COOLEY'S CYCLOPÆDIA

OF

PRACTICAL RECEIPTS

AND

COLLATERAL INFORMATION

IN THE

MANUFACTURES, PROFESSIONS, AND TRADES,

INCLUDING

Medicine, Pharmacy, and Domestic Economy:

DESIGNED AS A COMPREHENSIVE

SUPPLEMENT TO THE PHARMACOPŒIA

AND

GENERAL BOOK OF REFERENCE

FOR THE MANUFACTURER, TRADESMAN, AMATEUR, AND HEADS OF FAMILIES.

FIFTH EDITION,

REVISED AND PARTLY REWRITTEN BY

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PREFACE.

THE design of the present work is briefly, but not completely expressed its title-page. Independently of a reliable and comprehensive collection formulæ and processes in nearly all the industrial and useful arts, it ntains a description of the leading properties and applications of the bstances referred to, together with ample directions, hints, data, and ied information, calculated to facilitate the development of the practical value of the book in the shop, the laboratory, the factory, and the usehold. Notices of the substances embraced in the Materia Medica our national pharmacopœias, in addition to the whole of their prepaions, and numerous other animal and vegetable substances employed medicine, as well as most of those used for food, clothing, and fuel, th their economic applications, have been included in the work. The nonymes and references are other additions which will prove invalule to the reader. Lastly, there have been appended to all the incipal articles referred to, brief, but clear directions for determining eir purity and commercial value, and for detecting their presence and oportions in compounds.

The sources from which I have derived the vast mass of materials ming this volume are such as to render it deserving the utmost confiice. I have invariably resorted to the best and latest authorities, and ve consulted almost innumerable volumes, both British and foreign, ring its compilation. Secondary channels of information have been rcely ever relied on, when original authorities were within my reach. large portion of the work has been derived from my personal expence and observations in the departments of applied chymistry and giène, and from the processes of various laboratories and manufactories, ny of which I can the more confidently recommend, from having en inspected or witnessed their employment on an extensive scale. indiscriminate adoption of matter, without examination, has been formly avoided, and in no instance has any formula or process been itted into this work, unless it rested on some well-known fact of nce, had been sanctioned by usage, or come recommended by some pectable authority. The settlement of doubtful or disputed points often occupied me a greater number of hours, and not unfrequently, eater number of days, than that of the lines of letter-press which vey the results to the public. In all cases precedence has been

PREFACE TO THE FIFTH EDITION.

ALTHOUGH, in preparing a fifth edition of this work, it has been ected to a thorough and complete revision, every endeavour has n made to carry out the original intentions of the author. The arts sciences are, however, so continuously undergoing change that, in r to bring the information given up to the level of the knowledge ie present day, very many excisions, alterations, and additions have n rendered necessary. Thus, in the chemical portions of the work ubjects of practical importance have been retained, corrected, and d to, while those which possess only a purely scientific interest have, he most part, been expunged; to the name of every substance of olished composition a formula has been attached, and the articles hemical doctrine have been re-written. In carrying out this part y duty I have been most efficiently aided by my talented assistant, Edmund Neison.

ie value of this Cyclopædia to the pharmaceutist will, it is hoped, ncreased by the additions which have been made from the British, an, and United States Pharmacopœias.

ie length and number of the articles on the recognition and tre t of disease have been reduced, as it was thought that those of ious editions might, in many instances, be productive of more than benefit to those for whom such information was compiled, ely, emigrants and others not within the reach of the surgeon or ician.

very article on excisable or duty-bearing commodities has been fully revised or re-written by my able and experienced friend, Mr. iam Harkness, of the Inland Revenue Department.

the previous editions the use of different types was not only exten- y, but apparently, indiscriminately indulged in, consequently the

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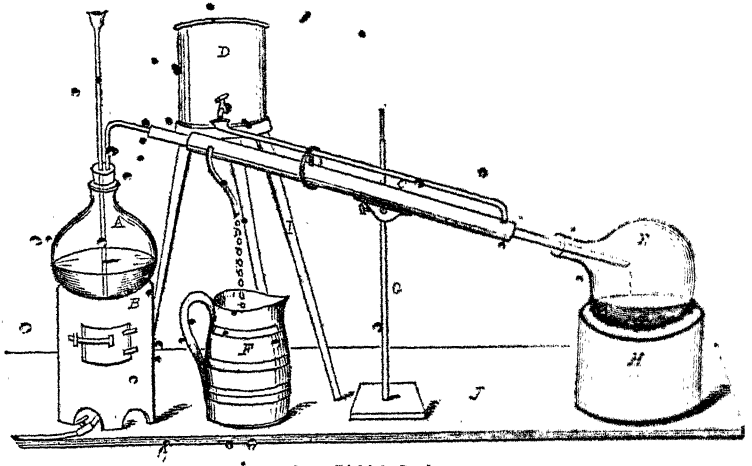
any trace of 'free sulphuric acid' on evaporation. After sufficient repose it is carefully decanted for use. An excellent *commercial* STRONG ACETIC ACID is thus obtained, *without distillation*, owing to the insolubility of sulphate of soda in acetic acid; and from which GLACIAL ACID may be procured by refrigeration. If, however, the process be badly managed, or the proportions of the ingredients be not carefully observed, the product will be contaminated with either a little sulphuric acid or saline matter. It is also important to the success of this process, that it be performed in a cool *apartment*, and in *well-covered vessels*. Per-



(*C.*) A Liebig's Condenser.
(The other *reference letters* are self-explanatory.)

fectly pure acetic acid may easily be obtained by rectification from this acid. The above plan of superseding a troublesome distillation is one of the greatest improvements yet introduced into the manufacture of acetic acid.

4. (Liebig's process.) Pure *acetate of soda*, thoroughly dried and finely powdered, 3 parts, is placed in a capacious retort, and pure *concentrated sulphuric acid*, 9·7 parts, poured over it through the tubulature. One eighth of the acetic acid passes over by the heat developed by the reaction of the ingredients. The heat of a sand bath is next applied and continued until the contents of the retort become quite liquid. The distillate, carefully rectified, yields two parts of pure acid, containing only 20 per cent. of water. On exposing the latter portion which comes over in a closed vessel to a temperature below 40° Fahr., crystals of *hydrated acetic acid* are deposited. The weaker, or liquid portion, being poured off, the crystals are again melted and re-crystallised by cooling. The crystals of the last operation, separated from the liquid, and carefully drained in a cool and closed vessel, are *perfectly pure* HYDRATED ACETIC ACID.

Obs. The above is an excellent process for obtaining a chemically pure acid. The excess of sulphuric acid left from the process may be recovered by distillation; or the whole residuum may be employed in a second distillation with fresh acetate.

Although a retort is recommended by Liebig for the distillation, and is usually adopted, on the small scale, for the purpose, a flask closed by a cork perforated by two tubes, as exhibited in the *engr.*, will be found more convenient and safe; as the product is thus less likely to be contaminated by the 'spirting' of the ingredients over the brim of the vessel. The heat of a diffused gas-flame, may also be often advantageously substituted for a sand bath.

b. From ACETATE OF POTASH:—

1. *Acetate of potash* (fused and powdered) is placed in a still, or other suitable vessel, and 50% of the strongest *sulphuric acid* ('oil of vitriol' of fully 1·84 sp. gr.) being added, the mixture is distilled to dryness, as before. The product is 50 to 51% of the weight of the acetate employed, with a sp. gr. of about 1·0735 to 1·074, containing about 66% of *anhydrous acetic acid*, or nearly 80% of ordinary *glacial acid*. By rectification from a little *dried acetate of lead* a perfectly pure acid of almost any strength may be obtained. The ingredients are nearly in equiv. proportions.

c. From ACETATE OF LEAD:—

1. (Ure.) Take of *dried acetate of lead*, 4 parts; *strongest oil of vitriol*, 1 part. Distil slowly to dryness. Nearly equal to the last.

2. (Liebig.) *Acetate of lead*, 3 parts; *sulphuric acid*, 8 parts: as before.

3. (Dollfuss' *Concentrated Acetic Acid.*) Take of *dried acetate of lead*, 12 oz.; *sulphuric acid*, 6 oz.: distil 7 ounces.

d. From ACETATE OF LIME:—

1. (Christ.) Raw *acetate* or *pyrolignate of lime* (prepared by Völckel's process), 100 parts, is mixed with *hydrochloric acid* (20° Baumé, or sp. gr. 1·1515), 120 parts; and after 12 hours, distilled in a copper vessel, with a gradually applied heat. The *product* is 100 parts or *lbs.* of *acetic acid* of 8° Baumé (sp. gr. 1·0556), containing about 47% of hydrated acid, only slightly coloured and empyreumatic, fit for various manufacturing purposes. The advantage of this process is the low price of hydrochloric acid, and the product not being contaminated with sulphuric or sulphurous acid.

Obs. It will be found that *pyroligneous of lime* generally contains 60% to 70% of neutral acetate; but should it contain either more or less, a proportionate quantity must be employed. When the proper proportions are used the distillate gives only a scarcely perceptible turbid cloud when tested with nitrate of silver. If the hydrochloric acid used has the sp. gr. 1·16, a less quantity being employed, the product will have the sp. gr. of 1·058 to 1·061, and will then contain from 48 to 51% of the *monohydrate*, or 41 or 42% of *anhydrous acetic acid*. The resin sometimes found floating on the mixed ingredients should be carefully removed, by skimming, before distillation.

As acid of the above strength is rarely required, and as the distillation is more easily conducted when the ingredients are less concentrated, a little water may be conveniently added either before or towards the end of the distillation. Hence the following proportions have been recommended:—

2. (Völckel.) *Acetate of lime* (as last), 100 parts; *hydrochloric acid* (sp. gr. 1·16), 90 to 95 parts; *water*, 25 parts; mix, and proceed as before. *Prod.* 96 to 98 parts of an excellent acid, well adapted to trading purposes, having a sp. gr. about 1·050, and containing nearly 40% of *hydrated acetic acid*. It has been correctly remarked, that the acetic acid produced with hydrochloric acid, is always of better quality than that produced with sulphuric acid; being not only less coloured, but also entirely free from sulphurous acid. The distillation uniformly proceeds with ease and regularity, and the whole of the acetic acid passes over between 212° and 248° Fahr.; by which the danger of contamination with other products, resulting from a high degree of heat, is obviated.

3. An Acetic acid sufficiently strong and pure for many ordinary purposes may be obtained without distillation, by pouring *strong sulphuric acid*, 30 parts, diluted with *water*, 5 parts, on *well-dried acetate of lime*, 100 parts; digesting, with occasional agitation in a close vessel, decanting the clear liquid, and straining the remainder.

II. *From* the *Acetates* by *dry distillation* with a *sulphate*:—

a. From ACETATE OF LEAD:—

1. *Acetate of lead* (dried), 5 parts; and *sulphate of iron* (gently calcined), 2 parts; are separately powdered; and after thorough mixture, carefully distilled, by the heat of a sand bath, into a well-cooled receiver. An economical process for a strong acid, under certain circumstances; but one now seldom adopted.

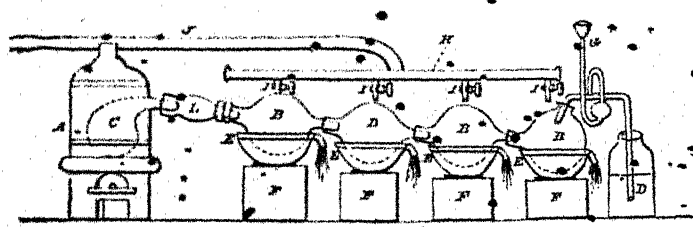
2. (Bardollier's *Strong Acetous acid.*) Dried *acetate of lead*, 10 *oz.*; *calcined green vitriol*, 12 *oz.*; as the last.

b. From the ACETATES OF COPPER:—By substituting *acetate* or *diacetate of copper*, in equiv. proportions, or better with excess of the sulphate. Seldom used.

c. From ACETATE OF POTASH, as the last.

III. From the *Acetates per se*:—

a. From ACETATE OF COPPER:—AROMATIC V.†; SPIRIT OF VERDIGRIS†; SPIRITUS VEN'ERIS†, L.; ESPRIT DE VENUS, Fr.; ACIDUM ACE'TICUM, Ph. L. 1787.). *Process.* Carefully dry *crystallised verdigris* (diacetate of copper) by a very gentle heat, and introduce it into a large stoneware retort



A, Furnace.
B B B B, Glass receivers.
C, Stoneware retort.
D, Bottle containing vinegar.
E E E E, Basins containing water.
F F F F, Supports for basins.
G, Welter safety-tube.
H, Supply-pipe of cold water.
I I I I, Cocks to supply water to the basins.
J, Water main.
L, Adopter connecting retort and globes.

(see *engr.*), the bottom of which has been previously coated with a mixture of *clay* and *horse-dung*, to render it more capable of standing the fire. Next place it in a suitable fur-

ration with hydrate of calcium 1·023, the sp. gr. of the *pure* vinegar would be 1·009, and that due to foreign matter ·005. For—

·028—·023 = ·005

and—

1·014—·005 = 1·009

The reason why *proof-vinegar* is called, in commerce, No. 24, is that 1 *fl. oz.* of it requires exactly 24 gr. of pure *anhydrous carbonate of soda* to neutralise it. *Weaker vinegars* are represented in the same 'notation' by the Nos. 22, 20, 18, &c., according to their respective strengths estimated by their saturating power.

ACÉTOLATS. [Fr.] *Syn.* ESPRITS ACÉTIQUES. In *French pharmacy*, medicated vinegars obtained by distillation.

ACÉTOLÉS. [Fr.] In *French pharmacy*, medicated vinegars obtained by maceration.

ACETOUS FERMENTATION. See ACETIFICATION.

ACETUM. [L.] Vinegar.

ACETYL. *Syn.* ACETYLE. A name originally given to a hypothetical body, having the formula C_2H_3, and regarded by Berzelius as the radical of the acetates and their congeners. The *acetyl* of Gerhardt (C_2H_3O) is, however, according to that chemist, the true radical of the acetates. Williamson, in order to remove the confusion of terms occasioned by the application of the same name two compounds of different composition, proposed the title of *othyl* for the radical C_2H_3O.

ACHAR. See PICKLES.

ACHILLE'INE (-kĭl-). A peculiar bitter principle obtained from *achillea millefolium* (Linn.), or yarrow.

A'CHOR (-kor). [Gr.] See SCALD-HEAD.

ACHROMAT'IC (ăk-rō-). *Syn.* ACHROMATIQUE. Fr. In *optics*, devoid of colour; bodies that transmit light without decomposition, and consequently, without the formation of coloured rings or fringes; applied to compound lenses, prisms, &c., and to instruments fitted with them.

ACHRO'MATISM. *Syn.* ACHROMATISME, Fr. In *optics*, the state of being achromatic; the absence of coloured fringes in the images of objects seen through a lens or prism.

Light is not homogeneous, but decomposable by refraction, absorption, or reflection, into coloured rays of unequal refrangibility. A ray of white light, in passing through a glass prism, is entirely separated into the coloured rays forming the '*prismatic spectrum*;' and when it passes through a lens, an analogous resolution into coloured rays still occurs, though not so readily observed, and that to an extent often incompatible with distinct vision. Now, if a *convex lens* be regarded as a number of prisms united by their bases round a common centre, and a *concave lens*, as a similar number of prisms with their apices in contact, the action of lenticular and prismatic glasses on light will be reduced to a common principle. A beam of light thrown on a simple converging lens not only suffers refraction at the spherical surface (SPHERICAL ABERRATION), but the different coloured rays of which it is composed, from the causes mentioned, being unequally bent or refracted, diverge from their original course (CHROMATIC ABERRATION), forming as many foci on the axis of the lens as there are colours, and fall separately, instead of together, on the eye or object which receives them. Hence arise the coloured fringes or halos that surround objects viewed through ordinary glasses, and which form the great impediments to the construction of *perfect* lenses. This effect, like the refractive power and focal distance, varies in degree in different diaphanous substances.

The *correction* of the *chromatic aberration* of *lenses* is commonly effected by combining two, or more, made of materials possessing different 'dispersive' powers. Thus, the spectrum formed by *flint glass* is longer than that formed by *crown glass*, for the same deviation. When the two are combined, so as to form a compound lens, the one tends to correct the 'dispersion' of the other. On this principle ACHROMATIC GLASSES are generally formed in this country. A *convex* lens of *crown glass* is combined with a weaker *concave* lens of *flint glass*, the latter counteracting the dispersion of the former, without materially interfering with its refractive power. The resulting combination is not absolutely achromatic but is sufficiently so for all ordinary purposes. According to Dr. Blair, a compound lens *perfectly* achromatic for the intermediate, as well as for the extreme rays, may be made by confining certain fluids, as *hydrochloric acid*, between two lenses of *crown glass*. In order to produce nearly perfect achromatism in the object-glasses of telescopes, microscopes, cameras, &c., a *concave* lens of *flint glass* is commonly placed between two *convex* lenses of *crown* or *plate glass*, the adjacent surfaces being cemented with the purest *Canada balsam*, to prevent the loss of light by reflection from so many surfaces.

Obs. The production of perfect achromatism in lenses is a subject not less fraught with difficulty than with practical importance to the astronomer, the mariner, the microscopist, and the photographer; and it has hence engaged the attention of the leading mathematicians and artists of Europe up to the present time. All the larger object-glasses lately manufactured are said to consist of only *two* lenses; the resulting achromatism proving sufficiently exact for all useful purposes. Those of recent production have come chiefly from the workshops of Dollond, of London, and the opticians of Bavaria and Switzerland. The *achromatism* of *prisms* depends upon the same principles, and it is effected in the same way as that of lenses.

ACIC'ULAR. Needle-shaped; slender or sharp pointed; spicular; in *botany*, applied to leaves, and in *chemistry*, to crystals. The last are also sometimes termed ACIC'ULÆ.

ACID. *Syn.* ACIDUM, L.; ACIDE, Fr.; ACIDO, Ital.; SÄURE, G. In *familiar language*, any substance possessing a sour taste. In *chemistry*, substances are said to be acid, or to have an acid reaction, when they are capable of turning blue litmus red. In *chemistry*, also, the term acid is applied to a very large class of compounds containing hydrogen (hydrogen salts), and in which one or more atoms of that element may be replaced by an equivalent quantity of a metal or other basic radical; *e.g.*—

1. The one atom of hydrogen in hydrochloric acid (HCl) may be replaced by sodium, producing the *salt* sodium chloride (NaCl).

2. The one atom of hydrogen in nitric acid (HNO_3) may be replaced by silver, producing the salt silver nitrate ($AgNO_3$).

3. One atom of hydrogen in acetic acid ($HC_2H_3O_2$)[1] may be replaced by the basic radical ammonium (NH_4), producing the salt ammonium acetate ($NH_4C_2H_3O_2$).

Acids which, like those mentioned in the foregoing examples, contain one atom of replaceable hydrogen are called *monobasic*; those which contain two such atoms (*e.g.* sulphuric acid, H_2SO_4; tartaric acid, $H_2C_4H_4O_6$),[1] *dibasic*; those which contain three such atoms (*e.g.* phosphoric acid, H_3PO_4; citric acid, $H_3C_6H_5O_7$),[1] *tribasic*; and so on with acids of higher basicity. Acids of greater basicity than unity are frequently termed *polybasic*.

Besides containing replaceable or basic hydrogen, acids are further characterised by the property of combining with alkaloids to form salts; *e.g.*—

Sulphuric Acid. Quinia.
$$H_2SO_4 + 2C_{20}H_{24}N_2O_2 =$$
Quinia Sulphate.
$$(C_{20}H_{24}N_2O_2)_2 . H_2SO_4$$

Acetic Acid. Morphia.
$$HC_2H_3O_2 + C_{17}H_{19}NO_3 =$$
Morphia Acetate.
$$C_{17}H_{19}NO_3 . HC_2H_3O_2$$

Dibasic Acids. See ACID.

Fatty Acids. Acids separable from fats or oils; *e.g.* stearic acid, oleic acid, butyric acid, &c.

Inorganic Acids. Same as MINERAL ACIDS (which *see*).

Mineral Acids. Acids chiefly or wholly derived from the mineral kingdom. In *medicine*, sulphuric, hydrochloric, and nitric acids, are commonly so called.

Monobasic Acids. See ACID.

[1] Symbols indicating the number of atoms of replaceable hydrogen occupy the foremost position in the formulæ of acids, as shown in the text.

Organic Acids. Acids formed by, or derived from, organic substances; *e.g.* acetic acid, tartaric acid, uric acid, &c.

Polybasic Acids. See ACID.

Pyro-acids. Acids resulting from the decomposition by heat of other acids; *e.g. gallic acid*, when heated, yields *pyro-gallic acid*.

Tribasic Acids. See ACID.

ACIDIFICA'TION. [Eng., Fr.] *Syn.* ACIDIFICA'TIO, L. In *chemistry*, the act, process, or state of acidifying, or of making, becoming, or impregnating with acid.

ACIDIM'ETER. *Syn.* ACIDOM'ETER; ACIDIME'TRUM, &c., L.; ACIDIMÈTRE, Fr. An instrument or apparatus employed in acidimetry.

The *ordinary acidimeters* of the *chemist* are small tubes, constructed to hold exactly 1000 grains of *distilled water*, at 60° Fahr., within the limits of their scale, which is accurately graduated into 100 divisions. They are used to contain the *alkaline solutions* (TEST-LIQUORS, NORMAL or STANDARD SOLUTIONS) employed in the following processes.

Beaumé's Acidimeter, and others of the same class, are HYDROMETERS, and are described under that 'head.'

ACIDIM'ETRY. *Syn.* ACIDOM'ETRY; ACIDIME'TRIA, &c., L.; ACIDIMÉTRIE, Fr. The estimation of the strength or quantity of acid, in a free state, contained in any liquid. It is the *reverse* of 'alkalimetry.' Acidimetrical assays are understood to refer to the relative strengths of the same acids (*i.e.*, the quantity of real acid of the *same* kind contained in the solutions examined), and not to the comparative strengths of acids of *different* composition or names.

Acidimetrical processes. These are founded chiefly on the capacity of the acids to saturate the bases; and, in some of the liquid acids, on the specific gravity.

a. VOLUMETRICALLY:—

1. The *sample of the acid* to be *examined* (100 gr., or any convenient aliquot part thereof) is placed in a suitable glass vessel, and if it be one of the stronger acids, diluted with six or eight times its weight of *water*, or if solid (as oxalic or citric acid), dissolved in a like quantity. This liquid is then *exactly* neutralised with an alkali.

This point is usually determined, by the addition of a small quantity of litmus solution, which turns just blue when the solution is neutralised, but when a carbonate is used for the alkaline solution, the acid must be boiled a short time after each addition to expel the carbonic acid. The quantity of the alkaline solution consumed for this purpose, represents an *equivalent quantity* of *acid*, and thus gives us the *acid content* of the sample under examination. The common practice is to dissolve *one equivalent* of the *alkaline test* in grains or grammes in *water*, and to make

up the solution to *exactly* 1000 parts by measure (*i.e.*, 1000 'water-grains' or grammes), so as to accurately fill the 100 divisions of an *acidimeter*; when the *quantity*, in grains or grammes, of the *sample tested*, bears the same proportion to the *equivalent number* of the *acid* under examination, that the *number* of *acidimeter divisions* of the *test-liquor* consumed bear to the *per-centage of acid sought*. Thus:—suppose 50 gr. of a sample of *sulphuric acid*, take 25 *acidimeter divisions* (300 parts or water-grains measure) of the *test-liquid* to neutralise it, what is its content of real acid?

The equivalent of sulphuric acid is 49 (half its atomic weight); so, by the rule of proportion,

$$50 : 49 :: 25 : 24\tfrac{1}{2}$$

It therefore contains $24\frac{1}{2}$ parts of real sulphuric acid, in 50.

If the 1000 parts or grain-measures, instead of the number of the acidimeter divisions, be taken for the calculation, it will, of course, be necessary to point off the first right-hand figure of the result as a decimal. Thus; repeating the above example—

$$50 : 49 :: 250 : 24{\cdot}5$$

Or, since the *equivalent* of the *test-liquid* is 100, it will bear the same proportion to the *equiv.* of the *acid examined*, as the *number* of the *acidimeter divisions* of the test-liquid consumed in neutralising 100 gr., do to the *per-centage* sought. Thus:—50 gr. of *hydrochloric acid* take 45 *acidimeter divisions* to effect neutralisation, what is its real strength?—The *equiv.* of hydrochloric acid is 36·5: therefore—

$$100 : 36{\cdot}5 :: 45 : 16{\cdot}425\%$$

and, since only 50 gr. (instead of 100 gr.) were examined,—

$$16{\cdot}425 \times 2 = 32{\cdot}85\%$$

Some operators prefer employing 100 gr. instead of the *equivalent* weights of the given tests in making their *test-solutions*, in which case *each* gr. or 1000th part represents $\frac{1}{10}$th. and *each* acidimeter degree 1 gr. of the alkali or carbonate employed; when a similar proportion will obtain to that first above given.

In *technical analysis* it is more convenient if the *number* of *acidimeter divisions* of the 'test-liquid' consumed express the per-centage strength of the acid, *without* further calculation. For this purpose the *number* of *grains* of the *acid* taken for the assay should correspond to the *equivalent number* of such acid (see *Table* I., below); or to some convenient aliquot part of it, as the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, or $\frac{1}{10}$th; the per-centage answer, in the last case, being doubled, quadrupled, &c., according to the aliquot part taken. The reason of this is obvious.

For the test-solutions, ammonia, and the dry and crystallised carbonates and bicarbonates of potash and soda, are used, and are made by dissolving in water their constituents except ammonia, of which 1000 grains, or one litre, of solution of specific gravity 0·992 contains exactly one equivalent.

53 grains (or grammes) of pure anhydrous carbonate of soda, prepared by gradually heating to redness the crystallised salt, constitute one equivalent (half the atomic weight), and 69 grains (or grammes) of pure dry carbonate of potash. Of the crystallised salt 143 grains of carbonate of soda will be required, and 84 grains (grammes) of the crystallised bicarbonate of soda, and 100 of the crystallised bicarbonate of potash. Occasionally solutions containing in one thousand parts, 50 of pure carbonate of lime or chalk, or 28 of pure caustic lime, are used.

Besides these, a process known as Kiefer's is practised, and an *ammoniacal solution of oxide of copper* is employed as the 'test-liquor;' and the 'point of neutralisation' is known by the turbidity observed as soon as the free acid present is completely saturated.

The *normal solution* or *test-liquor* is prepared by adding to an aqueous solution of *sulphate of copper*, pure *ammonia water*, until the precipitate, which at first forms, is *just* redissolved, carefully avoiding excess. Or better, by adding a rather strong solution of *sulphate of copper*, to a quantity of a rather strong *solution* of *ammonia* containing exactly 17 gr., or one equiv. of *pure ammonia*, as long as the precipitate which forms is redissolved on agitation; the resulting liquid being afterwards diluted with pure *distilled water*, until it accurately measures 1000 water-grains, or fills 100 divisions of an acidimeter, at 60° Fahr. In either case, the strength of the resulting 'test-solution' must be carefully determined by means of *standard sulphuric acid*, and adjusted, if necessary.

This method answers well with all the stronger acids (*excepting* oxalic acid), even when dilute; and it has the advantage of not being affected by the presence of a neutral metallic salt with an acid reaction, as sulphate of copper, or of zinc.

Besides this process a solution of lime in sugar may be used, as proposed by M. Peligot, and made as follows:—

Pure caustic lime is carefully slaked by sprinkling with water, and 50 grains (or grammes), made up by water to a milky solution, and 100 grains of pure sugar candy dissolved in 100 grains of water, are added, and the whole well shaken. It is allowed to settle in a closed bottle, and the clear solution poured off and diluted, until 1000 grains neutralise exactly 100 grains of pure hydrochloric acid of sp. gr. 1·1812. Of course it only answers with acids whose calcium salts are readily soluble in water.

TABLE I.—*Weights of the respective acids equivalent to the given weight of the principal bases, hydrogen being taken as unity.*

17 gr. of pure ammonia.[1]	are exactly neutralised by	51	Acetic acid (anhydrous).
31 „ anhydrous soda.[2]		60	„ „ (crystallised or glacial).
40 „ hydrate of soda.[2]		99	Arsenious acid (dry).
53 „ dry carbonate of soda.[3]		35	Boracic acid (anhydrous).
143 „ crystallised carbonate of soda.[4]		62	„ „ (crystallised).
84 „ crystallised bicarbonate of soda.		22	Carbonic acid (dry).
47 „ anhydrous potassa.[2]		67	Citric acid (crystallised).
56 „ hydrate of potassa.[2]		85	Gallic acid (dried at 212°).
69 „ dry carbonate of potassa.[3]		94	„ „ (crystallised).
100 „ crystallised bicarbonate of potassa.		127½	Hydriodic acid (dry or gaseous).
50 „ pure chalk. / pure marble.		27	Hydrocyanic acid (anhydrous).
28 „ pure caustic lime.		36½	Hydrochloric acid (dry or gaseous).
37 „ hydrate of lime (fresh).		109	„ „ (liquid, sp. gr. 1·162).
44 „ dry carbonic acid (when the bicarbonate of potassa or soda is used for testing in the process of Fresenius and Will).		166½	Iodic acid.
		54	Nitric acid (anhydrous).
		63	„ „ (liquid, *monohydrated*, sp. gr. 1·517 to 1·521).
		67½	„ „ (liquid, *sesquihydrated*, sp. gr. 1·503 to 1·504).
		72	„ „ (liquid, *binhydrated*, sp. gr. 1·486).
		90	„ „ (liquid, sp. gr. 1·42).
22 „ dry carbonic acid (when a dry carbonate is used).		36	Oxalic acid (anhydrous).
		63	„ „ (crystallised).
		72	Phosphoric acid (anhydrous).
		81	„ „ (glacial).
		50	Succinic acid (dry or anhydrous crystals).
		59	„ „ (ordinary crystals).
		40	Sulphuric acid (anhydrous).
		49	„ „ (liquid, *monohydrated*, sp. gr. 1·8485).
		75	Tartaric acid (crystallised).
		212	Tannic acid (carefully dried).

b. GRAVERMETRICALLY :—

The *test-liquors* or *standard solutions* of the above methods are made up so as to *weigh* exactly 1000 grains, instead of to 'measure' 100 acidimeter-divisions. Every grain of the *test-liquor* thus represents $\frac{1}{10}$th gr. of alkali; and every 10 gr., 1 gr. of alkali; or respectively, $\frac{1}{10}$th per cent., and 1 per cent. The vessel used for containing the solutions is carefully weighed whilst empty, and 1000 gr. being placed in the opposite scale, the *test-solution*, containing *exactly* one *equivalent* of *base*, is poured in, and the whole made up with *distilled water* (if necessary) so as to restore the balance to an equilibrium. After the process of neutralisation, the acidimeter, with its contents, is again placed in the scales; its previous weight still remaining there. The *number* of *grains* required to restore the *equilibrium* of the balance (*i.e.*, the loss of weight), gives the *exact weight* of the *test-liquor* consumed. In all other respects the process is the same as in the 'volumetrical method' already described.

Another method for estimating the strength of the sample of acid is by weighing the amount of carbonic acid expelled during saturation. (Method of Fresenius and Will.) This depends on the *weight* of *gaseous carbonic acid* which a given weight of the acid-sample under

[1] 1000 water-grains measure of pure *liquor of ammonia*, sp. gr. 0·992, contain exactly 17 gr., or 1 equiv. of pure *gaseous ammonia*. A standard liquor of this strength may be most conveniently prepared by cautious dilution of a stronger solution, until a hydrostatic bead, corresponding to the sp. gr., floats indifferently in the *middle* of the new solution, at 60° Fahr. By keeping *two* hydrostatic beads in the solution—the one made *barely* to float, and the other *barely* to sink—we shall always be able to detect any change of strength or temperature which it may suffer; since the "loss of a single hundredth part of a grain of ammonia per cent., or the difference of a single degree of heat, will cause the beads to" vary their positions. To preserve its integrity it must be kept in a well-stoppered bottle. (See *below*.)

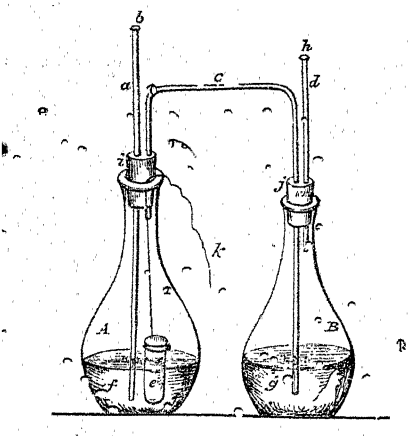
[2] These substances, as well as 'test-solutions' containing them, must be perfectly free from carbonic acid, and must be carefully preserved to prevent the absorption of carbonic acid from the atmosphere. Mohr states that a dilute solution of either of them is best preserved in a flask or bottle well closed with a cork fitted with a small bulb tube (resembling a chloride of calcium tube), filled with a finely triturated mixture of *sulphate of soda* and *caustic lime*, and bearing a very thin open tube in the exit aperture. Fresenius, and most other foreign chemists, prefer 'test-solutions' of pure soda. With test-solutions containing caustic alkalies, exact neutralisation of an acid is not only more easily effected, but more readily perceived, particularly when either solution is tinted with litmus.

[3] Prepared by gradually heating the pure *crystallised carbonate* to redness. From being uniform in composition, and easily procured or prepared, they are much employed; preference being usually given to the soda-salt.

[4] The crystals must be free from attached water, but not the least effloresced.

examination is capable of expelling from pure bicarbonate of soda (or of potash), which is estimated by the *loss of weight* in the acidimeter, or apparatus, after the gas, rendered perfectly dry by passing through sulphuric acid, has escaped into the air.

Oper. A determined amount of the *acid under examination* is accurately weighed into the flask *A* (see *engr.*); and if it be a concentrated acid, or a solid, it is mixed with or dissolved in 6 or 8 times its weight of *water*. The little glass tube (*e*) is then nearly filled to the brim with *pure bicarbonate of soda*, in powder, and a fine silken thread is tied round the neck of the tube, by means of which it can be lowered down into the flask (*A*), so as to remain perpendicularly suspended when the cork is placed in the latter; the cord being held between the cork and the mouth of the flask. The flask (*B*) is next about half filled with *oil of vitriol*, and the tubes being arranged in their places, as represented in the *engr.*; and time having been allowed for the mixture of acid and water to *cool completely*, after the increase of heat caused by mixing, the whole apparatus is very accurately weighed. The cork in the flask (*A*) is then slightly loosened, so as to allow the *little tube* containing the *bicarbonate of soda* to fall into the *acid*, and is again *instantly* fixed AIR-TIGHT in its place. The evolution of carbonic acid now commences, and continues until the acid in the flask (*A*) is neutralised. When this takes place, which is easily seen by no bubbles



(*A.*) A wide-mouthed flask, capable of holding 2½ to 3 oz., containing sample for trial (*f*).
(*B.*) Ditto, capable of holding 1½ to 2 oz., partly filled with oil of vitriol (*g*).
(*a, c, d.*) Tubes fitting air-tight in the flasks by means of the corks (*i*) and (*j*).
(*b.*) Piece of wax fitting air-tight on the end of (*a*).
(*e.*) Small tube capable of holding about 1 drachm of powdered *bicarbonate of soda* or *potash*.
(*h.*) Open end of the tube (*d*).
(*k.*) Silk cord fastened to the tube (*e*).

being emitted on shaking the apparatus, the flask *A* is put into hot water (120° to 130° Fahr.), and kept there, with occasional agitation, until the renewed evolution of gas has completely ceased. The little wax stopper is then taken off the tube (*a*), the apparatus taken out of the hot water, wiped dry, and suction applied, by means of a *perforated cork*, or a small *India-rubber tube*, and the mouth, to the end of the tube (*d*), until the sucked air no longer tastes of carbonic acid. The whole is then allowed to become *quite cold*, when it is replaced in the balance (the other scale still containing the original weights), and weights added to restore the equilibrium.

The loss of weight represents the exact quantity of dry carbonic anhydride, or anhydrous carbonic acid gas, that has been expelled from the bicarbonate of soda, by the action of the acid in the sample examined.

The quantity of *real acid* it contained is then deduced by the following calculation:—*One equivalent* of *gaseous carbonic anhydride*, or *anhydrous carbonic acid* (= 44) bears the same proportion to *one equivalent* of the *acid* in question, as the *amount* of the *carbonic anhydride expelled* does to the *amount* of the *acid* sought. Thus, suppose a *dilute sulphuric acid* expels 3 gr. of *carbonic anhydride*, the arrangement is—

44 : 49 :: 3 : 3·349

Consequently the sample operated on contained 3·5 (nearly) grains of true sulphuric acid.

Instead of the above calculation, we may multiply the *weights* of the *respective acids* required to *expel* 1 gr. *of carbonic acid* (as exhibited in the *following* table) by the *number of gr.* of *dry carbonic acid* evolved during the above operation. The *product* represents the *per-centage strength*, when 100 gr. of the acid have been examined. When only 50, 25, 20, or 10 gr. have been tested, this product must, of course, be doubled, quadrupled, &c., as the case may be.

TABLE II.

	Multipliers.
Acetic acid (anhydrous)	1·159
„ „ (hydrated or glacial) .	1·864
Citric acid (crystallised) . . .	1·523
Hydrochloric acid (dry or gaseous)	·829
„ „ (sp. gr. 1·16) .	2·478
Nitric acid (anhydrous)	1·227
„ „ (sp. gr. 1·5)	1·523
„ „ (sp. gr. 1·42)	2·045
Oxalic acid (crystallised) . . .	1·432
Sulphuric acid (anhydrous) . . .	·909
„ „ (sp. gr. 1·8485) .	1·114
Tartaric acid (anhydrous) . . .	1·500
„ „ (crystallised) . . .	1·705

Even this easy calculation may be avoided, in *technical analysis*, by simply taking for the assay, such a *weight* of the *respective acids* as is capable of disengaging *exactly* 10 gr. of *dry carbonic acid* from the *bicarbonate*. In this case, the *loss of weight* in grains, from the operation, multiplied by 10, at once indicates the exact *per-centage strength* sought.

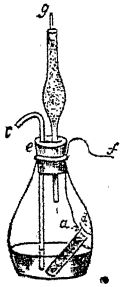
The *proper weight* of any *acid* to be taken to give per-centage results, is found by simply dividing *ten* times the *equiv.* of that *acid* by 44. For, taking sulphuric acid as an example, as— 44 : 49 :: 10 : 11·1318 or 11·13 nearly.

On this principle are obtained the *weights to be taken*, as given in—

TABLE III.

	Grains.
Acetic acid (anhydrous)	11·59
„ „ (hydrated or glacial) .	13·64
Citric acid (crystallised) . . .	15·23
Hydrochloric acid (dry or gaseous)	8·29
„ „ (sp. gr. 1·16) .	24·78
Nitric acid (anhydrous)	12·27
„ „ (sp. gr. 1·5)	15·23
„ „ (sp. gr. 1·42)	20·45
Oxalic acid (crystallised) . . .	14·32
Sulphuric acid (anhydrous) . . .	9·09
„ „ (sp. gr. 1·845) . .	11·14
Tartaric acid (anhydrous) . . .	15·00
„ „ (crystallised) . . .	17·05

2. A *convenient modification* of the *preceding method of acidimetry* consists in using the common apparatus figured in the margin, and employing *fused chloride of calcium* to dry the evolved carbonic acid gas, instead of concentrated sulphuric acid. The mode of conducting the process and obtaining the results is precisely the same as in that last explained, and need not therefore be repeated. In this case, however, suction must be applied to the small tube (*g*), instead of (*d*) in the preceding engraving.



(*a.*) Wide-mouthed flask, containing the sample for examination, hermetically stopped by the cork (*e*), and supporting the tubes (*b*) and (*c*).
(*b.*) Bulbous tube, containing fragments of *fused chloride of calcium*, terminating in a capillary tube (*g*).
(*c.*) Bent tube, reaching nearly to the bottom of the flask (*a*).
(*d.*) Small tube containing *bicarbonate of soda.*
(*e.*) Cork fitting bottle (*a*), and the tubes (*b*) and (*c*), hermetically.
(*f.*) Silken thread, suspending the small tube (*d*).

Obs. These methods, though apparently complicated, are not difficult to perform, when once well understood. The application of heat after the completion of the operation is indispensable, as if it were neglected, from 0·3 to 0·4 of a gr. of carbonic acid would be retained in the liquid. The *bicarbonate of soda* must be *pure*, and *perfectly free* from any *neutral carbonate* or *sesquicarbonate of soda.* To ensure this, the *bicarbonate of commerce* is reduced to a uniform powder, put into a glass jar, and covered with its own weight of *cold* distilled or rain water, and allowed to stand for twenty-four hours, with frequent stirring. It is then placed upon a funnel, the tube of which is stopped with loose cotton, so as to allow the lye to drain off. It is next washed several times with small quantities of *cold* distilled or rain water, and after being dried, by pressure between some sheets of blotting paper, without the aid of heat, is kept for use in a well-closed glass bottle. Before use, it may be tested to ascertain its purity. If *pure*, it *neither reddens turmeric paper*, nor gives a *brick-red precipitate* with a solution of *bichloride of mercury.* Pure *bicarbonate of potassa* may be used instead of bicarbonate of soda; but in either case it is always proper to use an excess, so as to leave some undecomposed carbonate, after the operation has ended. The presence of a little sodium chloride or sulphate in the bicarbonate will not interfere in the least, but the absence of every trace of neutral carbonate is a *sine quâ non.*

The two above methods of estimating the amount of acid are only superior to the generally used methods first described, when the presence of colouring matter interferes with the reaction of the litmus used to show the point of neutralisation.

Observations. When great accuracy is required in conducting the neutralisation of the solution in estimating volumetrically with litmus as an indicator, it is proper to prepare and keep *standard solutions* of *sulphuric acid* and *oxalic acid*, with which occasionally to try the alkaline test-liquor. The only difficulty in the process is to avoid over-saturation of the acid-sample. Great care must be taken not to exceed the *precise* point of neutralisation of the acid. After adding each portion of the test-liquor, the solution should be well stirred up, and as soon as the effervescence becomes languid the greatest caution must be observed in adding more. The proper point is arrived at when the liquid *ceases to redden litmus*, and *does not* alter the *colour* of *turmeric paper*; if it turns the latter *brown*, too much of the test-liquid has been added, and the operation becomes useless. Towards the end of the experiment, when great precision is required, a gentle heat may be applied, in order to expel the free carbonic acid in the liquor; but otherwise this is unnecessary. The peculiar soapy odour gradually acquired by the liquor as it nears saturation, will materially assist the operator when testing vinegars, and some of the other vegetable acids. A good method is to tint either the acid-sample or the test-liquid with a few drops of *litmus*, as noticed under ACETIMETRY; when the *reddish shade* will gradually deepen into 'purple,' or the *purple* into 'red,' as the point of saturation is approached; and the *blue colour* will be perfectly restored as soon as this point is reached. Dr. Ure recommends keeping the *ammonia-test* ready tinged with litmus; and the same applies to other test-liquors.

In *commerce*, the strength of acids is frequently reckoned with reference to a *standard*, termed 100 acidimetric degrees. This is taken from the circumstance that 91 gr. of commer-

cial *oil of vitriol*, of a sp. gr. of 1·845, exactly saturate 100 gr. of *dried carbonate of soda*. An acid requiring only 35, 50 or any other number of grains of the *carbonate* to saturate it, is in like manner termed of so many degrees strong; the number of grains representing in each case an equal number of degrees. This method originated with the French chemists, and though only conventional, and principally confined to commercial purposes, is especially adapted to practical men but little conversant with chemistry, yet very ready in retaining or calculating anything on the centesimal scale, from its similarity to monetary language and reckoning.

ACID'ITY. *Syn.* ACID'ITAS, L.; ACIDITÉ, Fr.; SÄURE, Ger. In *chemistry*, the state of being acid. In *physiology*, &c., the impression given to the organs of taste by tart or acid substances. Sourness. See FERMENTATION, MALT LIQUORS, WINES, &c.

Gas'tric Acidity. Acidity of the stomach; a common and well-known symptom of weak or disordered digestion.

Treat., &c. Small doses of *absorbents or antacids*, three or four times daily, to which some tonic bitter, as *calumba, cascarilla, chamomile, gentian*, or *orange-peel*, may be added. Stomachic stimulants, as *capsicum, ginger, mustard*, or *wine*, &c., taken with, or after, meals, are also useful. The *diet* should be light and nutritious; and acescent vegetables, overripe fruit, and weak new beer or other liquors, avoided as much as possible. The *bowels* should be kept regular, but not open, by the *occasional* use of mild aperients; as *rhubarb, aloes, castor oil, senna*, or *mercurial pill*, or compounds containing them. Excessive looseness or diarrhœa may be checked by a few doses of *carbonate of soda, chalk-mixture*, or *astringents*.

In INFANCY this affection is usually accompanied by restlessness, continual crying, drawing up of the legs forcibly towards the body, hiccups, vomiting, diarrhœa, sour eructations, griping pains, green stools, and debility; often followed, when the irritation is considerable, by convulsions. The *treatment* consists in relieving the bowels of all offending matter by a few doses of *rhubarb-and-magnesia*. The looseness or *diarrhœa* may be checked by a few small doses of *carbonate of soda* or *chalk-mixture*; or better, in an infant which is fed, by *lime-water* (1 or 2 fl. oz.) mixed with as much milk. Two or three drops of *caraway, cinnamon, dill*, or *peppermint water*, on sugar (not with the food), will tend to promote the expulsion, and prevent the undue generation of gases. The flatulence usually disappears with the acidity. The *occasional* administration of 1 to 3 gr. of *quicksilver-with-chalk* ('gray powder'), will frequently remove the complaint, and prevent its recurrence, when all other means fail. The *diet* of both nurse and infant should be carefully regulated. See ANTACIDS, DYSPEPSIA, &c.

ACIDULÆ. [L. pl.] In *medicine*, mineral waters rich in carbonic acid.

ACIDULATED. *Syn.* ACIDULATUS, L.; ACIDULÉ, Fr. Blended or flavoured with an acid; made slightly sour. See KALI (Acidulated), DROPS, LOZENGES, &c. In *chemistry*, the addition of an acid to a neutral or alkaline liquid until it reddens blue litmus paper.

ACIDUM. [L.] An acid.

ACOLOGY. *Syn.* In *medicine*, the doctrine of, or a discourse on, remedies, or the *materia medica*.

AC'ONITE (-nīte). *Syn.* ACON'ITUM, L.; ACONIT, Fr.; AKONITUM, EISENHUT, STURMHUT, Ger. Monkshood; wolfsbane. In *botany*, a genus of exogenous plants. *Nat. ord.*, Ranunculaceæ; *Sex. syst.*, Polyandria Trigynia. They are characterised by showy purple or yellow helmet-shaped *flowers* growing in panicles, deeply cut *leaves*, and perennial (usually) tap-shaped or tapering *roots*. The whole plant is highly poisonous, the roots being more poisonous than the leaves. In *medicine* and *materia medica*, the plant ACONITUM NAPELLUS (which *see*).

Symptoms. Numbness and tingling in the mouth and throat, which are parched; followed by giddiness, dimness of sight, and (sometimes) delirium, but seldom complete coma; there is numbness and tingling of the limbs, a loss of power in the legs, (in some cases) frothing at the mouth, severe abdominal pains, nausea, vomiting, and diarrhœa; tremors or twitchings of the voluntary muscles, (sometimes) convulsions (in animals, but not in man); sharp cries; pupil (*generally*) dilated, very rarely contracted; pulse, fitful and sinking; skin, cold and livid; difficulty of breathing; general prostration; loss of sensation or feeling; insensibility, general trembling, fainting, and sudden death. The eyes are often glaring; and, in some cases, the patient is completely paralysed, yet retains consciousness to the last. The case generally proves fatal in from 1 to 8 hours. If it last beyond this period there is hope of recovery. (Fleming.)

Treatment. See ALKALOIDS.

ACONITE LEAVES (B. Ph.). *Syn.* ACONITI FOLIA, L. The fresh leaves and flowering tops of *aconitum napellus*, Linn., gathered when about one third of the flowers are expanded, from plants cultivated in Britain.

Char. Leaves smooth, palmate, divided into five deeply cut wedge-shaped segments; exciting slowly, when chewed, a sensation of tingling. Flowers numerous, irregular, deep blue, in dense racemes.

Prep. Extractum aconiti.

ACONITE ROOT (B. Ph.). *Syn.* ACONITI RADIX, L. The dried root of *aconitum napellus*. Imported from Germany, or cultivated in Britain, and collected in the winter or early spring before the leaves have appeared.

Char. Usually from one to three inches long,

not thicker than the finger at the crown, tapering, blackish-brown, internally whitish. A minute portion, cautiously chewed, causes prolonged tingling and numbness.

Prep. Aconitia, the active principle; Linimentum Aconiti, 1 ounce to 1 fluid ounce; Tinctura Aconiti, 54½ grains to 1 fluid ounce.

ACONITI FOLIA. See ACONITE LEAVES.

ACONITI RADIX. See ACONITE ROOT.

ACONITIA. $C_{30}H_{47}O_7N$. (B. P.) *Syn.* ACONITIA, L. An alkaloid obtained from aconite.

Take of

Aconite root, in coarse powder	14 pounds.
Rectified spirit	of each a sufficiency.
Distilled water	
Solution of ammonia	
Pure ether	
Diluted sulphuric acid	

Pour upon the aconite root three gallons of the spirit, mix them well, and heat until ebullition commences; then cool and macerate for four days. Transfer the whole to a displacement apparatus, and percolate, adding more spirit, when requisite, until the root is exhausted. Distil off the greater part of the spirit from the tincture, and evaporate the remainder over a water bath until the whole of the alcohol has been dissipated. Mix the residual extract thoroughly with twice its weight of boiling distilled water, and when it has cooled to the temperature of the atmosphere, filter through paper. To the filtered liquid add solution of ammonia in slight excess, and heat them gently over a water bath. Separate the precipitate on a filter, and dry it. Reduce this to coarse powder, and macerate it in successive portions of the pure ether with frequent agitation. Decant the several products, mix, and distil off the ether until the extract is dry. Dissolve the dry extract in warm distilled water acidulated with the sulphuric acid; and, when the solution is cold, precipitate it by the cautious addition of solution of ammonia diluted with four times its bulk of distilled water. Wash the precipitate on a filter with a small quantity of cold distilled water, and dry it by slight pressure between folds of filtering paper.

Characters and Tests. A white, usually amorphous, solid, soluble in 150 parts of cold, and 50 of hot water, and much more soluble in alcohol and in ether; strongly alkaline to reddened litmus, neutralising acids, and precipitated from them by the caustic alkalies, but not by carbonate of ammonia or the bicarbonates of soda or potash. It melts with heat, and burns with a smoky flame, leaving no residue when burned with free access of air. When rubbed on the skin it causes a tingling sensation, followed by prolonged numbness. It is a very active poison.

ACONITIC ACID. (Identical with *Pyrocitric Acid.*) An acid extracted by Peschier from *aconitum napellus*, and by Bracconnot from *equisetum fluviatile*. It exists in these plants chiefly in the form of aconitate of calcium. *Properties.* A white, colourless, semicrystalline mass.

ACONITINA. See ACONITIA.

ACONITINE. See ACONITIA.

ACONI'TUM. [L.] Aconite. The pharmacopœial name of *aconitum napellus* (see *below*).

Aconitum Ferox. (Ind. P.) *Habitat.* Temperate and sub-Alpine Himalaya, at 10,000 to 14,000 feet elevation, from Gurhwal to Sikkim.

Officinal part. The dried root (*Aconiti ferocis Radix*), in common with those of other Himalayan species, viz., *aconitum napellus*, *a. palmatum*, and *a. luridum*, constitutes the drug well known in the bazaars of Upper India under the Hindostani name of *Bish* or *Bikh*.

It occurs in the form of tuberous roots of a more or less conical form, from two to three inches in length, and from half an inch to one inch in thickness at their upper end. They have usually a shrunken appearance, and are covered with a dark shrivelled bark; fracture shining and resinous; sometimes waxy, varying in colour from pale to deep brown. Some specimens are white and spongy; and these, it is asserted, are superior in activity to the more compact kinds. Inodorous; taste at first slightly bitter, leaving a peculiar sense of numbness on the tongue and fauces. Active principle, *aconitia*.

Medical properties and uses. Similar to those of *aconitum napellus* of Europe. *Preparations.* This root may be advantageously used for the manufacture of aconitia, the proportion of this alkaloid being much larger than in the European drug; and also for the preparation of Linimentum Aconiti. From its greater activity, however, it is unsuited for the preparation of this tincture, which is intended for internal use.

Aconitum Heterophyllum. (Ind. P.) *Habitat.* Western temperate Himalaya, at 8000 to 13,000 feet elevation; from Indus to Kumaon. *Officinal part.* The dried root (*Aconiti heterophylli Radix*). Ovoid tuberous roots, tapering downwards to a point, from one to one and a half inches or more in length, and from three eighths to half an inch in thickness. The surface, which is covered with a thin greyish epidermis, is slightly wrinkled longitudinally, and marked here and there with root scars. It is inodorous, and of a bitter taste, devoid of acridity. Does not contain aconitia. It may be readily distinguished from other roots sold in the bazaars under the same vernacular name (Atis) by its characteristic bitterness. *Properties.* Tonic and antiperiodic. It may be administered internally with safety, as it contains no poisonous principle. *Therapeutic uses.* In convalescence after debilitating diseases, and in intermittent and other paroxysmal fevers, it has been found an efficient remedy. *Doses.* Tonic, 5 to 10 grains thrice daily; antiperiodic, 20 to 30 grains of the powdered root every three or

four hours, irrespective of the presence of pyrexia.

Aconitum Napell'us. [Linn.] *Syn.* ACONI'TUM, Ph. L., E., & D.; ACONIT NAPEL, CHAPERON DE MOINE, Fr.; EISENHUT, BLAUER-STURMHUT, Ger. Early blue wolfsbane, or deadly aconite. *Hab.* Various parts of Europe; grows wild in England, flowering in June and July. The *fresh and dried leaves* (ACONITI FO"LIUM), Ph. L. & E. The *root* (ACONITI RA'DIX), Ph. L. & D. This is the species of aconite ordered in the pharmacopœias, and commonly used in medicine. When chewed it imparts a sensation of acrimony, followed by a pungent heat of the lips, gums, palate, and fauces, which is succeeded by a general tremor and chilliness. The juice applied to a wound or the unsound skin, affects the whole nervous system. Even by remaining long in the hand, or on the bosom, it produces unpleasant symptoms. Fatal cases of poisoning, by eating the root in mistake for horseradish, have been common of late years.

The *leaves* should be gathered as soon as the flowers appear. The *root* should be taken up in autumn. When the whole plant is employed, it should be gathered as soon as the flowers begin to open. The strength (richness in aconitia) varies considerably with the time of the year. 1 *oz.* of the 'fresh root' contains ¼ to ¾ gr. of aconitia; 1 *lb.* of the dried English root contains from 12 to 36 gr. (Herapath). The *leaves* possess the greatest activity just before flowering; the *root*, after it. The root is at all times fully *six* times as strong as the leaves or herb. The wild plant contains much more aconitia than that which is cultivated. The herb, and all its preparations, lose their efficacy if long kept. The powder, more particularly, cannot be relied on.

Properties, Antidotes, &c. See ACONITE.

Tests, &c. See ACONITE.

Uses, &c. In *small doses* aconite is narcotic, powerfully diaphoretic, and sometimes diuretic; in *larger ones*, the symptoms are similar to those produced by *aconitia*. It acts as a powerful sedative on the heart's action, and destroys sensibility without disturbing the mental faculties. It has been given in chronic rheumatism, gout, paralysis, scirrhus, scrofula, cancers, venereal nodes, epilepsy, amaurosis, intermittents, &c.; but its exhibition requires the greatest possible caution. As a *topical benumber* it has been used with great advantage in painful affections depending on increased sensibility of the nerves. Externally, it "is most valuable for the cure of neuralgic and rheumatic pains. In *neuralgia*, no remedy, I believe, will be found equal to it. One application of the tincture produces some amelioration; and after a few times' use, it frequently happens that the patient is cured. In some cases, the benefit appears almost magical. In others, however, it entirely fails to give permanent relief." "I do not think that in any (case) it proves injurious." "When it succeeds, it gives more or less relief at the *first* application. When the disease depends on inflammation, aconite will be found, I think, an unavailing remedy." "In *rheumatic pains*, unaccompanied with local swelling or redness, aconite is frequently of very great service." (Pereira, iii, 691.) *Dose*, of the *powder*, 1 to 2 gr., gradually increased to 6 or 8. Dr. Stoerk was the first who gave wolfsbane internally, about the year 1762. It has since been successfully employed in Germany in cases of chronic rheumatism, gout, &c., some of which were of long standing and had resisted every other remedy. In England it has been less extensively used.

Aconitum Panicula'tum. Panicled wolfsbane; a species formerly ordered in the Ph. L.; and, with *a. napellus*, also in the Ph. U. S. It is less active than the officinal species.

A'CORN. *Syn.* GLANS QUER'CUS, L. The seed or fruit of the oak. In the early ages of the world, acorns probably formed one of the principal articles of the food of man. (Ovid, *Met.*, i, 106; Virgil, *Georg.*, i, 8; &c.) In modern times, during periods of scarcity, they have been consumed as food on the Continent. Besides starch, they contain a peculiar species of sugar, which crystallises in prisms, and is unfermentable; they also contain tannic and gallic acids. Mannite and dulcose are the substances which it most nearly resembles. (M. Dessaignes.) During the autumn, acorns are said to be sometimes poisonous to cattle and sheep. Supposed cases of so-called acorn poisoning are best treated by withdrawing the supply of acorns, or removing the animals from the pastures on which the acorns fall, and by the administration of aperients, alkalies, and stimulants.

ACO'RUS CALAMUS. See SWEET FLAG.

ACOTYLE'DONS (-ko-te-lē'-). *Syn.* ACOTYLE'DONES (-dŏn-ēz; L., prim., Gr.), Jussieu; ACOTYLÉDONS, Fr.; OHNE SAMENLAPPEN, Ger. In *botany*, plants whose seeds are not furnished with distinct cotyledons or seed-lobes. *Acotyledonous plants* form one of the two great divisions of the vegetable kingdom, according to the natural system. They are remarkable by increasing chiefly in length, by additions to their end; and not by additions to the outside, as in Exogens; or to the inside, as in Endogens. They are also termed ASEX'UAL and FLOWERLESS PLANTS, and answer to the CRYPTOGAMIA of the Linnean system. See ACROGENS, CELLULARES, THALLOGENS, &c.

ACOUS'TICS (-kow'-). The science of audition and sound; that branch of *physics* which treats of their causes, nature, and phenomena. The doctrine of the production and transmission of sound is termed DIACOUS'TICS; that of reflected sound CATACOUS'TICS.

Acoustics. In *medicine*, remedies employed to relieve deafness.

AC'RID. *Syn.* AC'RE, AC'RIS, L.; ACRE (âcre), Fr.; BEISSEND, SCHARF, Ger. In *chemistry* and *medicine*, sharp, pungent, acrimonious. Acrid

substances are such as excite a sensation of pungency and heat when tasted, and which irritate and inflame the skin; as *mustard, turpentine, cantharides*, &c.

ACRIDITY. *Syn.* ACRETÉ, Fr.; ACRITUDO, L. The quality of being acrid.

AC'RIMONY. *Syn.* ACRIMO'NIA, L.; ACRIMONIE, ACRETÉ, Fr.; SCHARFE, Ger. In *medicine* and *chemistry*, the quality or property of inflaming, irritating, corroding, dissolving, or destroying other bodies.

ACROGENS. *Syn.* ACROGENÆ, L.; ACROGÈNES, Fr. In *botany*, acotyledonous or cryptogamic plants, in which stems and leaves, or an organisation approaching leaves, are distinguishable; which have stomates or breathing pores on their surface, are propagated by spores, and increase by the growth of the stem at the point only. *Ferns* and *club-mosses* are examples of this class of plants.

AC'ROSPIRE (-spīre). *Syn.* ACROSPI'RA, L.; PLUMULE, Fr.; BLATTKEIM, Ger. The shoot or sprout of a seed, when it begins to grow; the part of a germinating seed termed the plume, or plumula.

When the growth of a seed begins to be developed, the germ, from which the stem originates, shoots forth under the form of a delicate curved fibre, which, gradually bursting its covering, makes its appearance at the end of the seed. The fibrils of the *radicle* first sprout forth from the tip of the grain; a white elevation appears, that soon divides into three or more radicles, which rapidly grow larger, and are succeeded by the plumula, which peeps forth at the same point, in the form of a pale green leaflet, which, twisting thence beneath the husk to the other end of the seed, ultimately bursts its prison-house, and becomes a perfect leaf. See GERMINATION and MALTING.

ACTINIC RAYS. See ACTINISM.

ACTINISM. *Syn.* ACTINIC RAYS; CHEMICAL RAYS. A term given to a supposed principle accompanying the heat and light of the sunbeam. Actinic rays chiefly exist beyond the violet extremity of the solar spectrum, and are characterised by the power of exciting chemical change, *e.g.*, the decomposition of certain silver salts (in photography); the combination of a mixture of chlorine and hydrogen, &c. The so-called vital functions of animals and plants are also greatly influenced by the actinic or chemical rays.

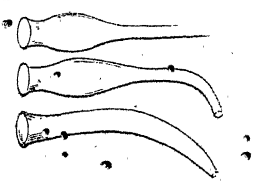
ACTINOGRAPH. An instrument for registering the intensity of the chemical influence (*actinism*) of the sun's rays.

AC'TUAL. Real, effectual, absolute; as opposed to that which is merely virtual or potential. In *surgery*, a red-hot iron, or any other heated body, used as a cautery, is termed the ACTUAL CAUTERY; whilst a caustic or escharotic so employed, is called the POTENTIAL CAUTERY.

ACTUAL CAUTERY. See ACTUAL.

ACUTE'. *Syn.* ACUTUS, L.; AIGU, Fr.; HEFTIG, HITZIG, SPITZIG, Ger. Sharp, pointed, sensitive. *Applied* to *the senses*, as *acute* hearing, eye-sight, &c. In *pathology*, diseases, exhibiting violent symptoms, and whose course is short, are said to be *acute diseases*.

ADAPTER. In *chemistry*, a tube placed between two vessels (commonly a retort and receiver) for the purpose of uniting them, or increasing the distance between them, so as to facilitate the condensation of vapour in distillation. (See *figure*.)



ADDER'S TONGUE. *Syn.* COMMON ADDER'S TONGUE; OPHIOGLOS'SUM VULGA'TUM, Linn. A perennial plant, of the *natural order* Filices (DC.), growing wild in England. It is found in our woods and pastures, and flowers in May and June. It was once used to form a celebrated traumatic or vulnerary ointment, and is still highly esteemed among rustic herbalists.

ADEPS. *Syn.* LARD. See ADEPS PRÆPARATUS, FAT, and LARD.

ADEPS BENZOATUS. *Syn.* BENZOATED LARD.

ADEPS PRÆPARATUS. *Syn.* AXUNGE; PREPARED LARD.

ADHE'SION (-hē-zhŭn). *Syn.* ADHÆ'SIO, L.; ADHÉSION, Fr.; ANHÄNGUNG, ANKLEBUNG, Ger. The act or state of sticking or being united.

Adhesion. In *physics*, the force with which bodies remain attached to each other when brought into contact; *e.g.*, ink *adheres* to paper, paint *adheres* to wood, &c. It differs from 'cohesion' in representing the force with which *different* bodies cling together; whereas cohesion is the force which unites the particles of a homogeneous body with each other; *e.g.*, particles of iron *cohere* and form a mass of iron; particles of water *cohere* and form a mass of water, &c.

Adhesion. In *pathology*, the morbid union, from inflammation, of parts normally contiguous but not adherent.

Adhesion. In *surgery*, the reunion of divided parts by the adhesive inflammation; as when incised wounds heal by what is termed the '*first intention*.'

ADHE'SIVE. *Syn.* ADHÆSI'VUS, L.; ADHÉSIF, Fr.; ADHÄSIVE, VERWACHSEND, Ger. In *pharmacy*, &c., having the quality or property of sticking or adhering. Hence *adhe'siveness*.

AD'IPOCERE (-sēre). *Syn.* GRAVE-WAX; ADIPOCE''RA, L.; ADIPOCIRE, Fr.; FETTWACHS, Ger. A substance resembling a mixture of fat and wax, resulting from the decomposition of the flesh of animals in moist situations, or under water. It is chiefly *margarate of ammonium*. Lavoisier proposed to produce this substance artificially, for the purposes of the

arts. Attempts have since been made to convert the dead bodies of cattle (carrion) into adipocere, for the purposes of the candle-maker and the soap-boiler, but without success. Besides, dead animal matter can be worked up more profitably than in making artificial adipocere.

Hatchettine or *rock-fat*, is sometimes called 'adipocere'; and *bog-butter* is a substance nearly similar to it.

AD'JECTIVE. *Syn.* ADJECTI'VUS, L.; ADJECTIF, Fr. In *dyeing*, depending on another, or on something else; applied to those *colours* which require a base or mordant to render them permanent. See DYEING.

AD'JUVANT. [Eng., Fr.] *Syn.* AD'JUVANS, L.; AIDANT, &c., Fr. Assistant; helping. (As a substantive—) In *prescriptions*, see PRESCRIBING (Art of).

Æ (ē). [L.] For words sometimes written with this initial diphthong, and not found below, look under **E.**

ÆGI'RINON (-jī'-). [Gr.] See OINTMENT.

ÆGYPTI'ACUM (-jĭp-tī'-). [Lat.] *Syn.* UNGUEN'TUM ÆGYPTIACUM, L. Oxymel or liniment of verdigris. The name originated with Hippocrates, who is said to have learned its composition in Egypt.

ÆOL'IPILE (-pīle). A hollow ball of metal, having a slender neck with a very small orifice, contrived to exhibit the conversion of *water* into *steam* by the action of heat, and to account for the natural production of winds. It was known to the ancients, is mentioned by Vitruvius, and was studied by Descartes and others. It has been used in *surgery* to produce *eschars*, in the same cases as moxas; the effect of the steam being limited by means of a piece of perforated pasteboard. When filled with alcohol, and the jet of vapour inflamed, it is sometimes employed as a blowpipe. M. Soyer used an apparatus of this kind to supply the heat in his portable furnace. The liquid, however, which he employed, was camphine.

A'ER (ā'-ĕr). [L., prim. Gr.] Air.

A'ERATED (ā'-ĕr-rāte-ĕd). In *chemistry*, &c., impregnated with *carbonic acid*. See ALKALI, LEMONADE, WATERS, &c.

AE''RIAL (ā-ēre'-ē-ăl). Belonging to the *air* or atmosphere; produced by, consisting of, depending on, or partaking of the nature of the *air*.

AERIFICA'TION (ā-ĕr-e-f. *Syn.* ÆRIFICA'TIO, L.; AÉRIFICATION, GAZÉIFICATION, Fr. In *chemistry*, the conversion of a body into gas.

A'ERIFORM (ā'-ĕr-) *Syn.* ÆRIFORM'IS, L.; AÉRIFORME, GAZÉIFORME, Fr.; LUFTFORMIG, &c., Ger. In *chemistry*, air-like, gaseous.

AEROL'OGY. *Syn.* ÆROLO'GIA, L.; AÉROLOGIE, Fr., Ger. In *physics*, a discourse or treatise of the *air*. In *physiology* and *hygiène*, the doctrine of the air, more especially with regard to its salubrity and action on organised beings.

AEROM'ETER. *Syn.* ÆROME'TRUM, L.; AÉROMÈTRE, Fr. An instrument used in aërometry.

AEROM'ETRY. *Syn.* ÆROME'TRIA, L.; AÉROMÉTRIE, Fr.; LUFTMESSKUNST, &c., Ger. In *chemistry* and *physics*, the art of measuring *gases*, and of determining their densities.

AERONAUT'ICS. *Syn.* AÉRONAUTIQUE, Fr. The art of sailing in, or of navigating the *air*. See BALLOONS.

AEROPHO'BIA. [L.] *Syn.* AÉROPHOBIE, Fr. In *pathology*, a dread of *air* (wind); a common symptom in hydrophobia, and occasionally present in hysteria and phrenitis.

AEROSTAT'ICS. *Syn.* AÉROSTAT'ICA, L.; AÉROSTATIQUE, Fr. That branch of *pneumatics* which treats of *air*, and other elastic fluids, in a state of rest.

AEROSTA'TION. [Eng., Fr.] *Syn.* ÆROSTA'TIO, L. The art of weighing the air; aërial suspension and navigation. See BALLOONS.

ÆRU'GO (ē-). [L.] The rust of brass, bronze, or copper; verdigris.

ÆSCULIN. $C_{21}H_{24}O_{13}$. A crystalline fluorescent substance existing in the bark of the horse-chestnut (*æsculus hippocastanum*) and of other trees of the genera *Æsculus* and *Paria*. In the above-named sources Æsculin is associated with another fluorescent body called *Pariin*.

Æ'THER. See ETHER.

ÆTHE''REA (-thēré-). [L. pl.] Ethers.

ÆSTHET'ICS (ēz-). *Syn.* ÆSTHET'ICA, L. Medicines or agents which affect sensation. See ANÆSTHETICS and HYPERÆSTHETICS.

Æ'THIOPS. See ETHIOPS.

AFFEC'TION. [Eng., Fr.] *Syn.* AFFEC'TIO, L. In *pathology*, a term nearly synonymous with disease.

AFFINITY. *Syn.* CHEMICAL AFFINITY; AFFINITAS, L.; AFFINITÉ, Fr.; VERWANDTSCHAFT, Ger. If oil and water be shaken together they produce no change upon one another, as is proved by their separating into two layers with their properties unaltered, when the mixture is allowed to remain at rest for a short time. Such bodies are said, in chemical language, to have *no affinity* for one another. If iodine and metallic mercury be rubbed together in a mortar they will unite in *definite proportions by weight*, and form a combination possessing *properties totally distinct from those of its constituents*. Thus, iodine is a greyish, metallic-looking solid, convertible into a violet vapour by heat, perceptibly soluble in water, and capable of producing a blue compound with starch. Mercury is a metallic, silvery looking liquid. The product of their union (*biniodide of mercury*) is a scarlet powder, destitute of metallic lustre, convertible into vapour by heat without the production of violet fumes, insoluble in water, and incapable of developing a blue colour with starch. Again, the greenish-yellow and intensely poisonous gas, chlorine,

unites in *definite proportions by weight* with the soft, wax-like, and highly poisonous metal sodium to produce the white crystalline solid chloride of sodium (common salt), a compound which, except in very large quantities, is not only not poisonous, but actually beneficial to health.

Such combinations are called *chemical compounds*, and the force which binds their constituents together is distinguished from all other attractive forces by the term *affinity* or *chemical affinity*. (See MIXTURE.) Bodies united by affinity are also said to have *united chemically*.

Affinity is in most cases exerted between *different* substances, in which respect it resembles *adhesion;* but bodies united by adhesion, *e.g.* ink to paper, paint to wood, &c., unlike those united by affinity, suffer no change of properties.

Affinity is exerted at immeasurable distances, therefore substances to be submitted to its influence must be brought into (apparently) actual contact. This condition is frequently fulfilled by the vaporisation, fusion, or solution of one or more of the bodies to be submitted to its action.

In many instances substances which have no affinity for one another at ordinary temperatures manifest this power when heated.

Whenever *chemical union* takes place, heat is invariably evolved; conversely, the decomposition of a chemical compound is always accompanied by an apparent loss of heat or reduction of temperature.

Finally, the most striking phenomena characteristic of, and accompanying, chemical affinity are, development of heat, change of properties, and union in definite or constant proportions by weight.

AFFUSION. In *chemistry*, the washing of a precipitate, &c., for the purpose of removing soluble matters. In *medicine*, affusion is of three kinds:—

1. *Lotions*, which consist in washing a part of the body with a sponge or rag soaked in a liquid.

2. *Aspersions*, which consist in throwing a liquid drop by drop, like rain, upon the body.

3. *Shower baths*, which consist in allowing a number of small streams of water to fall from a height upon the surface of the body. If the water fall from a considerable height, affusion is then termed *douche* by the French.

AFTER-DAMP. *Syn.* CHOKE-DAMP. Carbonic acid gas resulting from explosions of air and *fire-damp* (light carbonetted hydrogen) in coal mines.

AFTER-PAINS. Those following childbirth. The only remedy is *patience;* they may, however, be frequently alleviated by small doses of *morphia* or *liquor opii sedativus*. Heated cloths and warm fomentations are sometimes useful, particularly if assisted by moderate but sufficient pressure on the abdomen, by means of a broad bandage. They seldom follow with severity the first birth.

AFT'ER-WASH (-wŏsh). In the *art of the distiller*, the liquor in the still after the spirit has been drawn over.

AG'ARIC. [Eng., Fr.] *Syn.* AGAR'ICUM, AGAR'ICUS, L.; BLÄTTERSCHWAMM, PILZ, SCHWAMM, Ger. In *botany*, a genus of *fungi*, of numerous species, embracing the mushrooms and champignons. Of these plants, some are edible; others poisonous. The term is also commonly applied to the *boletus* found on oaks (TOUCHWOOD), and on larches (MALE AGARIC).

Fly-agaric. *Syn.* FLY MUSH'ROOM; AGAR'ICUS MUSCA"RIA, Linn.; AMANI'TA M. One of the most narcotic and poisonous of our fungi, producing, in *small doses*, intoxication and a pleasing species of delirium; for which purpose it is commonly employed in Kamschatka. (Hooker.) It possesses the singular property of imparting an intoxicating quality to the urine, which continues for a long time after taking it. This secretion is, therefore, commonly saved by the natives during a scarcity of the fungus. "Thus, with a few *amanitæ*, a party of drunkards may keep up their debauch for a week;" and the intoxication so produced is capable of "being propagated through five or six individuals." (Langsdorff.) Water in which it has been boiled is poisonous; but the *boiled* fungus itself is inert. The liquid from it is used as a FLY-POISON; whence the name *mushroom* is derived. It may be known by its rich orange-red colour in autumn.

AG'ATE (-ăte, -ĕt‡). [Eng., Fr.] *Syn.* ACHA'TES (-kā'-tēz), L. A semi-pellucid uncrystallised species of *quartz*, remarkable for its hardness, variety of colour, and susceptibility of receiving a high polish. It is an aggregate of various siliceous minerals, of which chalcedony appears generally to be the base. Carnelian, jasper, amethyst, and other similar minerals often enter into its composition. The colours are often delicately arranged in stripes, bands, or clouds. Those which take an angular form, as the *Scotch pebble*, are called FORTIFICATION AGATES. It is the least valuable of the precious stones, and is chiefly made into rings, seals, beads, burnishers, &c., on account of its hardness. Its *powder* is used for cleansing and polishing iron, brass, &c., and to sharpen edge-tools.

AG'NAIL. See WHITLOW.

AGRYPNOT'ICS (-grĭp-). *Syn.* ANTHYPNOT'ICS (-hĭp-); AGRYPNOT'ICA, ANTHYPNOT'ICA, L. In *medicine* and *pharmacology*, agents or substances which prevent sleep; as *tea, coffee, digitalis, vinegar*, &c.

A'GUE (-gū). See FEVER (Intermittent).

Ague-cake. The popular name of a tumour felt under the false ribs on the left side, formed by enlargement and induration of the spleen,

following protracted ague; also, sometimes, of indurations of the liver following ague.

Ague-drop. See QUACK MEDICINES.

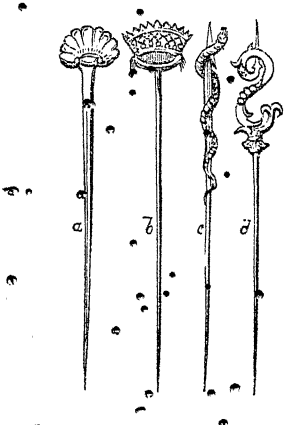
Ague-salt (-sŏlt). Disulphate of quinine.

Ague-tree. Sassafras.

Ague-weed. The herb *thorough-wort* ('Eupato″rium perfolia′tum,' Linn.).

AIG′REMORE (ĕg′r-mor). [Fr.] Pulverised *charcoal* in the state it is used to make gunpowder.

AIGUILLETTE (ATTELETTE). [Fr.] In



Attelettes from Soyer.

cookery, a term applied to several small dishes, from the articles of which they consist being mounted on *silver needles*, or *skewers*, with ornamental handles or tops. (See *engr.*) They form one of the varieties of the 'hors-d'œuvres' of Soyer, and are commonly served on a napkin. The *skewers* should be about four inches long, and of the thickness of an ordinary packing needle. The person eating what is served on them, takes the head of the skewer between the thumb and fingers of the left hand, and picks it off with his fork. Those noticed by Soyer are—

Aiguillettes à l'Éperlan (*smelts*);
Aiguillettes aux Huitres (*oysters*);
Aiguillettes de Filets de Sole (*soles*);
Aiguillettes de Homard (*lobsters*);
Aiguillettes de Langue de Bœuf (*ox-tongue*);
Aiguillettes de Ris de Veau (*sweetbread of veal*);
Aiguillettes de Volaille à la Jolie Fille (*fowl*);—

all of which are prepared in a nearly similar manner, merely varying the sauces, &c., to suit the article and palate. See ATTELETTES, HORS-D'ŒUVRES, &c.

AIL′MENT. Pain, indisposition; disease. Its use is generally restricted to the non-acute, and milder forms of disease.

AIR. [Eng., Fr.] *Syn.* AER, L. (from ἀήρ, Gr.); LUFT, Ger.; ATMOSPHERIC AIR; THE ATMOSPHERE. This name was formerly given to any aëriform body; thus, by the old chemists, ammoniacal gas was called alkaline air; oxygen,—dephlogisticated, vital, or empyreal air; carbonic anhydride (carbonic acid), fixed air; hydrogen, inflammable air; heavy carbonetted hydrogen (olefiant gas), heavy inflammable air; nitrogen,—mephitic, phlogisticated, or nitrous air. At the present time the term air is usually restricted to the gaseous envelope surrounding the solid and liquid parts of our globe.

Atmospheric Air (or simply, The Air). The air chiefly consists of a *mechanical mixture* of four volumes of nitrogen and one volume of oxygen, or more accurately—

	By volume.		By weight.
Nitrogen	79·1	...	76·8
Oxygen.....	20·9	...	23·2
	100		100

The chief functions of the oxygen are to maintain respiration and support combustion, while the office of the nitrogen is to dilute the oxygen and control its energy.

Besides nitrogen and oxygen, aqueous vapour, carbonic anhydride, ammonia, and nitric acid are met with in the atmosphere, the last especially during and after thunder storms.

Vapour of water is essential to the respiration of animals and plants, in order that the organs concerned in this operation may be kept in a soft and moist condition.

Carbonic anhydride is evolved during combustion, putrefaction, and fermentation; it is also a product of the respiration of animals, and highly poisonous to them, even when diluted with large proportions of air. This gas is, however, greedily absorbed by plants, which decompose it; they assimilate the carbon and return the oxygen to the atmosphere, ready to be again consumed in supporting the life of the animal world.

Ammonia is derived from the putrefaction of animal and vegetable substances. It is from atmospheric ammoniacal compounds that plants obtain much of the nitrogen which is essential to the formation of many parts of their structure.

Nitric acid, like ammonia, is absorbed, and its nitrogen assimilated, by plants.

In addition to the gases and vapours already enumerated, as well as others which exist in minute quantity, or which are of only occasional occurrence, Pasteur and other investigators have discovered in the air living germs which are capable of exciting putrefaction and fermentation, and which are competent, in some instances, to engender disease when they are injected into the blood of animals. In fact, the spread of infectious diseases, *e.g.*, smallpox, typhus fever, cattle-plague, &c., is attributed to the presence in the atmosphere of the germs of such maladies. These germs are believed to be living beings, which develope and multiply at the expense

of the tissues of the larger animals into whose systems they have found entrance.

AL-. [Ar.] An *inseparable article* equivalent to the English *the*. It is found in many chemical and other words derived from the Arabic; as, *alchemy, alcohol, alembic, almanac*, &c.

AL'ABASTER. *Syn.* ALBÂTRE, Fr.; ALABAS'TER, ALABASTRI'TES, ALABAS'TRUM, L. A soft, white species of calcareous and of gypseous stone, used by sculptors. There are several varieties, all of which may be ranged under two heads:—

1. CALCA"REOUS ALABASTER; ORIENT'AL A.; CALC-SIN'TER. A sub-variety of carbonate of calcium, formed by the deposition of calcareous particles in the caverns of limestone rocks. It has a foliated, fibrous, or granular structure, and a pure, soft, rich, semi-translucent whiteness, generally agreeably variegated with undulating zones or stripes of various shades of yellow, red, or brown. This variety is that most esteemed by sculptors, and for the manufacture of alabaster ornaments. The ancients used it for ointment and perfume boxes. At the baths of San Filippo (Tuscany), the process of its formation may be examined by the observer. The natural spring of boiling water holds carbonate of lime in solution by means of sulphuretted hydrogen, which, escaping into the air, leaves the lime as a precipitate, which is gradually deposited in a concrete form. (M. Alex. Brogniart.)

2. GYP'SEOUS *or* COMMON ALABASTER; GYPSUM. A natural hydrated sulphate of calcium, containing a little carbonate of calcium. That from the quarries of the Paris basin contains about 12% of the latter substance. When calcined or roasted, and powdered, it forms the substance known under the name of PLASTER OF PARIS. The more compact, fine-grained specimens of this variety are, like the preceding one, sculptured into almost numberless articles of ornament and utility, such as vases, clock-stands, statuettes, &c. The inferior kinds only are manufactured into the '*plaster of Paris*' of the shops. The best specimens are obtained from the lower beds of the gypsum quarries, and are white, and granular, not unlike Carrara marble. It takes a high polish; but from its softness and liability to become discoloured, articles formed of it require more careful treatment than even those of 'calcareous alabaster.'

Alabaster is WROUGHT, TURNED, and FASHIONED, in a nearly similar manner to the softer varieties of marble. The tools resemble those employed for the like operations in ivory and brass. Machinery is now often applied to this purpose.

Alabaster is POLISHED, first with *pumice stone*, and then with a paste or pap made of *whiting, soap*, and *milk* or *water;* and lastly with *dry flannel*. A better method, however, is to rub it first with *dried shave-grass* (equisetum), and afterwards with *finely powdered* and *sifted slaked lime* formed into a paste with *water*. The surface is then 'finished off' by friction with *finely powdered talc* or *French chalk*, until a satiny lustre is produced, or with *putty powder* in a similar way to marble.

Alabaster is ENGRAVED with tools resembling those employed for other soft minerals. It is ETCHED by covering every part of the surface, except that to be acted on, with a solution of *white wax* in *oil of turpentine* (1 to 4,) thickened with a little *finely powdered white lead*, and subsequent immersion in *water* acidulated with *acetic acid* or *hydrochloric acid*, for the calcareous variety; and in *spring water*, for 20 to 50 hours (according to the effect desired), for the gypseous variety. The varnish is washed off with *oil of turpentine*, and the etched parts carefully brushed over with *finely powdered gypsum*.

Alabaster is JOINED and REPAIRED by means of *white of egg*, or *rice glue*, thickened with *finely powdered quicklime;* or by a paste of newly baked and *finely powdered gypsum*, mixed up with the least possible quantity of *water*.

Calcareous alabaster is usually CLEANED with a brush and warm *soap-and-water*, or with *tepid water* to which a few grains of *carbonate of soda* or of *ammonia* has been added; followed in either case by rinsing in *clean water*. Delicate objects in *gypseous alabaster* can only be safely cleaned with *benzol*, or with *pure oil of turpentine*. If necessary, the surface must be repolished. GREASE SPOTS may be removed from either variety with a little *benzol* or *oil of turpentine*.

Alabaster is occasionally STAINED or COLOURED, and, for the calcareous variety, in a similar way to marble, except that heat is not employed; and for the gypseous variety, in the manner noticed under PLASTER OF PARIS. The gypseous variety is also BRONZED and HARDENED in a similar way to that adopted for casts in the latter substance.

Obs. Gypseous alabaster is dissolved by water; and the beauty of both varieties is almost irrecoverably destroyed by grease, coloured oils, varnishes, smoke, &c. It is, therefore, unfitted for garden ornaments, or other objects exposed to the rain or weather, unless it be painted or bronzed; and is even then very perishable. Contact with acids, alkalies, and ammoniacal and sulphurous fumes, also injure, and, if prolonged, destroy it. Even an uncorked phial of smelling-salts placed on a mantel-piece beside an alabaster vase, will soon destroy its beauty. Thus, all delicate objects in alabaster should be protected by a glass shade.

Orient'al Alabastar (Factitious). *Figures, basso relievos*, &c., of considerable hardness and beauty, may be formed by imitating the process adopted at the Baths of San Filippo, before referred to.

Proc., &c. Moulds of *sulphur* are placed either vertically or obliquely in an open tub or cistern, having a freely perforated bottom. Surmounting the whole are two or more pieces

of wood in the form of a cross or star. The *sulphurous calcareous water*, falling on this cross, is scattered into spray or streamlets, and losing the gaseous portion which holds the lime in solution, deposits it in the form of ORIENTAL ALABASTER on the surface of the moulds. In from 1 to 4 months, according to the nature of the article, a sufficiently thick deposit is obtained. The object is then removed from the mould, and trimmed and polished. It is found that the more *vertical* the position of the mould, the finer is the grain of the resulting deposit. The water of the Spring of San Filippo may be exactly and easily imitated by the chemist; and the whole process offers a new and valuable ornamental art for the amusement and profit of the ingenious and enterprising.

ALAMODE' (ăl-ăh-mōdé.) [Fr., *à la mode.*] According to the prevailing mode or fashion. In *cookery*, applied to several dishes, but more particularly to one of beef (ALAMODE BEEF), commonly shortened by the lower class of Londoners into "*alamode.*" See BEEF, STEWS, &c.

ALAN'TINE. [Eng., Fr., Ger.] *Syn.* ALANTI'NA, L. A substance identical with inulin, found in the roots of *garden angelica* ('angelica archangelica,' Linn.).

ALBA'TA. [L., Eng.] A name given to several alloys resembling silver. See ALLOYS, GERMAN SILVER, &c.

ALBU'MEN. [Eng., L.] *Syn.* ALBUMIN; ALBUMINE, Fr.; EIWEISS, EIWEISTOFF, Ger. Literally, the white of egg; a peculiar nitrogenous substance which enters largely into the composition of animal bodies. It abounds in the blood, muscles, bones, coagulable lymph, vitreous and crystalline humour of the eye, fluid of dropsy, &c. The white of egg consists of nearly pure albumen dissolved in water.

A substance identical with albumen is found in many vegetables. It enters largely into the composition of all the emulsive seeds. According to Seguin, it exists in considerable quantity in all those vegetables and fruits that afford a vinous liquor without the addition of yeast.

Prep. The white of egg and the serum of blood, when strained through muslin, furnish albumen, in solution, in a sufficiently pure state for all the ordinary purposes of the arts. Pure SOLID ALBUMEN may be prepared as follows:—

1. Agitate strained white of egg with 10 or 12 times its bulk of alcohol, collect the precipitated flocculi on a muslin filter, and suffer it to dry at a temperature not exceeding 120° Fahr.

2. Add a little water to white of egg, mix, filter, exactly neutralise with acetic acid, and then largely dilute with pure cold water; the precipitate which falls may be collected on a filter and washed. Strained serum of blood may be used instead of white of egg, in both the above forms.

Comp., &c. The following is the composition of albumen according to Lieberkühn:—

Carbon	53·3
Hydrogen	7·1
Nitrogen	15·7
Oxygen	22·1
Sulphur	1·8
	100·

Chatin found iodine in the white of egg; it also contains chloride, sulphate, phosphate, and carbonate of sodium, phosphate of calcium, and traces of potassium in it; but, unlike the sulphur, none of these substances form a constituent part of pure albumen, though probably always present in white of egg.

Prop. Pure solid albumen (unaltered by heat) is nearly colourless, inodorous, and tasteless; scarcely soluble in water, but readily so in water containing an exceedingly small quantity of caustic soda or potash, and in a strong solution of nitrate of potassium. When dried by a gentle heat it shrinks into a translucent horny mass; and when exposed to a sufficient temperature, yields the usual ammoniacal odour and products of animal matter. Its solution (as white of egg) is solidified or coagulated by a heat of from 145° to 165° Fahr., forming a white, opaque mass; when very dilute, on boiling (only) it separates in fine light flocks. When thus coagulated, it is insoluble in water at a less temperature than 302° Fahr. (Wöhler and Vögel), unless alkalised. Ordinary solutions of albumen give precipitates with sulphuric, hydrochloric, nitric, and metaphosphoric acids, with tannin and astringent solutions, and with most of the metallic salts; but are not affected by either acetic acid or tribasic (common) phosphoric acid. Alcohol, in quantity, also precipitates albumen. Strong oil of vitriol turns it black in the cold, but on applying a gentle heat, a gorgeous, red-coloured liquid is produced. Strong hydrochloric acid gives a deep violet-blue solution. White of egg or serum exposed in a thin stratum to the air, dries up into a pale, yellow, gum-like substance, and in this state may be kept for any length of time, retaining its property of redissolving when immersed in slightly warm water.

Tests.—1. Both heat and alcohol (or strong spirit) coagulate it:—2. A solution of perchloride of mercury dropped into a fluid containing albumen occasions a white precipitate:—3. Subacetate of lead acts in the same way. Either of the last two will render turbid a solution containing only the 1-2000th part of fresh white of egg, or the 1-10,000th part of dry albumen.—4. Tannin and tincture of galls give yellow, pitchy precipitates:—5. If dry caustic potash or soda be triturated with either liquid or solid albumen, ammoniacal fumes are evolved, and the mixture on calcination yields ferrocyanide of potassium:—6. Its coagulability by heat, and its *inco-*

agul off the spirit c acid, distinguish it from casei begins to t

Uses, &c. Independently of its value as an alimentary substance, albumen is largely employed in photography as a glaze or varnish, for fixing colours in calico printing, as a cement, &c., and more particularly as a clarifier for wines, syrups, vegetable solutions, and other liquids. Its efficacy for the last purpose depends on its entangling the impurities in its meshes during coagulation, and either rising to the surface with them as a 'scum,' or sinking with them as a precipitate. When the liquid operated on does not spontaneously coagulate albumen, it is necessary to apply heat to it. In cases of *poisoning* by the mineral acids, corrosive sublimate, nitrate of silver, sulphate of copper, bichloride of tin, or sugar of lead, the white of egg (or indeed the yelk as well) is one of the best antidotes that can be administered.

Flake Albumen. *Syn.* ALBUMEN IN POWDER, SOLID A., SOLUBLE A., PLANTER'S A. *Prep.* Expose strained *white of egg* or *serum of bullock's blood*, in a thin stratum, to a current of dry air, until it concretes into a solid transparent substance, resembling horn. In this state it may be kept any length of time, or it may be further dried until brittle, and then reduced to coarse powder.

Use. It is extensively employed as a 'clarifier' in the sugar plantations of the West Indies, and elsewhere. It is prepared for use by soaking and stirring it with cold water until it is dissolved, when it is whisked to a froth in the usual way, and agitated with the liquid to be clarified.

Vegetable Albumen. This substance, long considered to be a distinct proximate principle peculiar to the vegetable kingdom, has been shown, by recent researches, to be identical with animal albumen. It is particularly abundant in carrots, turnips, cabbages, green stems of peas, and oleaginous seeds.

Albumen, Solution of (B. P.). Take of white of one egg; distilled water, four fluid ounces. Mix by trituration in a mortar, and filter through clean tow, first moistened with distilled water. This solution must be recently prepared.

ALBU'MEN. In *botany*, the solid, fleshy, or horny substance found in many seeds, between the integuments and the embryo. It is the part that furnishes the *flour* of the 'cereals,' the *flesh* of the 'cocoa-nut,' and the great mass of the seeds of coffee and other vegetables. However poisonous the plants which produce it may be, this substance is never deleterious.

ALBUMENOIDS. A term applied to albumen, fibrin, casein, and similar bodies.

ALBU'MENOUS. *Syn.* ALBUMINO'SUS, L.; ALBUMINÉ, ABUMINEUX, Fr.; EIWEISSSTOFFHALTIG, Ger. Formed of, containing, or having the properties of albumen.

Albuminous Plants. In *botany*, all plants whose seeds contain albumen in a separate state; as in the *cereals*, *palms*, &c.

Albuminous Principles *or* **Substances.** *Albumen, casein, fibrin, gluten*, &c.

ALBURN'UM. [L.] *Syn.* ALBUEN*; SAPWOOD. In *botany*, the white and softer parts of the wood of exogenous plants, lying between the inner bark and the heartwood. It consists of empty or nearly empty tubes or cells, which gradually acquire solidity by the deposition of resins, tannin, and other products of vegetation, and in time becomes wood. It is through the albunum that the ascending sap chiefly flows.

ALCARAZ'ZA. [Sp.] A species of porous earthenware, or a vessel formed of it, made in Spain from a light, sandy marl, and but slightly fired. Their value as '*coolers*' arises from the copious evaporation of the water, which gradually transudes. A similar ware and articles are made in France, under the name of HYGROCERA'MEN; and in England, under the names of POROUS WARE, WATER COOLERS, WINE COOLERS, BUTTER COOLERS, &c. The following are forms said to be used in our potteries:—

Prep. 1. Take of *sandy-marl*, 2 parts; *brine*, q. s.; make a dough, and then knead in of *common salt*, in fine powder, 1 part. Bake the pieces slowly, and lightly.

2. *Good clay*, 2 parts; *fine siliceous sand*, 3 parts; *brine*, q. s.; *common salt*, 1 to 2 parts; as before.

3. *Powdered clay*, 2 parts; *powdered charcoal*, 3 parts (by weight); *water*, q. s. to form a stiff dough. The kilning must be so arranged that the heat is applied gradually, and the vessels exposed to a current of hot air; and it must be continued until all the charcoal is burnt out, carefully avoiding overfiring.

AL'CHEMY (kĭm-). *Syn.* AL'CHYMY (-kĭm-); HERMETIC ART*; ALCHEM'IA, ALCHYM'IA, L.; ALCHIMIE, Fr.; ALCHEMIE, Ger.; ALCHIMIA, It. The romantic forerunner of the modern science of chemistry. An imaginary art or science, having for its objects the discovery of —a substance (PHILOSOPHER'S STONE) capable of transmuting the baser metals into gold—a *panacea*, or *universal remedy* (ELIXIR VITÆ), by which disease and death were to be avoided by its possessor—an *alkahest*, or universal solvent—a *universal ferment*; and other like absurdities. A mixed metal formerly used for utensils was also called by this name.

AL'COHOL. C_2H_6O. [Eng., L.; B. P.] *Syn.* AL'KOHOL, Eng., L.; ALCOÖL, ALCOHOL, Fr.; ALKOHOL, HÖCHST RECTIFIEIRTER WEIN-GEIST, Ger.; ALCOÖLE, It. A term commonly applied to one kind of spirit—that obtained by the distillation of any fermented saccharine liquid, and forming the characteristic principle of wines, beers, spirits and other intoxicating liquors.

Etym. Kohol, a Hebrew-Syriac word, is the name given to a preparation of powdered

antimony used by Oriental ladies to paint their eyebrows. In course of time this term was applied to other fine powders, and ultimately to highly rectified spirits.

Hist., &c. Although the art of distillation was probably known at a comparatively early age of the world, the preparation of pure rectified spirit is a discovery of modern times. It was not until the 13th century, that Raymond Lully first showed the way to concentrate spirit by means of *carbonate of potash;* after which date pure concentrated spirit gradually rose into note as an article of trade and commerce in Europe. In the 16th century its distillation was in common practice in these countries. (Burns.) By means of *chloride of calcium*, Dr. Black obtained alcohol of sp. gr. 0·800 (*about* A.D. 1760); and Richter afterwards procured it of a sp. gr. so low as 0·796 at 60° Fahr. (Crell's 'Annals,' 1796.) Lavoisier first demonstrated the composition of alcohol (*about* 1780). Its analysis was subsequently perfected by M. Saussure, jun., and confirmed by MM. Dumas and Boullay, and Gay-Lussac; and by many others since.

Nat. hist. Alcohol is peculiar to the organic kingdom, being exclusively produced, in the natural way, by the process of fermentation.

Sources, &c. Dilute alcohol may be procured, by the ordinary process of distillation, from all fermented liquors. When drawn from wine (as in France), it constitutes BRANDY; when from the refuse juice of the sugar-cane, it is called RUM; when from malt, grain, or molasses (as in England), it is called MALT, RAW-GRAIN or MOLASSES SPIRIT; and when from rice or palm-wine, ARRACK. Brandy, rum, Hollands, and whiskey, contain only about half their volume of alcohol; and gin much less. When distilled from any of these spirituous liquors, the alcohol contains, besides water, variable quantities of essential oils, ethers, and other flavouring matters, which, by one or more redistillations with charcoal or lime, it for the most part loses, and then becomes commercial spirit of wine. By a further rectification from chloride of calcium, lime, carbonate of potash, or any other substance having a strong affinity for water, the water is retained, and a strong spirit passes over containing not more than 10 per cent. of water. By repeating the process, and using the proper precautions, it may be obtained almost entirely free from water, and is then called absolute or anhydrous alcohol.

Preparation I. Of *Absolute Alcohol*:—

a. Alcohol (highly rectified spirit), of 85% (sp. gr. ·835 to ·822), is mixed, in a tubulated retort, with about half its weight of fresh-burnt quick-lime, in coarse powder; and the whole, after securely stopping the neck with a cork, and agitation, is allowed to repose for several days. The alcohol is then carefully distilled off, drop by drop, by the heat of a water bath, until the weight of the distillate nearly equals that of the . . . 53·3 in the spirit operated on. . . . 7·1 the product should be ·795 or . . . carefully repeating the process with the distillate and a fresh quantity of lime, and prolonging the last digestion with the latter for several weeks, *absolute alcohol* of the sp. gr. ·79381 at 60° Fahr. may be easily obtained.

b. (Drink-water; Fownes.) The strongest rectified spirit of wine is digested in a stoppered bottle for several days, with about half its weight of anhydrous carbonate of potash, in powder, frequent agitation being had recourse to; the alcohol, after repose, is then decanted, and treated with sufficient fresh-burnt quick-lime to absorb the whole of the spirit. After 48 hours' digestion, the spirit, when distilled, will have the sp. gr. ·793 at 60° Fahr.

c. (Liebig; Ure.) Alcohol of about 90% is saturated with fused chloride of calcium, in powder, and after repose for a few hours in a stoppered bottle, is submitted to distillation as before. The product should nearly equal the quantity of dry alcohol in the sample. Ure recommends equal weights of the spirit and chloride to be taken; and the process to be stopped as soon as about half the volume of the spirit employed has passed over, or the distillate acquires a higher sp. gr. than ·791 at 68°, or ·796 at 60° Fahr.

d. (B. P. 1867.) Take of *rectified spirit*, 1 pint; *carbonate of potash*, 1½ ounce; *slaked lime*, 10 ounces. Put the carbonate of potash and spirit into a stoppered bottle and allow them to remain in contact for two days, frequently shaking the bottle. Expose the slaked lime to a red heat in a covered crucible for half an hour, then remove it from the fire, and, when it has cooled, immediately put the lime into a flask or retort, and add to it the spirit from which the denser aqueous solution of carbonate of potash, which will have formed a distinct stratum at the bottom of the bottle, has been carefully and completely separated. Attach a condenser to the apparatus, and allow it to remain without any external application of heat for twenty-four hours; then applying a gentle heat, let the spirit distil until that which has passed over shall measure 1½ fluid ounce; reject this, and continue the distillation into a fresh receiver until nothing more passes at a temperature of 200° Fahr.

II. Of *Hydrated* or *Commercial Alcohol*:—

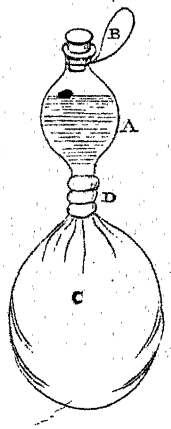
a. (ALCOHOL, Ph. L. 1836.) Take of *rectified spirit* (sp. gr. 0·838), 1 gal.; *chloride of calcium*, 1 lb.; proceed as above, and distil 7 pints and 5 fl. oz. Sp. gr. of product 0·815. It contains about 7% of water, by *weight*, and 5% by *volume*.

b. (ALCOHOL, Ph. D. 1826.) *Rectified spirit*, 1 gal.; *pearl-ashes* (dried and still hot), 3½ lbs.; mix, digest in a covered vessel, with frequent agitation, for seven days; then decant the clear portion, and add to it of *chloride of calcium*, 1 lb.; agitate to effect solution, and

distil off the spirit until the mixture in the retort begins to thicken. Sp. gr. of product 0·810. It contains about 5% of water, by *weight*.

c. (Without distillation.) *Rectified spirit* is agitated, in a closed vessel, with *anhydrous carbonate of potash* (prepared by heating the salt to redness, and still slightly warm), until the powder sinks to the bottom undissolved; the carbonate is then added in considerable excess, and the agitation repeated at short intervals for some hours or even days; lastly, after sufficient repose, the clear upper portion is decanted.—*Obs.* If a clean spirit, and pure carbonate of potash (or at least one perfectly free from *caustic* potash or any other impurity soluble in strong spirit), be used, an alcohol sufficiently pure and free from water for many common purposes may be thus obtained; otherwise the product contains a little potassa, &c., which can only be removed by distillation. For some purposes, however, this would not be objectionable. Sp. gr. about ·812.

III. (Soëmmering.—VARNISH-MAKER'S ALCOHOL.) The *bladder* of *an ox* or *calf*, thoroughly cleansed from fat, and washed and dried, is nearly filled with *rectified spirit*, and then securely fastened and suspended in any dry situation, at a temperature of about 122° Fahr. In from six to twelve hours, when the heat is properly maintained, the spirit is generally sufficiently concentrated, and in a little time longer is rendered *nearly* free from water (anhydrous), or of the strength of 96 to 98%.—*Obs.* The same bladder will serve for more than one hundred operations. If not kept very nearly full, a portion of the spirit escapes through the empty part. To prevent this accident, a bottle with a double neck, of the shape represented in the *engr.*, may be



A, A bottle with two necks, the upper furnished with a ground-glass stopper.
B, Loop of cord to hang the apparatus up by.
C, Bladder containing spirit, filled by means of the bottle *A*.
D, Neck of bladder accurately secured to the under neck of the bottle *A*.

employed; by which means the bladder may be kept constantly full during the process. After the first or second time of using, the bladder gives alcohol sufficiently pure for all ordinary purposes. Before hanging the apparatus up, it is better to enclose it in a coarse potato-netting, to prevent any accident arising from the strain on the neck of the bladder. Soëmmering recommends both the inside and outside of the dry bladder to be smeared over 2 or 3 times with a strong solution of isinglass; but this is not necessary to the success of the process.

IV. *Rectified Spirit.* (B. P. 1867.) *Spiritus Rectificatus.* Alcohol with 16 per cent. of water; obtained by the distilling of fermented saccharine fluids. Sp. gr. 0·838.

V. *Proof Spirit.* (B. P. 1867.) *Spiritus Tenuior.* Take of rectified spirit, 5 pints; distilled water, 3 pints. Mix. Sp. gr. of product 0·920.

Prop. of Alcohol. Light, transparent, colourless; highly volatile and inflammable, burning with a pale blue and smokeless flame; very mobile; odour, agreeable; taste, strong and pungent; miscible in all proportions with water, with the evolution of heat, and temporary expansion, but ultimate condensation of the mixture, some hours elapsing before the union is complete, and the normal temperature restored. The mixture has a higher sp. gr. than the mean of its constituents; and this is greatest when 54 vols. of *alcohol* are mixed with 49·77 vols. of water, the resulting compound measuring only 100 volumes. It absorbs water from moist air; dissolves resins, essential oils, camphor, bitumen, soaps, sugar, carbonic and boracic acid, iodine and the iodides, lime, ammonia, soda, potash, the alkaloids, wax and spermaceti (when boiling), all the deliquescent salts (except carbonate of potassa), and various other substances. It curdles milk, coagulates albumen, and (in quantity) separates both starch and gum from their mucilages. It boils, in the air, at 173° Fahr., when in the anhydrous state. When diluted with water its boiling-point rises in proportion to the amount of water added. It boils, *in vacuo*, at 56° Fahr. Every volume of boiling alcohol yields 488·3 vols. of vapour at 212° Fahr. Its sp. gr. is 0·793811 at 60° Fahr., that of its vapour being 1·6133. It has never been frozen; when cooled to −166° Fahr., it acquired the consistence of castor oil, but did not solidify. It contracts by cold; between −15° and +99° Fahr., this occurs with great regularity, at the rate of ·00047 part of its volume for every degree of the thermometer. Its evaporation, like that of ether, produces intense cold. The products of its combustion are carbonic anhydride and water. It acts as a powerful antiseptic on organic substances immersed in it, and is in consequence extensively employed in the preservation of anatomical preparations. With the acids it forms ethers.

Phys. eff. Alcohol is a narcotico-acrid poison. In *small doses* it occasions excitement and intoxication; in larger ones, delirium, somnolency, coma, apoplexy, and death. It

acts as a violent nervous stimulant, and, by abstracting water from the soft tissues of the stomach and primæ viæ, destroys their organisation. It is alike poisonous to *all* animals; —2 drs. will kill a dog. *All strong spirits* act in the same way, the effect being proportionate to the state of concentration and the quantity taken. On *plants*, it acts as a rapid and fatal poison.

Ant., &c. Copious internal use of tepid water, with cold affusions to the head and spine, and injection of cold water into the ears. In the absence of vomiting, a strong emetic should be given, or the stomach-pump used. *Ammonia* may be used as a stimulant, and, added to water just in sufficient quantity to flavour it, is one of the best antidotes. The head should be kept elevated, and bleeding had recourse to, if cerebral congestion threatens.

Tests in case of death. 1. The *odour* of the contents of the stomach and ejected matters, and their ready inflammability. 2. The spirit may be separated by digestion with water, filtration, the addition of carbonate of potash, and distillation.

Comp., &c. Its per-centage composition is—

	Dumas and Boullay.	Brande and Ure.	Ure, sp. gr. 0·812.
Carbon . .	52·37	52·18	47·85
Hydrogen .	13·01	13·04	12·24
Oxygen . .	34·61	34·78	39·91
	99·99	100·00	100·00

This nearly represents 2 equivalents of carbon, 3 eq. of hydrogen, and 1 of oxygen. The atom of alcohol is now regarded as a multiple of these numbers, and formed by the breaking up of one atom of *grape sugar* ($C_{13}H_{28}O_{14}$) into 4 eq. of alcohol, 8 eq. of carbonic acid, and 4 eq. of water. It was formerly regarded as a compound of 1 eq. of olefiant gas, and 1 eq. of water; but it is now generally viewed as HYDRATE OF THE OXIDE OF ETHYLE ($C_2H_5 . HO$), or a compound of ethylene and water ($C_2H_4 . H_2O$). Grape sugar alone yields alcohol; cane sugar, before it undergoes the vinous fermentation, being first converted into this substance by contact with the ferment.

Purity. The presence of water is shown by the specific gravity (see ALCOHOLOMETRY); the absence of other foreign matter by the following tests:—

1. Its *colour* and *transparency* is not affected by the addition of a little colourless oil of vitriol (Liebig), or by a solution of nitrate of silver, and subsequent exposure for some time to solar light (Vögel), unless either essential oil or organic matter be present, when it assumes a *reddish tinge*. 2. It should be *neutral* to test-papers, colourless, leave no residue on evaporation, and be miscible, in all proportions, with water and with ether. 3. Its boiling-point should never be less than 170° Fahr.; a lower temperature suggests the presence of wood spirits, or acetone, or one of the ethers. To detect wood spirit (wood-naphtha) see *Nesler's Test.* For the reverse of this adulteration—the evasion of the duty by the introduction of spirit, under the disguise of naphtha, turpentine, &c.—see those articles. 4. The presence of water in alcohol may be detected, not only by the sp. gr., but also by white anhydrous sulphate of copper burning *blue* when dropped into it. 5. Potassium placed on alcohol *does not take fire*, unless a considerable per-centage of water be present.

Tests, &c. 1. It may generally be recognised by its volatility, inflammability, odour, taste, miscibility with water, power of dissolving camphor and resins, and other qualities already described. 2. If a few fibres of asbestos be 'moistened' with a saturated solution of bichromate of potash in oil of vitriol, and exposed to the smallest possible portion of hot alcohol-vapour, it is almost instantly turned *green*, owing to the formation of oxide of chromium. *In practice*, the asbestos may be inserted in the neck of a retort, or even of a bulbed glass-tube containing a few drops of the suspected solution, when the effect occurs as soon as distillation commences. Ether and pyroxylic spirit produce a nearly similar result; but the 'first' of these is distinguished from alcohol by its *not* being miscible with water in *all* proportions; and the 'other,' by *Nesler's Test;* whilst both may be readily distinguished by their peculiar and characteristic odour. 3. Dissolve 3 pts. crystallised carbonate of soda in 10 pts. water. To this solution add 1 pt. of liquid to be tested, and heat to about 160° Fahr. Lastly, add iodine in small pieces, till it has entirely dissolved, and the liquid has become colourless. If alcohol be present, *iodoform* will make its appearance on cooling, and sink to the bottom in the form of a yellow powder. As a similar result is obtained with *wood spirit*, this must be proved to be absent before applying this test.

The only reliable method of proving that a sample is ethylic alcohol is the production of *ether*, by acting on the suspected liquid with sulphuric acid. See ETHER.

Uses. In the *arts*, alcohol is used by the *varnish-maker*, to dissolve resins; by the *perfumer*, to extract the odour of plants, and dissolve essential oils, soaps, and other similar substances; by the *pharmaceutist*, to prepare tinctures and other valuable medicinals; by the *instrument-maker*, to fill the bulbs of thermometers required to measure extreme degrees of cold; by the *photographer*, in the preparation of collodion; by the *chemist*, in analysis, and in the manufacture of numerous preparations; by the *anatomist* and *naturalist*, as an antiseptic; and by the *physician*, for various purposes and applications as a remedy. It is also frequently *burnt in lamps*, and in parts of the world where it is inexpensive, it

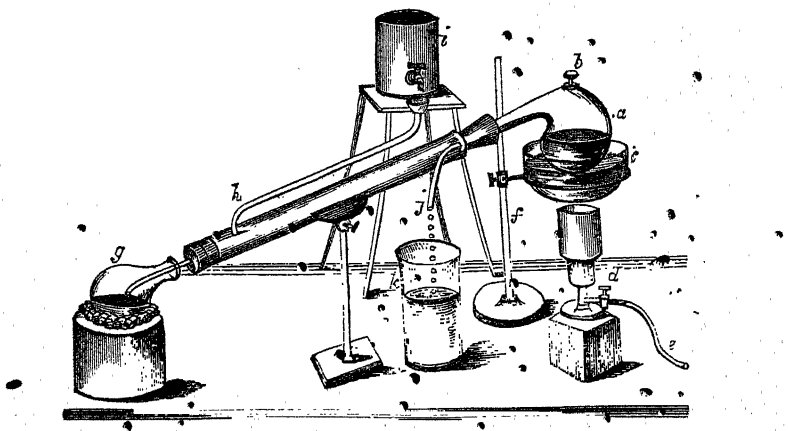
is employed in the manufacture of *vinegar*. Its uses, when dilute, as in the 'spirituous liquors' of commerce, are well known. In *medicine*, it is employed both *concentrated* ('*alcohol*,' '*rectified spirit*') and *dilute* ('*proof spirit*,' '*brandy*,' '*gin*,' &c.), as a caustic, irritant, stimulant, tonic, &c. It has also been used in a multitude of other cases, and has been applied to an almost infinite variety of other purposes.

Gen. commentary. The selection of any one of the processes given above for the preparation of alcohol, must greatly depend on the convenience or position of the operator. *Chloride of calcium*, and *quick-lime*, from their powerful affinity for water, and easy application, are the hygrometric substances most generally employed; but the processes involving the use of the other substances and methods already noticed, have all of them advantages under particular circumstances. Gay-Lussac has recommended the use of *caustic baryta*, instead of lime; and others have employed dry alumina, as an absorbent of the water prior to distillation. Common *proof spirit* may be concentrated until its sp. gr. falls to about 0·825, by simple distillation in a water bath; at which sp. gr. it contains only about 11% of water, by weight, and is then nearly as volatile as pure alcohol.

A convenient apparatus for the preparation of alcohol, on the small scale, is that figured in the *engr.*, and which will be self-explanatory to every one competent to use it. The tank (*e*) should be supplied with ice-cold water; and the receiver (*g*) should be covered with cloths kept continually wet with water of the same temperature. The capsule or basin (*c*) is a water bath heated by the little gas furnace (*d*). On the large scale, for commercial alcohol, a copper still, fitted with a glass refrigeratory and receiver, is commonly employed.

By surrounding the capital of a still, or other like apparatus, by a water bath kept at the proper temperature, the alcoholic richness or content of the product may be regulated to the greatest nicety, for any desired strength.

The different statements of chemical authors as to the boiling-point, specific gravity, &c., of alcohol, already noticed, may be referred to their having either experimented with samples which have not been *absolutely* anhydrous, or to their not having made the proper corrections for temperature, and for the different materials of which their vessels and instruments were composed—some probably having been made of glass, and others of brass or some other metal. In some instances the differences are more apparent than real, as in the *Tables* by Tralles and Lowitz; in the former of which, water, at its lowest sp. gr., is taken as the standard. Until recently, the only known source of alcohol was the fermentation of saccharine solutions. Its production by synthesis, though often attempted, is, however, erroneously said to have always failed. It had long been employed as an occasional source of bicarburetted hydrogen (olefiant gas) at a high temperature; but M. Berthelot succeeded



in reproducing it, from bicarburetted hydrogen, by agitating the latter, in a closed vessel, with *sulphuric acid* and *metallic mercury* ('Journ. de Chimie Med.,' 1855, p. 175); and Henry Flennel, nearly thirty years before M. Berthelot's discovery, found that pure olefiant gas is absorbed by agitation with concentrated sulphuric acid, with the formation of sulphovinic acid, and that by subsequent dilution with water, and distillation, alcohol passes over into the receiver.

ALCOHOLATE. *Syn.* ALCOHATE; ALCOHOLAS, L. A salt in which alcohol appears to replace the water of crystallisation, as is the case with certain chlorides, nitrates, &c. Some of them may be formed by simple solution and

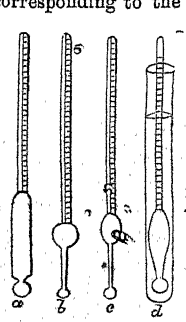
crystallisation of the salt in alcohol (Graham). They are all very unstable, being readily decomposed by water.

ALCOHOLIC. *Syn.* ALCOHOL'ICUS, L.; ALCOHOLIQUE, &c., Fr.; ALKOHOLISCH, Ger. Pertaining to, containing, of the nature of, or made with, alcohol.

ALCOHOLICA. [L.] *Syn.* ALCOÖLIQUES, Fr.; WEINGEIST-VERBINDUNGEN, Ger. In *pharmacy*, liquids containing, or preparations made with, alcohol, as a characteristic ingredient.

ALCOHOLISATION. [Eng., Fr.] *Syn.* ALCOHOLISATIO, L.; ALCOÖLISATION, &c., Fr.; ALKOHOLISERUNG, Ger. In *chem.* and *pharm.*, the development of the characteristic properties of alcohol in a liquid, or the use of it either as an addition or a menstruum; also the act or process of obtaining alcohol from spirit by rectification.

ALCOHOLOM'ETER (-lŏm'-). *Syn.* ALCOHOL'METER (-hŏl'-; -hŏm'-‡); ALCOHOLOMÈ'TRUM, L.; ALCOÖLOMÈTRE, ALCOÖMÈTRE, ALCOHOLMÈTRE, &c., Fr. An instrument or apparatus used in alcoholometry. Alcoholometers are simply 'hydrometers' adapted to the densities of alcohol, either concentrated or dilute. Some of these, as BAUMÉ'S, CARTIER'S, &c., merely indicate the number of degrees corresponding to the state of concentration of the liquid. Others, of a like construction, as those of RICHTER (*a*), TRALLES (*b*), and GAY-LUSSAC (*c*), have their stems so graduated as at once to indicate the *proportion per cent.* of alcohol present, either by weight, or by volume, at some standard temperature. (See *engr.*) A third class, as those of the Abbé BROSSARD-VIDAL, FIELD, &c., are essentially thermometers, with scales which indicate the boiling-points of spirits of different strengths, instead of the common thermometric degrees; whilst to a fourth class belong the alcoholometer of M. SILBERMANN, which is based upon the known *rate of expansion* of alcoholic liquors *by heat*, expressed in alcoholometric degrees; and that of M. GEISSLER, which depends on the measurement of the tension of the vapour of the liquid, as indicated by the height to which it raises a small column of mercury. In SYKES' HYDROMETER, used by officers of the Revenue, the scale of the instrument is enormously extended by the use of movable weights, with each of which it becomes, in fact, a separate instrument, adapted to a certain range of specific gravities.



A very convenient alcoholometer for ordinary purposes (*d*) has been lately produced by some of the instrument makers. It is of the usual form, but its stem on one side exhibits the per-centage richness of the sample in alcohol by volume; and on the other, the per-centage by weight. Thus, both results may be obtained at one trial. This instrument is sometimes called RICHTER'S ALCOHOLOMETER, in England. A further *improvement*, still more recently introduced, is a similar 'double-scale' instrument, showing the degrees of *Sykes* on one side, and carrying a small spirit-thermometer in the bulb, to which a scale is fixed ranging from 35° to 82° Fahr.

ALCOHOLOM'ETRY. *Syn.* ALCOHOL'METRY (-hŏl'-; -hŏm'-‡); SPIRIT TESTING‡; ALCOHOLME'TRIA, L.; ALCOÖLOMÉTRIE, ALCOÖMÉTRIE, &c., Fr. In *chemistry*, the art or process of ascertaining the richness of spirits in alcohol. In *commerce*, the determination of the quantity of spirit of a certain strength, taken as a standard, present in any given sample of spirituous or fermented liquors. In England, this standard is called "*proof spirit.*"

Hist., &c. The great importance of being able *accurately* to determine the strength of spirits in the United Kingdom, on account of the high duties levied on them, has induced the Government authorities, at various times, to investigate the subject. In 1790, the matter was referred to Sir C. Blagden, then Secretary to the Royal Society, who instituted an extensive series of experiments to determine the *real specific gravities* of different mixtures of alcohol and water. The results of his labours and researches were put forward, with 'Gilpin's Tables,' in 1794, but no practical measures appear to have been taken in consequence. In 1832 a committee of the Royal Society, at the request of the Lords of the Treasury, examined into the accuracy of the *Tables*, and the construction and application of the instrument (SYKES' HYDROMETER) now used by the Revenue officers, on which they reported favorably, and declared that they were sufficiently perfect for all practical and scientific purposes. The errors introduced into calculations of the strength of spirits by these *Tables* were found to be quite unimportant in practice, and did not, in any one instance, amount to unity in the fourth place of decimals. This method adopts the *specific gravity* as the test of the strength of spirits, and is founded on the fact that alcohol is considerably lighter than water, and that (with proper corrections for condensation and temperature) the sp. gr. regularly increases, or decreases, according to the relative proportions in which the two are mixed.

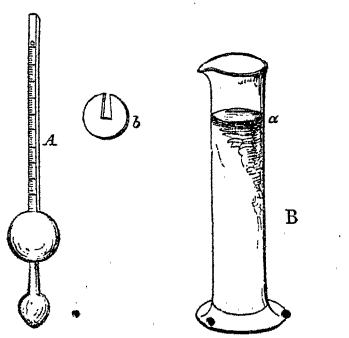
Several other methods of *alcoholometry* have been proposed, founded upon—the variations in temperature of the vapour of alcohol of different strengths—the heat evolved by its admixture with water—its dilatation by heat—the tension of its vapour—the insolubility of carbonate of potash in alcohol—its vola-

tility, boiling-point, &c. &c., the more important and useful of which are noticed further on. The method adopted by the *Boards of Inland Revenue* and *Customs* is, however, the one which is almost exclusively employed in trade and commerce in Great Britain, not only on account of its simplicity and correctness, but for the purpose of the results exactly coinciding with the results obtained by the Revenue officers.

METHODS OF ALCOHOLOMETRY.

1. *Methods based* on the *specific gravity*, or *per-centage strength*, by VOLUME :—

a. With SYKES' HYDROMETER. *Revenue system.* The *engraving* below represents Sykes' hydrometer, as made by Mr. Bate, under the directions of the Commissioners of Inland Revenue and Customs. It consists of a spherical ball or float, with an upper and lower stem, and is made of brass, which (in the more expensive instruments) is usually coated



with gold, to prevent corrosion from damp, and the acidity so generally present in spirituous liquors. The upper stem (A) is about four inches long, and is divided into ten parts, each of which contains five subdivisions. There are nine movable weights of the form (*b*), of different sizes, numbered respectively 10, 20, 30, &c., to 90, each of which represents so many of the principal divisions of the stem, as its number indicates. In use, one of these weights is slipped on to the lower stems; and thus, by means of them, the instrument acquires a range of above 500 divisions, or degrees, extending from the Revenue 'standard alcohol' (sp. gr. ·825) to water. It is so formed as to give the sp. gr. with almost perfect accuracy, at 62° Fahr. When loaded with the weight 60 it sinks in *proof spirit* to the line marked (P) on the narrow edge of the stem, at 51° Fahr.; and, by further placing the square weight or cap (also supplied with the instr.) on the top of the upper stem, it floats exactly at the same point in distilled water. This weight or cap is found to weigh 43·66 grs., which is practically 1-12th of the total observed weight of the instrument, and its poise 60, and hence shows the difference between the gravity of proof spirit and water, as explained hereafter. The whole is fitted up in a neat mahogany case, accompanied with a thermometer, and a book of *Tables* containing corrections for temperature, &c.—*Process.* A glass tube of the form of fig. (*B*) is filled to about the mark (*a*) with the sample for examination; the thermometer is then placed in the liquor, and stirred about for two or three minutes (observing not to breathe upon the glass, nor hold it in the hand), and the temperature noted. The hydrometer is next immersed in a similar manner, and gently pressed down in the liquor to the (0) on the stem with the finger; it having been previously loaded with any one of the nine weights that will cause it to float with the surface of the spirit at some point on the graduated part of the scale. The indication at the point cut by the surface of the liquor, as seen from below, added to the number of the weight with which the float is loaded, gives a number which must be sought in the book of *Tables*; which is *always* sold with the instrument. In this book, at the page headed "*Temperature as observed by the thermometer*," and against the part of the column appropriated to the *given indication* (weight), will be found the strength per cent., expressed in degrees *over* or *under proof, by* VOLUME, in whole numbers or decimal parts. In reading off the indication, to ensure accuracy, it is necessary to allow for the convexity of the liquor at the part where it immediately rests against the stem.

Obs. In an instrument requiring so much care and skill in its manufacture, the purchaser should be careful to procure a *perfect* one. A very slight blow, friction from continual wiping with a rough cloth, and other apparently trivial causes, tend to injure so delicate an instrument. The shape of the weights occasionally vary; some being intended to be attached to the hydrometer at the bottom of the spindle, and others to rest on its top. The first plan is, perhaps, the best, as it tends to make the instrument float with greater steadiness in the liquor; but, at the same time, it renders its adjustment by the maker a matter of greater difficulty.

In employing this instrument, the Revenue officers are instructed to take the nearest degree *above* the surface of the mercury, when it stands between any two degrees of the thermometer; and the division on the scale of the hydrometer next *below* the surface of the liquid, when it cuts the stem between any two lines; thus giving the difference in favour of the trader in both cases.

By means of the *Table* at page 43, the hydrometer indication, or the degrees *over* or *under proof*, of the Revenue System, may be converted into 'real specific gravities,' by mere inspection; and the corresponding 'per-centage richness in alcohol of any

sample may be found, either by WEIGHT or VOLUME.

The specific gravities in this table are such as, on being referred to Gilpin's Tables, will give the expressions of proof-strength, answering to whole indications of the Revenue hydrometer. Intermediate values at fifths of indications may be had by taking proportional differences between the nearest tabular numbers. Thus, to find the specific gravity that should stand opposite to Indication 70·6, we first obtain the difference between the densities standing in a line with Indications 70 and 71 respectively, and then say, as 1 : 0·6 : : ·00192 : ·00115, and ·94135 + ·00115 = ·94250, the specific gravity required.

b. With GLASS ALCOHOLOMETERS. That of Tralles, and most others of a like description, (as made in England), gave the *per-centage strength*, by VOLUME, with tolerable accuracy, at the standard temperature of 60° Fahr. Gay-Lussac's ALCOÖMÈTRE, which closely resembles that of Tralles, is adjusted for the temperature of 59° Fahr. (15° Cent.). All of these, to give at once accurate results, must, of course, be employed at the 'normal temperature' of the instrument. As, however, in practice, the experiment cannot be conveniently performed at any 'fixed' temperature, but only at that of the atmosphere, it is obvious that certain corrections are constantly required in order to obtain results of any value. Perfect accuracy requires that *Tables* for every variation of the thermometer, founded on actual experiments, should accompany each instrument; as, without them, tedious and difficult calculations are necessary, which, in the hurry of the cellar and laboratory, or by persons inexpert at figures, are not easily performed. A series of such *Tables* were prepared by Gay-Lussac, and, with his instrument, are those which are almost exclusively used in France. For rough purposes, in the absence of *Tables*, or nicer calculations, it may be useful to know, that, for *commercial spirits*, at ordinary temperatures, a variation of—

By VOLUME,

5° Fahr.	is equal to (about)	1·00%	of Alcohol;	or (about)	1·794%	of Proof spirit.
1° "	" "	0·20%	"	"	0·359%	"
5° Cent.	" "	1·80%	"	"	3·229%	"
1° "	" "	0·36%	"	"	0·646%	"

By WEIGHT,

5° Fahr.	is equal to (about)	0·80%	of Alcohol;	or (about)	1·62%	of Proof spirit.
1° "	" "	·16%	"	"	·32%	"
5° Cent.	" "	1·43%	"	"	·29%	"
1° "	" "	·28%	"	"	·58%	"

Thus, by making the proper ADDITION to the *apparent strength* per cent., when the *observed temperature* is BELOW the *normal temperature* of the instrument, or a corresponding SUBTRACTION, when it is ABOVE it, the *strength* of the sample may be determined sufficiently near for all practical purposes.

The following Table, taken from Loftus's 'Inland Revenue Officer's Manual,' will be found of great value in making these corrections, and has the merit of being easily applied.

An example will show how this Table is to be used.

Example.—If a quantity of spirit is of the sp. gr. 894 at 73°, what will be its sp. gr. at 60°?

Here the sp. gr. being between 890 and 900, we must add ·450 for each degree of temperature between 73° and 60°. The sp. gr. at 60° would, therefore, be 894 + (·450 × 13) = 899·85. *When the temperature is below 60°, the correction for each degree must be subtracted.* When, however, *very* accurate results are desired, and the necessary *Tables* are *not* accessible, the sample for trial must be brought to the normal temperature of the

TABLE II.—*Table for finding the Specific Gravity of any Spirit at 60° Fahr., when the Specific Gravity at any other Temperature is given.*

Water taken as 1000.

Specific gravity.	Correction for each degree.	Specific gravity.	Correction for each degree.
810 to 820	± ·475	910 to 920	± ·434
820 to 830	± ·473	920 to 930	± ·424
830 to 840	± ·472	930 to 940	± ·406
840 to 850	± ·471	940 to 950	± ·381
850 to 860	± ·471	950 to 960	± ·340
860 to 870	± ·466	960 to 970	± ·269
870 to 880	± ·460	970 to 980	± ·165
880 to 890	± ·456	980 to 990	± ·090
890 to 900	± ·450	990 to 1000	± ·084
900 to 910	± ·442		

TABLE I.—*Showing the Densities and Values of Spirits at 60° Fahr., corresponding to every Indication of Sykes' Hydrometer.*

Sykes' Hydrometer Indication.	Strength per cent.	Specific Gravity.	Per Cents. of Absolute Alcohol.		Sykes' Hydrometer Indication.	Strength per cent.	Specific Gravity.	Per Cents. of Absolute Alcohol.	
			By Measure.	By Weight.				By Measure.	By Weight.
	O. P.					O. P.			
0	67·0	·81520	95·28	92·78	51	11·4	·90551	63·54	55·70
1	66·1	·81715	94·78	92·08	52	10·0	·90732	62·74	54·89
2	65·3	·81889	94·31	91·42	53	8·6	·90913	61·94	54·09
3	64·5	·82061	93·84	90·78	54	7·1	·91107	61·09	53·23
4	63·6	·82251	93·33	90·07	55	5·6	·91299	60·24	52·38
5	62·7	·82441	92·80	89·36	56	4·2	·91479	59·43	51·57
6	61·8	·82622	92·29	88·67	57	2·7	·91666	58·58	50·73
7	60·9	·82800	91·77	87·99	58	1·3	·91839	57·78	49·94
8	60·0	·82978	91·25	87·30		U. P.			
9	59·1	·83151	90·74	86·63	59	0·3	·92037	56·96	49·08
10	58·2	·83323	90·23	85·96	60	1·9	·92228	55·96	48·17
11	57·3	·83494	89·72	85·30	61	3·4	·92408	55·10	47·33
12	56·4	·83661	89·21	84·65	62	5·0	·92597	54·19	46·46
13	55·5	·83827	88·70	84·00	63	6·7	·92798	53·22	45·53
14	54·6	·83993	88·17	83·33	64	8·3	·92984	52·30	44·65
15	53·7	·84153	87·67	82·70	65	10·0	·93176	51·36	43·76
16	52·7	·84331	87·10	81·99	66	11·7	·93367	50·39	42·84
17	51·7	·84509	86·51	81·26	67	13·5	·93586	49·34	41·86
18	50·7	·84680	85·95	80·58	68	15·3	·93758	48·31	40·90
19	49·7	·84851	85·39	79·89	69	17·1	·93949	47·29	39·96
20	48·7	·85022	84·81	79·19	70	18·9	·94135	46·29	39·04
21	47·6	·85205	84·19	78·44	71	20·8	·94327	45·20	38·04
22	46·6	·85372	83·61	77·74	72	22·7	·94518	44·09	37·03
23	45·6	·85537	83·04	77·07	73	24·7	·94709	42·96	36·01
24	44·6	·85700	82·47	76·39	74	26·7	·94899	41·82	34·98
25	43·5	·85878	81·85	75·66	75	28·8	·95092	40·63	33·92
26	42·4	·86055	81·21	74·92	76	31·0	·95288	39·40	32·82
27	41·3	·86229	80·59	74·19	77	33·2	·95484	38·10	31·68
28	40·2	·86402	79·97	73·47	78	35·6	·95677	36·76	30·50
29	39·1	·86574	79·34	72·75	79	38·1	·95877	35·32	29·24
30	38·0	·86745	78·71	72·03	80	40·6	·96068	33·90	28·01
31	36·9	·86915	78·08	71·32	81	43·3	·96259	32·41	26·73
32	35·7	·87099	77·40	70·54	82	46·1	·96457	30·77	25·32
33	34·5	·87282	76·71	69·77	83	49·1	·96651	29·08	23·88
34	33·4	·87450	76·08	69·06	84	52·2	·96846	27·31	22·38
35	32·2	·87627	75·41	68·32	85	55·5	·97049	25·39	20·77
36	31·0	·87809	74·72	67·55	86	59·0	·97254	23·41	19·11
37	29·8	·87988	74·03	66·79	87	62·5	·97458	21·39	17·42
38	28·5	·88179	73·29	65·98	88	66·0	·97660	19·41	15·78
39	27·3	·88355	72·60	65·23	89	69·4	·97857	17·46	14·16
40	26·0	·88544	71·86	64·43	90	72·8	·98057	15·51	12·56
41	24·8	·88716	71·17	63·68	91	76·1	·98261	13·58	10·97
42	23·5	·88901	70·43	62·89	92	79·2	·98452	11·85	9·56
43	22·2	·89086	69·69	62·10	93	82·3	·98657	10·04	8·08
44	20·9	·89268	68·95	61·32	94	85·2	·98866	8·28	6·65
45	19·6	·89451	68·21	60·53	95	88·0	·99047	6·83	5·48
46	18·3	·89629	67·47	59·76	96	90·7	·99251	5·25	4·20
47	16·9	·89822	66·67	58·92	97	93·3	·99448	3·80	3·03
48	15·6	·89997	65·93	58·15	98	95·9	·99658	2·31	1·84
49	14·2	·90182	65·14	57·34	99	98·2	·99851	·997	·793
50	12·8	·90367	64·34	56·52	100	...	1·00000	...	...

This Table has been copied, by permission, from Loftus's 'Inland Revenue Officer's Manual,' and its correctness verified by W. H. Johnston, Esq., Surveying General Examiner.

instrument, in the manner explained under HYDROMETRY.

c. From the SPECIFIC GRAVITY. The temperature having been taken by a thermometer, and the specific gravity ascertained by any of the usual methods, but preferably by means of an accurate *glass* hydrometer, it merely becomes necessary to refer to Table I, where, against the number expressing the specific gravity, the alcoholic content *per cent.*, by VOLUME, of the sample examined, will be found for 60° Fahr., subject to the corrections just referred to, when the temperature is either above or below this point.

If the *precise specific gravity* sought cannot be found in the *Table*, the *difference* between it and the next *greater* specific gravity must be taken for the numerator of a fraction, having for its denominator the difference between the greater and the next less specific gravity in the table. This fraction, added to the per-centage of alcohol in the fourth column of the table, opposite the greater sp. gr., will give the true per-centage sought. Thus, the sp. gr. ·96051 is not in the table, and the next greater number is ·96068; the former must, therefore, be deducted from the latter, and the difference (17) put as the *numerator* of the fraction, having for its *denominator* 191, the difference between ·96068 and ·95877. The fraction $(\frac{17}{191})$ ·089, so found, added to the per-centage strength opposite ·96068 in the third column, gives 33·989 as the true per-centage of alcohol in the given sample.

The per-centage by *volume* may be converted into per-centage by *weight*, by multiplying the former by ·793811, the sp. gr. of absolute alcohol, and dividing the product by the sp. gr. of the sample. The quotient is the number of pounds of alcohol in 100 pounds of the given spirit. Thus:—Suppose 1000 grains by measure of alcohol to weigh 950·92 grains, and to contain (see Table I) 40·63 per cent. by volume of absolute alcohol, what per cent. by weight does the sample contain?

·793811 × 40·63 = 32·25254093, and this product divided by ·95092 = 33·917, the true per-centage by weight of absolute alcohol in the sample.

2. Method based on the *specific gravity*, or *per-centage strength* by WEIGHT:—

The specific gravity is ascertained and the Table used in precisely the same manner as in the "method by volume," already described.

The per-centage by *weight* may be converted into per-centage by *volume*, by multiplying the former by the sp. gr. of the sample, and dividing the product by the sp. gr. of absolute alcohol. This is merely the reverse of the operation described above.

Obs. The preceding methods of *alcoholometry*, as well as all others depending on the *sp. gr.*, refer to UNSWEETENED SPIRITS only; and are inapplicable to those holding sugar in solution, or any other organic matter capable of altering the sp. gr. For *sweetened spirits, fermented worts, wine, beer*, &c., one or other of the following processes must be adopted:—

3. Other methods, adapted to either SWEETENED or UNSWEETENED *Spirits, Tinctures, Fermented Liquors*, &c.—

a. By DISTILLATION, as originally proposed by M. Gay-Lussac. 300 parts of the *liquor* under examination (measured in a graduated glass tube) are placed in a retort or small still, and a quantity *exactly* equal to *one third* (*i.e.*, 100 parts), carefully drawn over; a graduated glass tube[1] being used as a receiver, and the operation stopped as soon as the distillate reaches the hundredth degree. The 'alcoholic strength' of the *distilled liquor* is then ascertained by any of the usual methods, and the result divided by three, when the *per-centage* of alcohol in the original liquor is at once obtained. If, from want of attention, more than 100 parts should be distilled over, the *number* which *expresses* the *relation of the volume of the distilled product* to the *original bulk of the liquor tested*, must be employed as the *divisor*. Thus, if 106 parts of *liquor* have distilled over (instead of 100), containing 33% of alcohol, the 300 must be *divided* by 106, which gives 2·83, and the 33% by this 2·83, which gives 11·66%, the *true proportion* of *alcohol* in the original liquor. The strength at 'proof' may be calculated from this in the usual way.

To ensure accurate results, the acidity (if any) of the liquor must be neutralised with *carbonate of sodium*, prior to distillation. It is also advisable to add 8% or 10% of common salt to the liquor in the retort or still; this, by raising the boiling-point, causes the whole of the spirit to pass over into the receiver before the distillate has reached the required measure. This applies more particularly to weak liquors. With those of greater strength (as the stronger wines), it is better to distil over 150 parts, and divide the result by 2 instead of 3. To liquors stronger than 25% by volume of alcohol, or above 52% to 54% under proof, add about an equal volume of water to the liquor in the still, and draw over a quantity equal to that of the sample tested; when the alcoholic strength of the distillate gives without calculation, the *true strength* sought. To liquors stronger than 48% to 50% (14 to 12 u. p.), add thrice their *bulk* of *water*, and do not stop the process until the volume of the distillate is double that of the sample tested, when the *per-centage* obtained must also be doubled. In each case a proportionate quantity of salt is employed.

REVENUE METHOD. The following is the method adopted in the Inland Revenue and Customs Laboratories for the estimation of the per-centage of alcohol in wines, liqueurs, &c.

[1] Mulder, in his "*Chemistry of Wine*," recommends this receiver to be shaped like a bottle, with its neck, or tubular part, bent at right angles *above* the line of its scale; and that it should be set in the centre of a glass jar kept filled with *very cold* water.

A *measure flask* is filled up to a mark on its neck, with the wine, which is then carefully transferred to a distilling flask or retort, the traces of wine remaining in the former vessel being rinsed out with small quantities of distilled water, and the rinsings added to the wine in the latter vessel. About two thirds of the contents of the retort are then distilled over into the clean *measure flask*, and made up to the original bulk with distilled water, at the same temperature as the sample was previous to distillation. The strength is then taken by Sykes' hydrometer, and this (if u. p.) deducted from 100, gives the per-centage of *proof spirit* in the wine. Thus:—

Strength of distillate = 74·6 u. p. = 25·4 per cent. proof spirit.

b. From the TEMPERATURE of the VAPOUR, as originally proposed by Gröning. The bulb of a thermometer is thrust through a cork into the head of the still, or other vessel employed, and the temperature of the vapour in which it is immersed being noted, is sought in the following table:—

TABLE III.—*Showing the Alcoholic Content, by* VOLUME, *of Boiling Spirits, and of their Vapour, from the Temperature of the latter, as observed by a Thermometer.* By GRÖNING.

Temperature of the Vapour. Fahr.	Alcoholic content of the Distillate per cent.	Alcoholic content of the Boiling Liquid per cent.	Temperature of the Vapour. Fahr.	Alcoholic content of the Distillate per cent.	Alcoholic content of the Boiling Liquid per cent.
170·0	93	92	189·8	71	20
171·8	92	90	192·0	68	18
172·0	91	85	194·0	66	15
172·8	90½	80	196·4	61	12
174·0	90	75	198·6	55	10
174·6	89	70	201·0	50	7
176·0	87	65	203·0	42	5
178·3	85	50	205·4	36	3
180·8	82	40	207·7	28	2
183·0	80	35	210·0	15	1
185·0	78	30	212·0	0	0
187·4	76	25			

This method is admirably adapted to the purposes of the *distiller* and *rectifier*, as it furnishes a ready means of approximately determining the strength of the *spirit passing over*, at *every* part of the process of distillation, as well as that of the *wash* left in the still.

c. From the BOILING-POINT, as originally proposed by M. l'Abbé Brossard-Vidal. This method is founded on the fact, that the *boiling-points* of *mixtures* of *alcohol* and *water*, unlike water alone, are scarcely disturbed by the addition of saline, saccharine, or extractive matter within certain limits. It hence offers a ready means of determining the proportion of alcohol present in *spirits*, *wines*, *fermented liquors*, &c., with sufficient accuracy for all ordinary purposes. In applying it, a *thermometer*, with a *large* bulb and a *narrow* bore, and a *movable* scale graduated from 180° to 212° Fahr., is usually employed. Before using it as an alcoholometer, it is set, with its bulb immersed, in a small *metallic* boiler (brass or copper) containing distilled water, which is then raised to the *boiling-point*, and the 212° of the scale accurately adjusted on a level with the surface of the mercury, should it vary from that point. This is necessary on account of variations of atmospheric pressure causing corresponding variations of the boiling-points of liquids. It is then ready for several hours' operations, and, generally, for an entire business day, without further adjustment. The little boiler is next filled with the *liquor* to be examined, and the lamp again lighted. The *temperature* as shown by the scale of the instrument at the *commencement* of *full ebullition* being ascertained, may be sought in one of the following *Tables*, against which the alcoholic content of the liquor will be found (nearly).—

TABLE IV.—*Exhibiting the* BOILING-POINTS *of Mixtures of Alcohol and Water of the given strengths.* By GRÖNING.

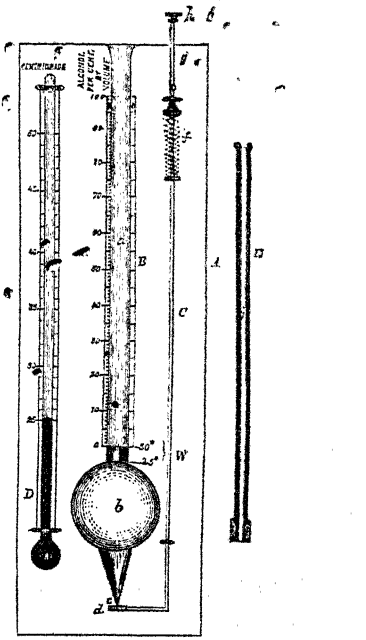
Boiling-point. Fahr.	Alcohol per cent. by volume.	Boiling-point. Fahr.	Alcohol per cent. by volume.
205·34	5	179·96	55
199·22	10	179·42	60
195·8	15	178·7	65
192·38	20	177·62	70
189·50	25	176·54	75
187·16	30	175·46	80
185·	35	174·92	85
183·38	40	174·2	90
182·12	45	173·14	95
181·58	50	172·	100

TABLE V.—*Showing the* BOILING-POINTS *of 'under proof' spirit.* By Dr. URE.

Boiling-points. Fahr.	Per-centage strength.	Corresponding Sp. Gr.
178·5	Proof	·9200
179·75	10· U.P.	·9321
180·4	20· „	·9420
182·1	30· „	·9516
183·4	40· „	·9600
185·6	50· „	·9665
189·	60· „	·9729
191·8	70· „	·9786
196·4	80· „	·9850
202·	90· „	·9920

This method does not answer well with spirituous liquors *above* 'proof,' owing to the variations of their boiling-point being so slight as not to be easily observed with accuracy; but with liquors *under* 'proof,' and particularly with *wines, beer*, and other *fermented liquors*, due care being observed, it gives results closely approximating to those obtained by distillation, and sufficiently accurate for all ordinary purposes. In testing *strong* alcoholic solutions it is, therefore, proper to dilute them with twice their bulk of water; and *commercial spirits*, with an *equal* bulk of water; the results obtained being *doubled* or *tripled* as the case may be.

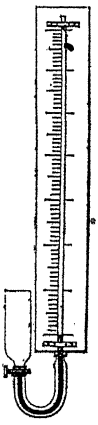
d. From the EXPANSION of the LIQUID when heated:—Silbermann's DILATATOMETER. The expansion of alcohol between 0° and 212° Fahr. is *triple* that of water; and between 77° and 122° Fahr., it is much greater. Between —14° and —98° Fahr., the rate of expansion is about the $\frac{1}{90047}$th part in volume for every degree of Fahrenheit's scale. The measurement of this expansion has been proposed as a new and ready method of alcoholometry, adapted to nearly all spirituous and fermented liquors. Silbermann's instrument, which is based on it (see *engr.*), simply consists of a flat brass or ivory plate (*A*), on which are fixed a mercurial thermometer (*D*) graduated from 22° to 50° Cent. (=77° to 122° Fahr.); and the DILATATOMETER (*B*), which is a glass pipette open at both ends. A valve of cork, or vulcanised Indian rubber, closes the tapering end (*c*); this valve is attached to a movable rod (*C*) which is fastened to the supporting-plate, and connected with a spring (*f*) and a handle (*g*) bearing a four-threaded screw, by which the lower orifice of the pipette can be opened or closed at will. In use, the pipette is filled with the liquor under examination, to a little *above* the *zero* point (0) on the scale. This is effected by suction, by means of a little piston of leather (*i*), which fits tightly in the long and wider limb of the pipette; the valve (*d*) being previously opened by turning the knob (*h*). The proper quantity of liquor being introduced, and the *lower* end closed, the piston is moved up



and down two or three times, for the purpose of drawing the air-bubbles and absorbed air out of the liquid, the presence of which would vitiate the results of the trial. To allow the piston to be withdrawn without any shock, or the danger of dividing the column abruptly, the rod attached to it is made hollow throughout. In using it, the operator applies the ball of his forefinger to the *top* of the piston-rod (*E*), in order to create a vacuum as he *raises* it; and then withdraws it, to readmit the air when he *thrusts it down* or *removes* it from the tube. The excess of liquid (if any) in the pipette, is then run off until its *upper* surface is *exactly* level with the *zero* (0) of the scale, at 25° C., to which it is raised by immersion in a *water bath* of that temperature, as observed by the thermometer; which is done by very *cautiously* turning the rod which depresses the valve. The whole apparatus is now again immersed in the *water bath*; and, held by the upper portion of the plate, kept in gentle motion with the hand, until the temperature rises to *exactly* 50° C., when the coefficient of expansion is obtained; and hence also the *proportion* of *alcohol*—the *scale* of the *instrument* being so graduated, from actual experiments previously made upon mixtures of known composition, as to give, at once, the *per-centage* of *alcohol* by VOLUME (nearly).[1]

[1] "*Comptes Rendus*," xvii, 418.

e. From the TENSION of the VAPOUR:—Geissler's ALCOHOLOMETER. This method, for which we are indebted to M. Geissler, of Bonn, depends on the *measurement* of the *tension* or *elastic force* of the *vapour* of the liquid, as indicated by the height to which it raises a small column of mercury. The *spirit, wine,* or *other liquor,* of which it is desired to ascertain the strength, is put into the little flask (*a*), which, when completely filled, is screwed on to the 'curved glass-tube' which contains the mercurial column (which is inverted for the purpose), and is closed by the stop-cock (*b*). The instrument (see *engr.*), is then placed *erect,* and the flask and lower part of the tube immersed in a water bath, as in the previous method. The number, on the graduated scale of the instrument corresponding to the *height* of *the mercury,* at the *boiling-point* of the liquor under examination, gives the *per-centage* of *alcohol* by VOLUME (nearly).



This method furnishes approximative results with great facility and expedition; and, with proper care, these do not vary more than $\frac{1}{2}$ to $\frac{1}{2}$ of $1\frac{0}{0}$, from those obtained by distillation. We find, that by having the diameter of the part of the tube at which the surface of the mercury is acted on by the vapour a little larger than that of the longer limb, and by previously abstracting the air from the sample, as in Silbermann's method, or even by agitation and exposure in an open vessel, the two may be made to correspond almost exactly.

f. From the DIFFERENCE between the Sp. Gr. BEFORE and AFTER *ebullition*:—Taberié's METHOD and ŒNOMETER. The *sp. gr.* of the sample is first accurately determined by any of the usual methods. It is next carefully evaporated, in an open vessel, to *one half* its volume. The *residuum,* when *cold,* is made up with *pure water* to *exactly* its original measure at its original temperature, and the *sp. gr.* again ascertained. The *difference* between the *two* being due to the spirit originally present, furnishes the means of calculating a *new sp. gr.,* from which the *per-centage richness* of the *sample* may be obtained by mere inspection of the *Tables.* The *observed* sp. gr. is the *true one,* whenever the liquor, *after* ebullition and restoration to its original volume, has the *same* sp. gr. as water (*i. e.,* 1·000), at 60° Fahr. Taberié employs a peculiar instrument, which he calls an ŒNOMETER; but its use is not essential to his method of alcoholometry. The results are, of course, only approximative, though sufficient for all ordinary purposes. Prof. Mulder, however, says that he prefers it to any of the previous methods; and that the results, with care, are almost as accurate as those obtained by distillation.

g. By means of CARBONATE OF POTASH:—

g. a. (Brande's Method.) The *liquor* for trial is poured into a long, narrow glass-tube (graduated centesimally), until the vessel is half-filled, and after the addition of about $12\frac{0}{0}$ or $15\frac{0}{0}$ of a *strong solution* of *subacetate of lead,* or a little *finely powdered litharge,* is agitated until the colour is entirely, or nearly removed. *Anhydrous carbonate of potash,* in powder, is next added, until it sinks undissolved, even after prolonged agitation of the liquid. The whole is now allowed to repose for a short time, when the ALCOHOL is seen floating on the top of the aqueous portion of the liquid in a well-marked stratum. Its quantity, read off by means of the graduations of the tube, and *doubled,* gives the *per-centage richness* of the sample in *alcohol,* by VOLUME.

This process answers well with *cordials, wines,* and the *stronger ales;* but with *weak liquors* it is not to be relied on. The whole operation may be performed in two to five minutes, and (with these exceptions) furnishes very reliable *approximative* results. In most cases the decolouring part of the process may be omitted. The alcohol thus separated has a sp. gr. of from ·8064 to ·8118, and contains $3\frac{0}{0}$ or $4\frac{0}{0}$ of water; but for *ordinary* purposes it may be regarded as *pure alcohol.*

4. *Alcoholometry of* MINUTE QUANTITIES *of liquid.* When only a few drops, or a quantity too small for the application of the preceding methods, can be obtained, an *organic analysis* may be had recourse to, and the quantity of absolute alcohol calculated from that of the resulting carbonic anhydride and water; care being previously taken to free the sample from other volatile bodies, if it contains any of them.

Gen. commentary. The DUTIES on spirits in England are charged on the number of *proof gallons* they contain, which is ascertained by gauging or weighing the spirit, and then trying its strength by Sykes' hydrometer. The per-centage of *proof spirit* multiplied by the number of gallons, gives the net amount of proof spirit to be charged.

'PROOF STRENGTH' is an arbitrary standard, adopted for the purpose of facilitating calculations, for which it is well suited; although pure alcohol would, for this purpose, be more simple. As defined by Act of Parliament, 58 Geo. III, c. 28, "*proof spirit*" is such "as shall, at the temperature of 51° of Fahrenheit's thermometer, weigh exactly *twelve thirteenth* parts of an *equal measure* of *distilled water.*"

Taking, therefore, water at 51° Fahr. as unity, the sp. gr. of "proof spirit" at 51° Fahr., is $\frac{12}{13}$ of 1·000 or ·92308. When such spirit is raised to the temperature of 60° Fahr., its density is ·91984.

Spirit at "proof" contains very nearly *equal weights* of absolute alcohol and water; the exact proportions according to recent experiments are:—

By Weight.	By Volume.		Sp. gr. at 60° Fahr.
	Bulk *before* admixture.	Bulk *after* admixture and condensation.	
Alcohol. Water. 100·00 + 103·08 49·24 + 50·76	Alcohol. Water. 100·00 + 81·80 57·05 + 46·68	175·23 100·00	·91984

The *standard alcohol* of the Revenue authorities, and that on which Gilpin's *Tables* are founded, is a spirit of the sp. gr. ·825 at 60° Fahr., which is said to contain, by *weight*, 89% of *pure alcohol* of ·796; and 92·6% of alcohol, by *volume*, which corresponds to about 62·5 o. p.

It is of great importance to the spirit-dealer to be able to estimate correctly the *number* of 'proof gallons' in any quantity of his commodities, or in the whole or any portion of his stock, as disagreeable errors frequently result from ignorance on this point. Calculations of this kind are extremely simple. Thus, when we find, by the hydrometer, that a given sample of spirit is 10% *over-proof*, it means that 100 gallons of such spirit contain as much alcohol as 110 gallons of proof spirit. In *over-proof* spirit, the per-centage o. p. always represents the *quantity of water* which the given spirit requires to reduce it to proof. By *adding* this *per-centage* over-proof to 100, we obtain a *number*, which multiplied by any number of gallons, and divided by 100, gives the exact number of proof-gallons which is contained in any quantity of the spirit referred to. Thus:—*A puncheon of rum* gauged at 91 *galls.*, and *shown by the hydrometer to be* 21 o. p., contains—

21 o. p. of sample added to 100 . .	121
No. of gallons of rum	91
100)	11011
No. of gal. of *proof-spirit* . . .	110·11

In like manner when a spirit is said to be 11 *u. p.*, or *under-proof*, it means that 100 gal. of such spirit contains 11 gal. of *water*, and 89 gal. of 'proof spirit.' By *deducting* the *per-centage* under-proof from 100, we not only obtain the number of proof gal. contained in 100 gal. of such spirit, but, as in the last case, a *factor* which *multiplied* by any number of gal., and divided by 100, gives the exact number of 'proof gallons' contained in any quantity of the given strength. Thus:—An *ullage brandy-piece containing* 45 *gal. of spirit at* 10 *u. p.*, would have the *proof value* of—

Per cent. *u. p.* of sample 10, subtracted from 100 . . .	90
No. of gall.	·45
100)	4050
Quantity of *proof spirit* . . .	40·50

Or exactly 40½ gallons.

The *strength* of *absolute alcohol* (sp. gr. ·7938) is estimated at 75¼ % *over-proof*. It therefore contains 175¼ % of 'proof spirit,' whilst *proof spirit* (sp. gr. ·91984) contains 57·06% of 'absolute alcohol;' both being by measure or volume. Thus—

$$\frac{\text{meas. of } alc. \times 175\frac{1}{4}}{100} = \begin{cases} \text{equiv. meas.} \\ \text{of } pf.\ spt. \end{cases}$$

And—

$$\frac{\text{meas. of } pf.\ spt. \times 57{\cdot}06}{100} = \begin{cases} \text{equiv. meas.} \\ \text{of } abs.\ alc. \end{cases}$$

From which we derive the 'constant multipliers' 1·7525 (or roughly 1¾), and ·5706, applicable to any number of volumes or gallons. For—

$$\text{meas. of } alc. \times 1{\cdot}7525 = \begin{cases} \text{equiv. meas.} \\ \text{of } pf.\ spt. \end{cases}$$

and—

$$\text{meas. of } pf.\ spt. \times {\cdot}5706 = \begin{cases} \text{equiv. meas.} \\ \text{of } alc. \end{cases}$$

To ascertain *what quantity* of a *spirit* at *any* given strength is *equiv.* to or contains 100 *lbs.* of *absolute alcohol*, we have only to *divide* the constant number 2207·7 by the *proof-value* per cent. of such spirit.[1] Thus—for a spirit 12 *u. p.*—this would be

$$100 - 12 = 88\% \text{ of } proof\ spirit;$$

and—

$$\frac{2207{\cdot}7}{88} = 25{\cdot}1 \text{ gal. (nearly).}$$

That is, 25$\frac{1}{10}$ gal. of such spirit would contain 100 *lbs.* of *absolute alcohol*.

By removing the decimal point *one* place to the RIGHT, we have the *equiv. measure* of 1000 *lbs.* By removing it *one, two,* or *three* places to the LEFT, we have it respectively for 10 *lbs.*, 1 *lb.*, and $\frac{1}{10}$ *lb.*; from which the equiv. for all other weights may be easily obtained.

By *reversing* the above operation, the *measure* of *alcohol* corresponding to *any given weight* of *spirit*, at any strength, may also be easily found.

The WEIGHT of 1 gal. of *absolute alcohol* being 7·938 *lbs.*; that of 1 gal. of *proof spirit*, 9·2 *lbs.*; and that of the 'alcohol' in 1 gal. of *proof spirit*, 4·53 *lbs.*; the weight of any number of gallons or volumes of either,

[1] This number is obtained thus:—

$$\frac{100}{\cdot 79381} = 126 \text{ (nearly)},$$

and—

$$126 \times 175{\cdot}25 = 2207{\cdot}7.$$

and their equivalents, may be easily found. Thus:—

gallons of alc. × 7·938 = *lbs. weight* of alc.
„ pf. sp. × 9·2 = *lbs. w.* of pf. spt.

and—

gallons of alc. × 16·121 = { *lbs. weight* of pf. spt.
„ pf. spt. × 4·53 = { content in *lbs. weight* of alc.

In these cases a knowledge of the first four rules of *decimal fractions* is necessary, or, at least, advantageous; as the Excise officers carry their calculations to *two* figures of decimals, or $\frac{1}{100}$ths. Their plan is to reject the *third* decimal figure when less than 5, but to carry 1 to the next figure on the left hand, when it exceeds 5. Thus, 5·432 is set down as only 5·43; but 5·437 is written 5·44. In the delicate chemical processes of the laboratory, even greater accuracy is observed.

Formerly, spirit was said to be 1 to 3, 1 to 4, &c., *over-proof*; by which it was meant that 1 gal. of *water* ADDED to 3 or 4 gals. of such spirit would reduce it to 'proof.' On the other hand 1 in 5, or 1 in 8, *under-proof*, meant that the 5 or 8 gals., as the case might be, contained 1 gal. of water, and the REMAINDER represented the quantity of 'proof spirit.' This method of calculation has now long given way to the 'centigrade system,' which not only admits of greater accuracy, but is quite as simple. It should be adopted by every spirit-dealer in England, from being that which is employed by the Revenue officers, whose 'surveys' it is absolutely necessary that the trader should understand, in order that his own estimation of his stock and his business calculations should correspond with theirs.

Several other methods of alcoholometry, besides those already noticed, have been adopted at various times, but the majority of them possess so little accuracy, as to be quite inapplicable to the purposes of trade, and of the laboratory. Thus, the strength was at one time estimated by what was called the 'PROOF.' A little of the spirit was poured upon a small quantity of gunpowder, contained in a spoon or saucer, so as just to moisten it, and was then inflamed. If at the end of the combustion the gunpowder took fire, the spirit was held to be '*above proof*;' if it only languidly fizzed away, or slowly burnt, the spirit was said to be '*proof*;' but if the gunpowder failed to ignite, the spirit was esteemed '*below proof*.' Hence arose the terms 'proof' and 'proof spirit,' which have since been adopted by Act of Parliament. Another method was that of dropping oil into the spirit; if the oil floated, the spirit was considered to be '*under proof*;' if it sunk, it was rated as '*proof*' or '*over proof*.' The 'gunpowder test' is quite fallacious; for, if a certain quantity of a spirit is capable of firing the gunpowder, a little excess of a spirit 20% or 25% stronger will often fail to do so, so much water being formed as to prevent the ignition. The 'PREUVE D'HOLLAND' test, of the French, or the 'BEAD,' is still frequently employed by persons unacquainted with the use of the hydrometer. It consists in shaking the spirit in a phial, and observing the size, number, and duration of the bubbles or *beads*, as they are called. The larger and more numerous these are, and the more rapidly they break and disappear, the stronger the spirit is presumed to be. This method is unreliable, as the presence of sugar or acid, even in minute quantities, will sometimes give to a weak sample the appearance of one many degrees stronger. LOVI'S BEADS are also often employed to ascertain approximately the strength of spirit, when a hydrometer is not at hand.

The insufficiency of most of the methods of alcoholometry here referred to, throws us back on the *Revenue System* (Sykes' hydrometer), or on the *specific gravity* for UNSWEETENED SPIRITS. For SWEETENED SPIRITS, as *cordials*, *wines*, *beers*, &c., there are none of the tests which give such accurate results as the DISTILLATION test, previously described as the Revenue Method.

The spirituous liquors of commerce being sold by *measure*, and not by *weight*, the methods of alcoholometry which give the results, per cent. by volume, are those we have chiefly explained. In the laboratory, the method by *weight* is that most generally employed in delicate processes and in analyses. By WEIGHT, the per-centage of alcohol remains the same for all temperatures, for the same sample; whilst by VOLUME, the per-centage varies with the temperature of the liquid. This variation explains the cause of many of the sudden apparent decreases and increases, which occur in large stocks of spirits. Persons purchasing spirits during very warm weather, and paying for them according to their apparent quantity and strength, lose considerably by selling the same spirit when the weather becomes colder, without being conscious of such loss from the hydrometer. The reason of this is obvious, for, whilst the relative proportions of the alcohol to the water continue the same, the *sp. gr.* and the volume alter with the temperature; the latter being increased by warmth, and decreased by COLD, in exact opposition to the former. Accuracy requires, in all cases, that a spirituous liquor should be tested for its strength at the temperature at which it was measured; and measured at the same temperature at which its strength was determined.

A consideration of these facts has led some of the great houses to introduce the system of weighing their spirits, instead of measuring them, the weight of an imperial gallon at 60° Fahr. being taken as the standard gallon. This is the method adopted by the Inland Revenue, at all distilleries, for assessing the duty, and will be readily understood by the following example:—

	Cwts.	qrs.	lbs.
Gross weight of full cask =	13	2	27
Tare . . . . . =	2	2	5
Net weight of spirit =	11	0	22

or 1254 lbs. Let us suppose the hydrometer indication to be 43·0, the weight per imperial gallon would be 8·903 lbs. (see Table VI), and 1254 ÷ 8·903 = 140 gallons.

TABLE VI.—*Table for determining the Weight per Gallon of Spirits by Sykes' Hydrometer.*

Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.
0	8·145	10		21	8·512	31		42	8·885
2	8·157	6	8·333	2	8·516	6	8·699	2	8·889
4	8·161	8	8·337	4	8·519	8	8·702	4	8·892
6	8·164	11	8·340	6	8·523	32	8·706	6	8·896
8	8·168	2	8·343	8	8·526	2	8·709	8	8·899
1	8·171	4	8·347	22	8·530	4	8·713	43	8·903
2	8·174	6	8·350	2	8·533	6	8·716	2	8·907
4	8·178	8	8·354	4	8·537	8	8·720	4	8·911
6	8·181	12	8·357	6	8·540	33	8·723	6	8·914
8	8·185	2	8·361	8	8·544	2	8·727	8	8·918
2	8·188	4	8·364	23	8·547	4	8·730	44	8·922
2	8·191	6	8·368	2	8·551	6	8·734	2	8·926
4	8·195	8	8·371	4	8·554	8	8·737	4	8·929
6	8·198	13	8·375	6	8·558	34	8·741	6	8·933
8	8·202	2	8·378	8	8·561	2	8·745	8	8·936
3	8·205	4	8·382	24	8·565	4	8·748	45	8·940
2	8·208	6	8·385	2	8·568	6	8·752	2	8·944
4	8·212	8	8·389	4	8·572	8	8·755	4	8·947
6	8·215	14	8·392	6	8·575	35	8·759	6	8·951
8	8·219	2	8·395	8	8·579	2	8·763	8	8·954
4	8·222	4	8·399	25	8·582	4	8·766	46	8·958
2	8·225	6	8·402	2	8·586	6	8·770	2	8·962
4	8·229	8	8·406	4	8·589	8	8·773	4	8·965
6	8·232	15	8·409	6	8·593	36	8·777	6	8·969
8	8·236	2	8·412	8	8·596	2	8·781	8	8·972
5	8·239	4	8·416	26	8·600	4	8·784	47	8·976
2	8·242	6	8·419	2	8·603	6	8·788	2	8·980
4	8·245	8	8·423	4	8·607	8	8·791	4	8·984
6	8·249	16	8·426	6	8·610	37	8·795	6	8·987
8	8·252	2	8·429	8	8·614	2	8·799	8	8·991
6	8·255	4	8·433	27	8·617	4	8·802	48	8·995
2	8·258	6	8·436	2	8·620	6	8·806	2	8·999
4	8·262	8	8·440	4	8·624	8	8·809	4	9·002
6	8·265	17	8·443	6	8·628	38	8·813	6	9·006
8	8·269	2	8·446	8	8·631	2	8·817	8	9·009
7	8·272	4	8·450	28	8·635	4	8·820	49	9·013
2	8·275	6	8·453	2	8·639	6	8·824	2	9·017
4	8·279	8	8·457	4	8·642	8	8·827	4	9·021
6	8·282	18	8·460	6	8·646	39	8·831	6	9·024
8	8·286	2	8·464	8	8·649	2	8·835	8	9·028
8	8·289	4	8·467	29	8·653	4	8·838	50	9·032
2	8·292	6	8·471	2	8·656	6	8·842	2	9·036
4	8·296	8	8·474	4	8·660	8	8·845	4	9·039
6	8·299	19	8·478	6	8·663	40	8·849	6	9·043
8	8·303	2	8·481	8	8·667	2	8·853	8	9·046
9	8·306	4	8·485	30	8·670	4	8·856	51	9·050
2	8·309	6	8·488	2	8·674	6	8·860	2	9·054
4	8·313	8	8·492	4	8·677	8	8·863	4	9·058
6	8·316	20	8·495	6	8·681	41	8·867	6	9·061
8	8·320	2	8·498	8	8·684	2	8·871	8	9·065
10	8·323	4	8·502	31	8·688	4	8·874	52	9·069
2	8·326	6	8·505	2	8·692	6	8·878	2	9·073
4	8·330	8	8·509	4	8·695	8	8·881	4	9·076

Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.	Indication on Sykes' Hydrometer.	Weight per Gallon.
52		62		71		81		90	
6	9·080	2	9·260	8	9·444	4	9·631	8	9·816
8	9·083	4	9·264	72	9·448	6	9·635	91	9·820
53	9·087	6	9·267	2	9·452	8	9·639	2	9·824
2	9·091	8	9·271	4	9·456	82	9·643	4	9·828
4	9·095	63	9·275	6	9·459	2	9·647	6	9·832
6	9·098	2	9·279	8	9·463	4	9·651	8	9·836
8	9·102	4	9·283	73	9·467	6	9·655	92	9·840
54	9·106	6	9·286	2	9·471	8	9·659	2	9·844
2	9·110	8	9·290	4	9·475	83	9·663	4	9·848
4	9·114	64	9·294	6	9·479	2	9·667	6	9·852
6	9·117	2	9·298	8	9·483	4	9·671	8	9·856
8	9·121	4	9·302	74	9·487	6	9·674	93	9·860
55	9·125	6	9·305	2	9·491	8	9·678	2	9·864
2	9·129	8	9·309	4	9·495	84	9·682	4	9·868
4	9·132	65	9·313	6	9·498	2	9·686	6	9·872
6	9·136	2	9·317	8	9·502	4	9·690	8	9·876
8	9·139	4	9·321	75	9·506	6	9·694	94	9·880
56	9·143	6	9·324	2	9·510	8	9·698	2	9·884
2	9·147	8	9·328	4	9·514	85	9·702	4	9·888
4	9·151	66	9·332	6	9·517	2	9·706	6	9·892
6	9·154	2	9·336	8	9·521	4	9·710	8	9·896
8	9·158	4	9·340	76	9·525	6	9·714	95	9·900
57	9·162	6	9·344	2	9·529	8	9·718	2	9·904
2	9·166	8	9·348	4	9·533	86	9·722	4	9·908
4	9·170	67	9·352	6	9·537	2	9·726	6	9·913
6	9·173	2	9·356	8	9·541	4	9·730	8	9·917
8	9·177	4	9·360	77	9·545	6	9·733	96	9·921
58	9·181	6	9·363	2	9·549	8	9·737	2	9·925
2	9·185	8	9·367	4	9·553	87	9·741	4	9·929
4	9·189	68	9·371	6	9·557	2	9·745	6	9·934
6	9·192	2	9·375	8	9·561	4	9·749	8	9·938
8	9·196	4	9·379	78	9·565	6	9·753	97	9·942
59	9·200	6	9·382	2	9·569	8	9·757	2	9·946
2	9·204	8	9·386	4	9·573	88	9·761	4	9·950
4	9·207	69	9·390	6	9·576	2	9·765	6	9·955
6	9·211	2	9·394	8	9·580	4	9·769	8	9·959
8	9·214	4	9·398	79	9·584	6	9·773	98	9·963
60	9·218	6	9·401	2	9·588	8	9·777	2	9·967
2	9·222	8	9·405	4	9·592	89	9·781	4	9·972
4	9·226	70	9·409	6	9·596	2	9·785	6	9·976
6	9·229	2	9·413	8	9·600	4	9·789	8	9·981
8	9·233	4	9·417	80	9·604	6	9·792	99	9·985
61	9·237	6	9·420	2	9·608	8	9·796	2	9·989
2	9·241	8	9·424	4	9·612	90	9·800	4	9·994
4	9·245	71	9·428	6	9·615	2	9·804	6	9·998
6	9·248	2	9·432	8	9·619	4	9·808	8	10·003
8	9·252	4	9·436	81	9·623	6	9·812	100	10·007
62	9·256	6	9·440	2	9·627				

*** For *further information* in connection with *Alcoholometry*, see ALCOHOL, BEER, BREWING, DISTILLATION, EBULLIOSCOPE, HYDROMETER, HYDROMETRY, LIQUEURS, MALT-LIQUORS, ORGANIC ANALYSIS, SACCHARINE, SPECIFIC GRAVITY, SPIRIT, SUGAR, SYRUPS, TINCTURES, WINE, WORT, &c. &c.

AL'COHOLS. In *chemistry*, a term applied to compounds possessing a composition, formulæ, and chemical properties similar to those of ordinary alcohol. They form a series presenting an unmistakable symmetry, and differ from one another by well-marked gradations, as shown below:—

Methyl-alcohol (*wood-spirit*) .	C	H_4	O
Ethyl-alcohol (*ordinary alcohol*)	C_2	H_6	O
Amyl-alcohol (*fusel-oil*) . .	C_5	H_{12}	O
Capryl-alcohol	C_8	H_{18}	O
Cetyl-alcohol	C_{16}	H_{34}	O

&c. &c.

Alcohols. In *commerce*, pure spirits of a greater strength than about 58 *o. p.* (sp. gr. ·8335), or containing more than about 85% by WEIGHT, or 90% by VOLUME, of pure alcohol, are commonly so called.

Alcohols. In *perfumery*, rectified spirit of wine, or commercial alcohol, holding essential oils or other odorous matters in solution.

Alcohols. In *Fr. pharmacy*, alcoholic tinctures and essences.

ALCOOLATIFS (alcoölatifs). [Fr.] *Syn.* ALCOHOLATI'VA, L. In *Fr. pharmacy*, alcoholic solutions of *liniments, embrocations*, &c., whether made by distillation, maceration, or solution.

ALCOOLATS (alcoölats). [Fr.] In *Fr. pharmacy*, esprits; applied by Béral, Henry and Guibourt, and others, to medicated distilled spirits.

ALCOOLATURES (alcoölatures). [Fr.] *Syn.* ALCOHOLATU"RA, L. In *Fr. pharmacy*, alcoholic tinctures, elixirs, &c. M. Béral confines the term to vegetable juices preserved by alcohol.

ALCOOLÉS (alcoölés). [Fr.] Tinctures; the '*teintures alcoholiques*' of the Fr. Codex.

ALCOOLIQUES (alcoöliques). [Fr.] *Syn.* ALCOHOL'ICA, L. In *Fr. pharmacy*, alcoholic or spirituous solutions. (Béral.)

AL'CORNINE (-nĭn). [Eng., Fr.] *Syn.* ALCOR'NOCINE (-sĭn); ALCOR'NEUM, ALCORNI'NA, L. A crystallisable substance, apparently intermediate between fat and wax, discovered by Biltz, in *alcornoco bark*.

ALCORNO'CO. *Syn.* A.-BARK; ALCORNOQUE, Fr.; ALKORNOC, A.-RIND, Ger. The bark of an unknown tree of South America. It is astringent and bitter, and has been highly extolled as a specific in *phthisis*; but appears to possess little medicinal virtue. The bark of the young branches of the *cork-tree* (*quercus suber*), used in tanning, is also sometimes called alcornoco-bark; but possesses none of the characters of the former article.

AL'DECAY. The *galls* on the leaves of *myrobalanus chebula* (Gaertn.), a forest-tree of Bengal. Equal to the best oak-galls.

AL'DEHYD (-hīd). [*al-*(*cohol*)-*dehyd* (*rogeratus*).] C_2H_4O. *Syn.* HYDRATED OXIDE OF ACETYLE; HYDRATE OF OTHYLE*; HYDROXIDE OF O.* *Literally*, dehydrogenated alcohol. In *chemistry*, a peculiar ethereal liquid, first obtained in a pure form by Liebig, from alcohol. It is produced under various circumstances, particularly during the destructive distillation of certain organic matters, and in several processes of oxidation. The following are the most convenient methods of preparing it:—

Prep. 1. (Liebig.) *Sulphuric acid*, 3 parts; is diluted with *water*, 2 parts; and as soon as the mixture has cooled, *alcohol* of 80%, 2 parts, is added; and, subsequently, *peroxide of manganese* (in fine powder), 3 parts. The whole, after agitation, is then distilled at a very gentle heat, from a spacious retort into a receiver surrounded with ice, the connection between the two being perfectly air tight. The process is continued until frothing commences, or the distillate becomes acid; which generally occurs when about one third (3 parts) has passed over. The distillate is next agitated in a retort, with about its own weight of fused chloride of calcium, in powder; after which about one half only is drawn over at a very gentle heat (85° to 90° Fahr.), by means of a water bath. This rectification is repeated in a precisely similar way. The last distillate is ANHYDROUS ALDEHYD only slightly contaminated with foreign matters.

2. (Liebig.) *Aldehyd-ammonia*, 2 parts, is dissolved in an equal weight of *distilled water*; and, after being placed in a retort, *sulphuric acid*, 2 or 3 parts, previously diluted with rather more than its own weight of *distilled water*, and allowed to cool, is added. The whole is now distilled, by means of a water bath, into a receiver surrounded with ice, or (preferably) a freezing-mixture, the temperature of the bath at first being very low, and the operation being stopped as soon, or rather, before the water begins to boil. The distillate is then placed in a retort connected with a well-cooled receiver, as before; and after all the joints are made perfectly tight, powdered fused chloride of calcium, in weight equal to that of the liquid in the retort, is added through the tubulature. The heat produced by the hydration of the chloride causes the distillation to commence, after which it is carried on, by means of a water bath, at a temperature ranging from 80° to 82° Fahr. This rectification being very carefully repeated, the last distillate is PURE ANHYDROUS ALDEHYD.

Prop., &c. Limpid, colourless, ethereal, neutral, inflammable; mixes in all proportions with alcohol, ether, and water; odour, peculiar, penetrating, and, when strong, exceedingly suffocating, the vapour, in quantity, producing spasmodic contraction of the thorax; boils at 72° Fahr. (70°—Ure, 5th ed.); sp. gr. ·790 at 60°, and ·800 at 32° Fahr.; sp. gr. of vapour, 1·532; by exposure to air it is gradually converted into acetic acid, and speedily so under the influence of platinum-black; heated with caustic potash, a brown substance resembling resin (ALDEHYD-RESIN) is formed; gently heated with protoxide of silver, or its solutions, *metallic silver* is deposited on the inner surface of the vessel, in a uniform and brilliant film, whilst ALDEHYDATE OF SILVER remains in solution; heated with hydrocyanic acid it yields ALANINE. By age, even in close vessels, it passes into one or more isomeric compounds (ELALDEHYDE; METALDEHYDE), with change of properties. Aldehyde for experiments should, therefore, be always recently prepared; and it must be kept in a well-stopped bottle, in a very cold place, and preferably, in ice.

Obs. Aldehyd is important for its assumed position in the acetyl-series, and the part which it plays in the process of acetification, &c. The word is now also commonly employed, by chemists, as a generic term for any organic substance which, by assimilating two atoms of hydrogen yields, or would yield, a compound having the composition or properties of an alcohol; or which, by taking up one atom of oxygen, yields an acid. Many of the essential oils (as those of *almonds, cinnamon,* and *cumin*) are composed principally of bodies which may thus be called ALDEHYDS. One of the most valuable properties of these substances, is their strong tendency to combine with the bisulphites of ammonium, potassium, and sodium; and by which they may be separated from complex mixtures.

AL'DEHYD-AMMO'NIA (-hĭd-). An ammonia-compound of aldehyd, discovered by Döbereiner and Liebig.

Prep. (Liebig.) *Aldehyd* (of process No. 1, above) is mixed with an equal volume of ether,[1] in a flask surrounded with ice, or (what is better) a freezing-mixture; and is then saturated with dry gaseous ammonia. The crystals which soon form, after being washed with ether, and dried by means of bibulous paper and a short exposure to the air, are PURE ALDEHYD-AMMONIA.

Prop., &c. It smells like a mixture of turpentine and ammonia; melts at 165° to 170°; volatilises, unchanged, at 212° Fahr.; decomposed by exposure to the air; very soluble in water; soluble in alcohol, and more or less so in most other menstrua, except ether; acids decompose it. With sulphuretted hydrogen it forms THIALDINE.—*Use.* Chiefly to make *pure aldehyd* (which see).

AL'DER (awl'-). *Syn.* AL'DER-TREE; AL'NUS (ăl-), L.; A. GLUTINO'SA (Gaertn.); BETU'LA ALNUS, Linn.; AUNE, AULNE, Fr.; ERLE, Ger. A well-known English tree, chiefly growing in moist grounds near rivers. Its *wood* is used for hurdles, for various articles of turnery and furniture, and when converted into *charcoal*, for making gunpowder; it possesses considerable durability under water; but is otherwise of little value. *Bark* and *leaves*, very astringent, and reputed vulnerary; decoction used as a gargle in sore throat, and, in double the dose of cinchona, as a febrifuge in agues; *bark* and *sap* used in dyeing and tanning. The following belong to different *nat. orders* and *genera* to the preceding:—

Black Alder. *Syn.* WIN'TER-BERRY; PRI'NOS VERTICILLA'TUS, Linn. A tree growing in the United States of America. *Bark*, febrifuge, tonic, and astringent; *berries*, tonic and emetic (Bigelow). It has been much recommended in dropsies, diarrhœa, intermittents, &c. *Dose* (of the *dried bark*), ½ to 1 dr., 3 or 4 times a day.

Black Alder-tree. *Syn.* BERRY-BEARING ALDER-TREE; RHAM'NUS FRAN'GULA, Linn. A large shrub found in the woods and thickets of England, &c. *Wood*, BLACK DOG'WOOD; *bark*, bitter, emetic, purgative; used to dye yellow; *root-bark*, a drastic purgative; *berries*, purgative, emetic; *unripe berries* yield SAP-GREEN; *charcoal* of the wood esteemed the best for gunpowder.

ALE. *Syn.* BARLEY WINE*; AILE, Fr.; WEISS-BIER, Ger.; AEL, EALE, Sax.; CERE-VIS'IA ALBA, C. LUPULA'TA, A'LA*, AL'LA*, L. Pale-coloured beer, prepared from lightly dried malt, by the ordinary process of brewing. The ale of the modern brewer is manufactured in several varieties, which are determined by the wants of the consumer, and the particular market for which it is intended. Thus, the finer kinds of Burton, East India, Bavarian, and other like ales, having undergone a thorough fermentation, contain only a small quantity of undecomposed sugar and gum, varying from 1 to 5 per cent. Some of these are highly 'hopped,' or 'bittered,' the further to promote their preservation during transit and change of temperature. Mild or sweet ales, on the contrary, are less attenuated by lengthened fermentation, and abound in saccharine and gummy matter. They are, therefore, more nutritious, though less intoxicating, than those previously referred to.

In brewing the *finer kinds of ale*, pale malt and the best East Kent hops of the current season's growth, are always employed; and when it is desired to produce a liquor possessing little colour, very great attention is paid to their selection. With the same object, the boiling is conducted with more than the usual precautions, and the fermentation is carried on at a somewhat lower temperature than that commonly allowed for other varieties of beer. For *ordinary ale*, intended for *immediate use*, the malt may be all *pale*; but, if the liquor be brewed for keeping, and in warm weather, when a slight colour is not objectionable, *one fifth*, or even *one fourth* of 'amber malt' may be advantageously employed. From 4½ *lbs.* to 6 *lbs.* of *hops* is the quantity commonly used to the *quarter of malt*, for 'ordinary ales;' and 7 *lbs.* to 10 *lbs.* for 'keeping ales.' The proportions, however, must greatly depend on the intended quality and description of the brewing, and the period that will be allowed for its maturation.

The *stronger varieties* of *ale* usually contain from 6 to 8% of 'absolute alcohol;' *ordinary strong ale*, 4½ to 6%; *mild ale*, 3 to 4%; and *table ale*, 1% to 1½%; (each by volume;) together with some undecomposed saccharine, gummy, and extractive matter, the bitter and narcotic principles of the hop, some acetic acid formed by the oxidation of the alcohol, and very small and variable quantities of mineral and saline matter. See BEER, BREWING, FERMENTATION, MALT-LIQUORS, &c.

Devonshire White Ale. A liquor once generally drunk, and still in demand, in the neighbourhood of Kingsbridge and Modbury, Devon.

Prep. Ordinary *ale-wort* (preferably *pale*) sufficient to produce 1 barrel, is slowly boiled

[1] Some authorities recommend the use of twice this quantity of ether.

with about 3 handfuls of *hops*, and 12 to 14 *lbs.* of *crushed groats*, until the whole of the soluble matter of the latter is extracted. The resulting liquor, after being run through a coarse strainer, and become lukewarm, is fermented with 2 or 3 pints of *yeast;* and, as soon as the fermentation is at its height, is either closely bunged up for 'draught,' or is at once put into strong stoneware bottles, which are then well-corked and wired.

Obs. White ale is said to be very feeding, though apt to prove laxative to those unaccustomed to its use. It is drunk in a state of effervescence or lively fermentation; the glass or cup containing it being kept in constant motion, when removed from the mouth, until the whole is consumed, in order that the thicker portion may not subside to the bottom.

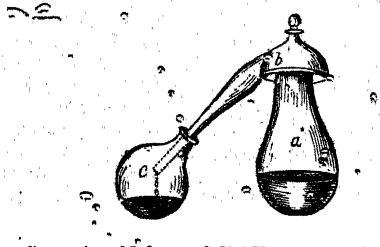
Med'icated Ales. *Syn.* BRYT'OLES; BRUTOLÉS, Fr.; CEREVIS'IÆ MEDICA'TÆ, L. In *pharmacy*, ale prepared by macerating medicinal substances in it, either at the ordinary temperature of the atmosphere, or when heated; infusions and decoctions, in which ale or beer is employed as the menstruum. The old dispensatories enumerate several medicated ales; such as CEREVISIA OXYDOR'CICA, for the eyes; C. ANTI-ARTHRIT'ICA, for the gout; C. CEPHAL'ICA, for the head; C. EPILEP'TICA, against epilepsy; &c. Preparations of this kind are now seldom ordered by the faculty, and their use is chiefly confined to the practice of empirics, and to domestic medicine. *Bark, rue, savine, anti-scorbutic plants, aromatic bitters,* and *stomachics,* are the substances most commonly administered in this way. *Ale* in which *wormwood, gentian, orange-peel,* and the like, have been steeped, taken warm early in the morning, is much esteemed as a restorative tonic by drunkards and dyspeptics. See BEER, PURL, &c.

ALE'BERRY. A beverage made by boiling *ale* with *spice, sugar,* and *bread-sops;* the last, commonly toasted. A domestic remedy for a cold.

ALE'GILL (*g* hard). Ale or beer flavoured or medicated by infusing the *leaves* of *ground ivy* in it; pectoral, stomachic, and nervine.

ALE'WIFE. The *clupea serrata,* an American species of herring. Its proper name is *a'loof,* although the established pronunciation and common orthography is *ale-wife.*

ALEM'BIC. *Syn.* MOORS'HEAD†; ALEM'BICUS, L.; ALAMBIC, Fr.; DESTILLIRKOLBEN, Ger. An old form of distillatory vessel usually made of glass or earthenware, but sometimes of metal. The body (*a*) which holds the liquid for distillation, is called the CU'CURBIT; the upper part (*b*), the HEAD or CAP'ITOL; (*c*) is the RECEIVER. It is still employed in the laboratory, in the distillation of articles that are apt to spurt over into the neck of the common retort, and thus vitiate the product.



ALEUROM'ETER. *Syn.* ALEUROMÈTRE, Fr. An instrument for determining the quantity and quality of *gluten* in wheat-flour, invented by M. Boland. It essentially consists of a hollow copper cylinder, about 6 inches long, and ¾ of an inch internal diameter. This tube has two principal parts; the *one,* about 2 inches long, is closed at the lower end, forming a kind of *cup,* into which the gluten is placed; it screws into the remainder of the cylinder. The *cup* being charged with a *sample* of *gluten,* and the upper part of the cylinder being screwed on, it is exposed in an oven, or (preferably) in an oil bath, to a temperature of 350 to 380° Fahr.[1] From the length of the tube the gluten occupies in swelling, as measured by a graduated scale, its quality is determined. The 'crude gluten' of good wheat-flour augments to four or five times its original volume, when thus treated; but that from *bad* flour does *not* swell, becomes viscid and semi-fluid, and generally gives off a disagreeable odour; whilst that of good flour merely suggests the smell of hot and highly baked bread.

AL'GA. (-gă). [L.] Sea-weed. A common name of *grass-wrack* ('zostera marina'—Linn.), though not one of the algæ.

AL'GÆ. (ăl'-jē). [L. pl.] *Syn.* AL'GALS; ALGÆ (DC.), AL'GALES (Lindl.), L.; ALGUES, VARECH, Fr.; ALGE, MEERGRASS, SEEGRASS, Ger. Sea-weeds. In *botany,* an order of Thallogens living in water or very moist places, nourished throughout their whole surface by the medium in which they live, having no distinct axis of vegetation, and propagated by zoöspores, coloured spores, or tetraspores. Linnæus defines them—"plants, the *roots, leaves,* and *stems* of which are all in one." The *algæ* consist either of simple vesicles lying in mucus, or of articulated filaments, or of lobed fronds formed of uniform cellular tissue. Those that vegetate in *salt water* are popularly called SEA-WEEDS (*fu'ci,* L.) and LA'VER (*ulvæ,* L.); those found in *fresh water* CONFER'VÆ. One of their divisions (the *Zoöspermeæ*) comprehends the lowest known forms of vegetable life, being merely adhering cells, emitting, at maturity, seeds or sporules having a distinct animal motion. In *Oscillatorias,* the whole plant twists and writhes spontaneously; and *Zymenas* actually copulate like animals. Some of the Algæ possess great beauty. In the lower grades the colour is green; in the higher, red or purple.

Prop., Uses, &c. None of the Algæ are

[1] Mr. Mitchell recommends the heat to be 420°; whilst Prof. Muspratt gives 284° Fahr. as the proper temperature; but of these, the *first* is too high, and the *other* too low. About 210 gr. are also ordered to be taken for examination; but the exact quantity is immaterial. (See Mitchell's "*Falsification of Food.*")

poisonous. Several are nutritious, emollient, and demulcent, from containing mucilage (*carrageenin*), starch, sugar (*mannite*), and a little albumen; and are hence used as esculents. The *ash* from the *dried weed* varies in different varieties from 9% to fully 25%; and contains variable quantities of potassa, soda, lime, magnesia, iron, manganese, and silica, with sulphuric acid, phosphoric acid, chlorine, and a little iodine and bromine. (Schweitzer; Forchhammer; Gödechens.) *Sea-weeds*, their *charcoal*, and their *ashes*, have been long regarded as alterative and resolvent; and antiphthisic virtues have been attributed to them by Laennec and others. They were formerly much given in scrofulous affections and glandular enlargements; but their use is now almost superseded by that of iodine and its preparations. Dr. Stenhouse has proposed some of the algæ as furnishing an economical source of mannite. The *sea algæ* are used for manure; their *ashes* form KELP.

ALGARO'BA. *Syn.* CA"ROB-TREE, ST. JOHN'S BREAD; CERATO'NIA SIL'IQUA, Linn. A leguminous tree of southern Europe, Palestine, and part of Africa. *Pods* (ALGAROBA BEANS), used for food, and to improve the voice; they contain a sweetish, nutritious powder, and are supposed to have been the 'locusts' on which St. John fed in the wilderness; their decoction has been used as a pectoral in asthma and coughs.

Algaroba or Algarovil'la. The *astringent pods* of *prosopis pallida*, *p. siliquastrum*, and *Inga Marthæ* (South American trees), bruised and more or less agglutinated by the extractive exudation of the seed and husks. They are used in *tanning*, for which purpose they have been strongly recommended; indeed that of Chili, and of Santa Martha (New Carthagena), is said to possess "four times the power of good oak bark" (Ure); and in *dyeing*, are only inferior to oak-galls.

AL'IMENT. [Eng., Fr.] *Syn.* ALIMEN'TUM, L.; NAHRUNG, SPEISE, Ger. Food; nutriment; anything which nourishes or supports life.

ALIMENT'ARY. *Syn.* ALIMENTA"RIUS, L.; ALIMENTAIRE, Fr.; ZUR NAHRUNG GEHÖRIG, Ger. Pertaining to food or aliment; nutrimental; nourishing.

Alimentary Canal'. *Syn.* ALIMENTARY DUCT; CANA'LIS ALIMENTA"RIUS, L. In *anatomy*, the cavity in the bodies of animals into which the food is taken for the purpose of being digested; the whole passage or conduit extending from the mouth to the anus. In some of the lower animals this is a simple cavity, with only one opening; when the same aperture which admits the food also gives egress to the excrementitious matter. In others, it is a true canal, with both a mouth and an outlet. Another step, and we find this canal is divided into a stomach and intestines. In the higher grades, a mouth, pharynx, and œsophagus precede the stomach. Birds have one or two sacculi or crops added to the œsophagus. The stomach of the ruminants consists of four sacs or parts, each of which may be regarded as a separate stomach; that of the bottle-nose whale contains no less than seven of such sacs. The part below the stomach, forming the intestines, is also variously subdivided, complicated, and connected. In man, these subdivisions are termed—DUODE'NUM, JEJU'NUM, IL'EUM, CÆ'CUM, CO'LON, and RECT'UM; the lower end or orifice of the last being called the A'NUS. The existence of an alimentary canal is said to be the only true characteristic of an animal. Plants have no common receptacle for their food, nor canal for carrying away effete matter; but every animal, however low in the scale of being, possesses an internal cavity which serves it as a stomach.

Alimentary Substances. *Syn.* ALIMENTS; MATE"RIA ALIMENTA"RIA, L. Substances employed as food.

ALIMENTA'TION. [Eng., Fr.] *Syn.* ALIMENTA'TIO, L.; NAHRHAFTIGKEIT, Ger. The act, process, power, or state of nourishing, or being nourished.

AL'IZARI. [Tur., *ali-zari.*] The commercial name of *madder* in the Levant.

ALIZARIN. $C_{10}H_6O_3 . 2H_2O$. *Syn.* LAZARIC ACID. A red colouring matter obtained from madder.

Prep. 1. Exhaust madder with boiling water, and precipitate the decoction by sulphuric acid. Wash the precipitate, and, while yet moist, boil it with a concentrated solution of hydrate of aluminum in hydrochloric acid, and mix the solution with hydrochloric acid; red flakes of impure alizarin deposit. Dissolve this precipitate in alcohol or in dilute ammonia, and treat the solution with hydrate of aluminum. Boil the aluminum compound thus formed with carbonate of sodium, and, after freeing it from resinous impurities by digestion with ether, decompose it with hot hydrochloric acid. Wash the alizarin thus separated, dry it by simple exposure to air, and purify it by repeated crystallisation out of alcohol.

2. Sublime on a paper an alcoholic extract of madder. This method yields the purest alizarin.

Props. Red prisms; sublimes at 419° F.; odourless, tasteless, and neutral to test-paper; sparingly soluble in water, even at the boiling temperature; soluble in alcohol and ether; not decomposed by hydrochloric acid; dissolved, without decomposition, by strong sulphuric acid; soluble in solutions of the alkalies and their carbonates; acids precipitate alizarin from its alkaline solutions in orange-coloured flakes; alumina decolorises an alcoholic solution of alizarin, forming a red lake.

ALKALI. *Syn.* ALKALI, Fr.; LANGENSALZ, Ger. This word has been used in various senses, but is now usually applied to four substances only, viz. the hydrates of potassium, sodium, lithium, and ammonium (the latter being supposed to exist in the aqueous solution of ammonia). In a more general sense, it is applied to the hydrates of barium, strontium, and calcium, which, for the sake of distinction, are called the *alkaline earths*. The

following properties are characteristic of the alkalies:—(1) They are soluble in water, the alkalies proper more so than the alkaline earths. (2) They change the hue of many vegetable colouring matters; thus, they turn reddened litmus blue, yellow turmeric brown, and syrup of violets and infusion of red cabbage green. (3) They neutralise the strongest acids. (4) They precipitate most of the heavy metals from solutions of their salts as hydrates or oxides. (5) They saponify the fixed oils and fats. (6) They exert a caustic or corrosive action on animal and vegetable substances.

ALKALIM'ETRY. *Syn.* ALKALIME'TRIA, L.; ALCALIMÉTRIE, Fr. In *chemistry*, the estimation of the strength of the commercial alkalies; the art or process of determining the quantity or proportion of pure caustic alkali, or of its carbonate, in any given sample or simple solution. It is the reverse of 'acidimetry;' and it should be understood that it does not apply to alkalies occurring under any other form or condition than those just mentioned. Alkalimetric assays are now also frequently and conveniently extended to the estimation of the alkaline earths and their carbonates, as hereafter noticed.

Alkalimetrical processes. These, like those of 'acidimetry,' are for the most part founded on—the capacity of the bases to saturate acids—the estimation of the quantity of dry carbonic acid liberated from a given weight of an alkaline carbonate under the influence of a stronger acid; and, in the case of the pure alkalies—the sp. gr. of their solutions. From any one of these results the exact amount of alkali, or of alkaline carbonate, present in a sample, is easily found or calculated. These processes are, indeed, precisely similar to those described under ACIDIMETRY; but here the unknown quantity sought is the *alkali*, instead of the *acid*.

Assay. The SAMPLE is drawn from as near the centre of the cask containing the alkali as possible, and at once placed in a wide-mouthed bottle, which is then closely corked up, and numbered. Before proceeding to the assay, the contents of the bottle are thrown on a piece of dry paper, the lumps crushed small, and the whole reduced to coarse powder as rapidly as possible. The number of grains required for the trial are then at once weighed, placed in a phial or *small* glass tube, and agitated with about ½ *oz.* of hot water. After a short time allowed for repose, the clear liquid is poured off into a beaker-glass or other vessel in which the trial is to be made. This process is repeated with a *second* and a *third* quantity of water, or until nothing soluble remains, shown by the last washings not affecting the colour of turmeric paper. The greatest care must here be taken not to waste the smallest portion of the liquid, which would render the results inaccurate.

To the solution in the beaker-glass, a little solution of litmus is added, unless the acid is tinted with it, when it is unnecessary. The solution is now heated until near its boiling-point, and a piece of white paper or porcelain put behind it, to better show up the changes of colour. The alkaline solution is now treated with the standard test-acid, which is poured carefully from an alkalimeter or Mohr's burette, until the solution, after turning a purple red, suddenly assumes a pink colour. Neutralisation being thus effected, the operator allows the sides of the alkalimeter or burette to drain, and then either 'reads off' the number of divisions which have been consumed, or (if using the test-acid by weight) determines the quantity by again weighing the alkalimeter. The common practice is to allow two drops (= ½th of an alkalimetrical division by VOLUME, or 2 gr. by WEIGHT) for over-saturation, which is, therefore, deducted from the 'observed quantity' of the test-liquor employed.

In testing solutions of the PURE or CAUSTIC ALKALIES, the colour, on neutralisation, suddenly changes from blue to pink or red, without any intermediate vinous or purple colour being produced.

The quantity of test-acid used gives the absolute or per-centage composition of the sample examined, according to the constitution of the test-acid used.

Standard Acids. The various test-acids in use as described below, each being used by different operators as they think best.

The most convenient *test-acid*, or normal solution, both for commercial and chemical assays, is perhaps dilute sulphuric acid, which, when intended to be used VOLUMETRICALLY, has the sp. gr. 1·032 at 60° Fahr., and contains in 100 alkalimetrical divisions 1000 water-grains measure, or 1 litre, exactly 49 gr. (or grammes) of sulphuric acid; and when intended to be used GRAVIMETRICALLY, or by weight, has the sp. gr. 1·033, and contains in 1000 gr. (or grammes) weight exactly 49 gr. (grammes) of sulphuric acid; and, in both cases, consequently corresponds to 1 equiv. of every other base. These dilute acids are easily prepared by mixing 1 part of the concentrated *acid* with 11 or 12 parts of distilled water; the precise quantity depending on the strength of the acid employed, and must be so arranged that 1000 grains shall exactly neutralise 1000 grains of water containing 53 grains of pure anhydrous sodium carbonate.

This acid (as well as all those hereafter mentioned) may be kept faintly tinged with litmus, which is often more convenient than tinging the alkaline solution at the time of making the assay.

It will at once be seen that every alkalimeter division of the first of the above acids, and every 10 gr. of the second, represent the $\frac{1}{100}$th part, or 1% of alkali whenever the equivalent weight[1] of the latter is taken for the assay. Every 1-10th part of an alkalimeter-division (or every drop), and every grain weight (when a Schüster's alkalimeter is employed) then

[1] See Table II, at the end of this article.

respectively represents the $\frac{1}{10}$ of 1%; and the result sought is obtained without the necessity of any calculation.

This is obvious—for if the equivalent of a pure alkali or of its carbonate (*i. e.* one of 100%) requires an equiv. (100 alkalimeter-divisions, or 1000 gr.) of test-acid to saturate it, an alkali or alkaline carbonate of 75%, 50%, or 25%, will respectively require only 75, 50, or 25 divisions, or 750, 500, or 250 gr.; and so of other strengths in proportion. The only precaution necessary is always to take the *standard weight* for the assay answering to the equiv. of the denomination of the *per-centage* result sought. Thus, in testing a carbonate of potash, we may either wish to determine its per-centage richness in 'dry carbonate,' or in 'pure potassa,' the latter being usually the case. To obtain the first, we must take 69 gr. for the assay; and to obtain the second, 47 gr. With CAUSTIC ALKALIES, or mixtures containing them, the weight, in grains, taken for the assay, must always correspond to the equiv. of the *pure base*. See Table II, at the end of this article.

In *commercial assays*, when 100 gr. (or some aliquot part thereof) are taken for trial, the *per-centage* result is obtained from the number of *alkalimeter-divisions*, or the number of grains, of the test-acid consumed, by the common Rule of Proportion. Thus:—A crude sample of *potash* having taken 90 alkalimeter-divisions of *test-acid* to neutralise it, would contain—

100 : 47 :: 90 : 42·30

or nearly 42½ per cent. of *pure potassa*. If only 50, 25, or 20 gr. are tested, the result must, of course, be double, quadruple, &c., as the case may be. Or the third term of the proportion may be multiplied by the denominator of the fraction representing the aliquot part. This, in the case of 50 gr. (repeating the above example), would be—

100 : 47 :: 45 × 2 : 42·30%

as before; but even these easy calculations may be simplified, as is shown below.

One of the advantages, and not the least, attending the use of test-acids corresponding to equivalents, is, that by means of the simple Rule of Three, the *per-centage* quantity of *alkali* may be found, whether 100 or any other number of grains have been submitted to trial. For—The weight of the sample tested (in grains) bears the same relation to the equivalent weight of the alkali under examination, that the number of alkalimeter-divisions or of the grains of test-acid consumed, do to the per-centage of alkali sought. Thus, with a sample of 33 gr. of pearlash taking 35 alkalimeter-divisions or 350 grains (every 10 gr. being = 1%) of test-acid for neutralisation, this would be—

33 : 47 :: 35 : 49·85%

or nearly 50 per cent. of pure potassa. By substituting the equiv. of the dry carbonate of potash (69), for that of pure potassa used above, the quantity of that article corresponding to the same weight of the pure alkali may be at once found. Repeating the last example this will be—

33 : 69 :: 35 : 73·18%

or nearly 73½ per cent. The same applies to all the alkaline bases and their carbonates.

For commercial purposes, there is used, amongst others, an empirical solution, as a test-acid for potassa, soda, and ammonia, to save the necessity of calculation.

This is dilute sulphuric acid having a sp. gr. of about 1·071; 100 alkalimeter-divisions (1000 water-grains measure) exactly saturate 100 gr. of pure potassa, or 113 gr. of anhydrous carbonate of soda. The number of measures consumed, read off by mere inspection from the scale of the alkalimeter, gives the exact *per-centage* of alkali in the sample examined, for POTASH; and by multiplying it by ·66, that for SODA also. By employing ·362 as the multiplier, it gives the like result for AMMONIA. In fact, occasionally, in order to save the necessity of any calculation, two 'test-acids' are frequently employed—the one for *potash* and the other for *soda*.

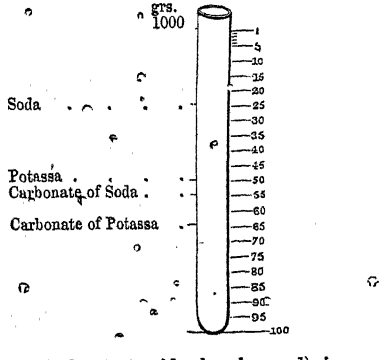
These are made by diluting sulphuric acid to a sp. gr. of near 1·071 and 1·086 respectively; 1000 grains, by measure, of the first, neutralising exactly 100 grains of pure potassa, or 113 of pure anhydrous soda carbonate, and the latter neutralising exactly 100 grains of pure soda, or 171 gr. of pure anhydrous sodium carbonate.

There is another system of preparing standard acids by means of a Faraday's alkalimeter. A strong acid is prepared by diluting sulphuric acid to a sp. gr. of 1·1268 at 60°, and 455·7 grains exactly neutralise 100 of anhydrous carbonate of soda.

The glass tube here referred to, and known as Faraday's ALKALIMETER, is graduated centessimally, in the usual manner; but opposite the numbers 22·1, 48·62, 54·43, and 65, are cut the words '*soda*,' '*potassa*,' '*carbonate of soda*,' and '*carbonate of potassa*,' to indicate the quantity of the *test-acid* to be employed for each of these substances. (See *engr.*) It is used by pouring the *test-liquid* into it until it reaches the line marked against the alkali, or carbonate, under examination, the remaining divisions being filled up with pure water, and the whole well mixed by placing the thumb on the orifice of the tube and shaking it well. The measure of the resulting dilute acid must then be very carefully observed, and more water added, if required, to bring it up to the zero (0) or 1000 gr. on the scale; careful agitation being again employed, as before. The *test-acid*, thus prepared, is then added, with the usual precautions, to the sample until exact neutralisation is effected. The quantity consumed for this purpose, read off from the graduated scale, expresses the exact *per-centage* of the pure ALKALI, or of its CARBONATE, as the case may be, contained in the sample examined, provided 100 gr. have been taken for the assay.

Another method sometimes used is that of

M. Mohr, and practised as follows:—The alkaline solution, slightly coloured blue with litmus, is strongly supersaturated with a *standard acid* (sulphuric or oxalic) of known strength, supplied from an alkalimeter in the usual manner; the last traces of carbonic anhydride being removed by boiling, shaking, blowing into the flask, and, finally, sucking out the air. A standard solution of caustic soda (of a strength exactly corresponding to



that of the test-acid already used) is now cautiously added, drop by drop, until the colour, rendered yellowish-red by the acid, just appears of a light blue. The difference between the quantity of the solution of the test-alkali and of the test-acid consumed, expresses the exact quantity of acid neutralised by the alkali, and hence, also its strength.

Besides the above methods, the alkaline carbonates are analysed, by the loss of carbonic anhydrid (carbonic acid) they suffer, by being decomposed by a strong acid. The best method in use is that of MM. Fresenius and Will, and depends on the same principle, and is performed in a similar manner and in a similar apparatus to that described under ACIDIMETRY; the only difference being that here the uses of the small tube (*e*) is dispensed with, and that the alkali is tested under the form of carbonate, instead of bicarbonate.

Oper. The smaller flask (*B*) is about half filled with concentrated sulphuric acid, and the sample of alkali, in solution (under the form of carbonate), being placed in the larger flask (*A*), water is added until it is about one third full. The tubes are then fitted into the apparatus quite air-tight; the end of the tube (*b*) is fastened with a piece of wax, and the whole is very carefully weighed. The apparatus is now removed from the scales, and a perforated cork, or a small piece of India-rubber tube, being temporarily applied to the end of the tube (*h*), a few bubbles of air are sucked out of the flask (*B*) by means of the lips; the consequence of which is, that on removing the mouth, the acid in (*B*) ascends to a certain height in the tube (*c*). If in a short time this little column of liquid maintains its height in the tube, it is a proof that the apparatus is perfectly air-tight, and as it should be. Suction is now again cautiously applied to the tube (*h*) and a little of the acid in (*B*) made to flow over into the flask (*A*), the quantity being proportionate to the vacuum produced by suction, and capable of being regulated at will. No sooner does the acid come into contact with the carbonate in the flask (*A*), than the evolution of carbonic acid commences, and this, from the construction of the apparatus, having to pass through the concentrated sulphuric acid, is rendered quite dry before it can escape by the tube (*d*) into the atmosphere. Whenever the effervescence flags, a little more acid is sucked over, until the whole of the carbonate is decomposed; after which an additional quantity is made to pass into (*A*), so as to raise the temperature considerably, for the purpose of expelling all the gas absorbed by the fluid during the operation. As soon as this is effected, the wax is removed from the aperture (*b*), and suction applied to (*h*), until all the carbonic acid in the apparatus is replaced by atmospheric air. The whole is now allowed to cool, and (together with the piece of wax removed) is again accurately weighed. The loss of weight gives the exact amount of dry carbonic anhydride, or anhydrous carbonic acid, which was contained in the specimen, from which the weight of PURE ALKALI is readily estimated, as every 22 *gr.* of dry carbonic acid gas evolved represents exactly 31 gr. of pure SODA, 47 gr. of pure POTASSA, &c. &c.; these numbers being the equivalents of the respective substances from which the *per-centage* strength may be found by the rule of proportion, as before explained.

Thus, in the case of a 100-gr. sample of carbonate of soda which has lost 15¼ gr. of carbonic acid, by the assay, this would be—

22 : 31 :: 15¼ : 21·48$\frac{9}{11}$

or nearly 21½ per cent. of pure soda. If 53, the equiv. of anhydrous carbonate of soda, be taken, instead of 31 (the eq. of pure soda), the answer would have been, in the terms of that substance, 36·748$\frac{9}{11}$, or nearly 36¾ per cent. When an aliquot part of 100 gr. has been taken for the assay, either the result, or the third term of the proportion, must, of course, be multiplied by the denominator and divided by the numerator of the fraction representing such aliquot part.

By multiplying the weight of *carbonic anhydride* lost by the numbers opposite the names of the respective alkalies and their carbonates in the second column of the following *Table*, the equivalent *per-centage* value of the carbonates examined may be obtained in terms corresponding to the various denominations named therein, when 100 gr., or any aliquot part of 100 gr., have been tested; the result, in the latter case, being, of course, multiplied as before.

By taking certain standard weights for the assay, the quantity of carbonic acid evolved

may be made to furnish the *per-centage* strength or value of the specimen in the terms of either the pure or carbonated alkalies, whether in their *anhydrous* or *hydrated* state. The numbers in the second column of the following *Table* represent the quantity in grains and decimal parts of each of the substances named in the first column, equivalent to one grain of *carbonic anhydride*. These numbers, as already mentioned, may be employed as factors for converting any numbers representing grains of that acid into the equivalents of these substances, true to 4 places of decimals; and further, they furnish us with the data for determining the exact number of grains which must be tested, so that the loss of weight in *carbonic anhydride* shall at once give us the *per-centage* richness of the sample in the terms of the denomination for which it is taken. The numbers in the third column of the *Table*, formed by simply moving the decimal point of the numbers in the second column one figure further to the right, indicate the weights to be taken for the assay, so that the loss of weight, reckoned in tenths of a grain, exactly represents the *per-centage* strength in the terms sought. The weights corresponding to the numbers in the fifth column, give the same results, provided the loss of weight is reckoned in quarter-grains; those in the sixth column effect the same when the loss of weight is reckoned in half-grains; whilst those in the last column require that the gas eliminated should be counted in grains, and are simply the numbers in the second column of the *Table* multiplied by 100, or reproduced by moving the decimal point two figures to the right.

TABLE I.—*Multipliers and Standard Weights for the Principal Alkalies and their Carbonates.* (COOLEY.)

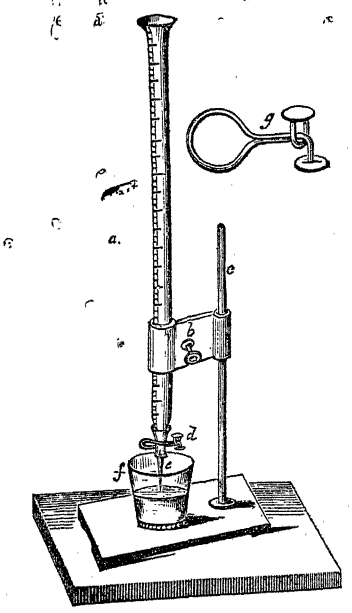
NAMES, &c.	Factors or Multipliers for converting the *weight* of *carbonic acid* expelled into *real strength*.	Quantity (in *grains*) to be taken, so that the *per-centage value* of the *sample* tested shall be shown in the terms of *any* of the *denominations* given, by the weight of the evolved Carbonic Acid reckoned—				
		in *tenths* of a grain.		in *quarter-grains.*	in *half-grains.*	in *grains.*
		Whole numbers and decimals.	Nearest common numbers.			
AMMONIA (pure, gaseous)	·77273	7·727	7¾	19⅓	38⅝	77 3/10
Carbonate of ammonia (neutral, anhydrous)	1·77273	17·727	17¾	44 5/16	88⅝	177¼
Carbonate of ammonia (neutral, crystallised)	1·9773	19·773	19¾	49 7/16	98⅞	197¾
Sesquicarbonate of ammonia (translucent)	2·6818	26·818	26 13/10	67 1/10	134 1/10	268⅕
Bicarbonate of ammonia (crystallised)	3·5909	35·909	35 9/10	89 13/16	179⅝	359 1/10
POTASSA (anhydrous)	2·1364	21·364	21½	53½	107	213⅜
Hydrate of potassa	2·54546	25·455	25 5/11	63⅝	127¼	254 1/10
Carbonate of potassa (anhydrous)	3·1364	31·364	31⅜	78½	157	313½
" " (granulated)	3·7727	37·727	37 1/10	94 3/10	188⅝	377¼
" " (crystallised)	3·9545	39·545	39⅝	99	198	395½
Bicarbonate of potassa (crystallised)	4·5454	45·454	45 1/10	113¾	227½	454½
SODA (anhydrous)	1·4091	14·09	14 1/10	35¼	70½	141
Hydrate of soda	1·8182	18·182	18⅕	45½	91	182
Carbonate of soda (anhydrous)	2·4091	24·091	24 1/10	60¼	120½	241
" " (crystallised)	6·5	65·	65	162½	325	650
Sesquicarbonate of soda (dry; theoretical)	2·9091	29·091	29 1/10	72½	145	290
" " (Ph. L., 1836)	3·7273	37·273	37¼	93¼	186½	373
" " (average commercial)	3·7954	37·954	38	94½	189¾	379½
Bicarbonate of soda (crystallised)	3·8182	38·182	38⅕	95½	191	382
LITHIA (pure, anhydrous)	·6818	6·818	6 13/10	17 1/10	34 1/10	68⅕
BARYTA (pure, caustic)	3·4773	34·773	34⅘	86⅞	173¾	347¾
LIME (pure, caustic)	1·2727	12·727	12¾	31¾	63½	127¼
MAGNESIA (pure, anhydrous)	·9090	9·091	9 1/11	22¾	45½	91

In this ingenious method of alkalimetry it is absolutely necessary that the whole of the alkali in the specimen tested should be in the state of neutral carbonate. If a sample of potash contains any caustic alkali (as the potashes and pearlash of commerce generally do), Fresenius and Will direct it, previously to being tested, to be triturated with its own weight of pure quartzose sand, and about one third of its weight of carbonate of ammonia; and the resulting mixture, placed in a small iron capsule, or a porcelain crucible, to be moistened with water, and exposed to a gentle heat until it becomes quite dry, and all the ammonia is expelled. If the sample contains any bicarbonate or sesquicarbonate, it must be heated to dull *redness* before being placed in the apparatus and tested. In the case of crude soda (particularly *soda-ash*), the proportion of carbonate of ammonia should be equal to at least one half the quantity operated on. With both alkalies, if the sample contains sulphides, sulphites, or hyposulphites, the same method is to be followed, except that solution of ammonia, instead of water, is to be employed for moistening the powder. To remedy the error which would arise from the apparent amount of carbonic anhydride liberated during the assay, being swelled by the disengagement of 'sulphuretted hydrogen' or sulphurous acid from these substances, a small quantity of neutral (*i. e.* yellow) chromate of potash may be added to the alkaline solution in the flask (*A*); by which they will be converted into sulphates, sulphur, and water, which will remain in the apparatus, the carbonic acid only being evolved. "As most sorts of soda of commerce contain one or other of the substances (just) named, and as it is far more simple to add at once some chromate of potassa to the soda solution, than to test the latter for either of the three salts—it is always advisable to make it a rule, in the examination of SODA, to add some *chromate of potassa.*" (Fresenius.)

If the sodium or other carbonate under analysis contains much chloride, the addition of more sulphuric acid than necessary must be avoided, and the carbonic anhydride expelled by gently heating over a water bath, and not by the addition of excess of acid.

To obviate the difficulties and to give greater precision and delicacy to volumetrical assays, the instrument known as Mohr's ALKALIMETER, or Mohr's BURETTE, and which is figured in the margin, may be employed. By means of it the test-acid in the graduated tube (*a*) may be added to the alkaline solution in (*f*), in any quantity at a time, however minute, by merely pressing the handles of the clamp (*d*) with the thumb and finger. The terminal tube (*e*) has its lower orifice very small, and it is connected with the burette by means of a small piece of vulcanised India-rubber tube, on which the clamp (*d*) acts. (See *engr.*) The inner cylindrical part of the arm (*b*) is lined with cork, to prevent injury to the glass burette, and to hold it the more firmly.

Generally the alkali in the specimen examined may be in either the caustic or carbonated state, or it may consist of any mixture of caustic alkali, or carbonates; but it is



absolutely necessary for accurate results, that it should be *free* from *sulphides*, *sulphites*, and *hyposulphites*, as sulphuric acid acts upon these substances as well as on carbonates. The presence of chlorides does not interfere with the accuracy of the assay, unless a higher degree of heat is employed than that necessary for the expulsion of the absorbed carbonic acid. The SODA-ASH of commerce generally contains all these substances besides common salt, sulphate of soda, and insoluble matter, which do not interfere. Rough samples of POT-ASHES and PEARL-ASH also generally contain some sulphides, though not a large quantity. Various plans have been proposed to avoid this source of error. The best is that of MM. Fresenius and Will, given above, in which the value of the carbonates is estimated by their yield of carbonic anhydride.

The difference between an assay of a sample of the unprepared alkali and of another which has been treated as above, indicates the quantity of impurities contained in them under the forms just referred to. The presence of these substances in the commercial alkalies may be detected by the following tests:—

Sulphides. The addition of sulphuric acid causes the evolution of an odour like that of bad eggs. The sample in solution yields a black precipitate with acetate of lead paper.

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But the most delicate test is the splendid violet-blue colour with nitro-prusside of sodium.

Sulphites and hyposulphites. A solution of the alkali, insufficient for saturation, being added to sulphuric acid tinged reddish-yellow with bichromate of potash, occasions a greenish tinge (owing to the formation of oxide of chromium), when these are present. Some hydrochloric acid added to a clear solution, after some time causes a turbidness and odour of sulphur.

Chlorides yield a copious curdy precipitate with nitrate of silver, soluble in ammonia, and reprecipitated by excess of nitric acid.

The amount of pure caustic alkali in a sample of alkali is best determined by Fresenius's method, as follows:—The total amount of pure alkali, both caustic and carbonated, expressed in per-cents. of carbonate of soda or carbonate of potassa, is ascertained by *any* of the usual methods. The apparent quantity of alkali per cent. is then determined, without previous treatment of the sample with carbonate of Ammonia, by the method of Will and Fresenius (p. 58). The difference between the results indicates the *per-centage* of dry caustic alkali present; or if the volumetric method be in use, it can be often fairly estimated by adding the first portions of the test-acid very gradually to the sample, carefully observing the effect. When the effervescence at length commences, the weight or measure of the test-liquor expended shows the quantity of pure caustic alkali under treatment (nearly). The result depends upon the fact, that little or no carbonic acid gas is expelled from the liquid on the addition of the test-acid, until the caustic portion is very nearly neutralised.

The quantity of WATER or MOISTURE, per cent., present in an alkaline carbonate, is indicated by the loss of weight which 100 gr. suffer on gentle ignition in a loosely covered iron dish or platinum crucible. So also with samples containing caustic alkali, except that here, the water of hydration (= 1 equiv. = 9) is not expelled from the 'caustic' portion, and must therefore, be determined by calculation.

Other matters deserving the serious attention of the operator are—hitting the exact point of neutralisation, and—preparing the test-acids of the proper strength. The method of effecting the former correctly, has been already referred to in this article, and is also fully noticed under ACETIMETRY and ACIDIMETRY.

Test-acids may be very simply prepared, by gradually diluting concentrated sulphuric acid with water until it is reduced to the proper strength; the dilution being made in a glass vessel containing a "hydrostatic bead," exactly corresponding to the desired specific gravity of the dilute acid. When the proper point is reached, and the mixture has again acquired the normal temperature of 60° Fahr., the bead rises from the bottom of the vessel, and floats about indifferently in the middle of the liquid. The sp. gr. may then be carefully ascertained by means of an hydrometer or a specific gravity bottle; after which the strength must be accurately determined by means of a standard solution of either pure anhydrous carbonate of soda or pure caustic soda. An acid of *any* given strength or saturating power may also be prepared in the following manner:—49 parts of commercial sulphuric acid (oil of vitriol), sp. gr. 1·825, contain nearly 40 parts or 1 equiv. of anhydrous sulphuric acid; if we, therefore, wish to prepare a dilute acid containing in every 1000 grains weight, or measure, exactly 1 equiv. of hydrated sulphuric acid, we have only to make 49 gr. of such acid up to 1000 gr. weight or measure with pure water. After it has recovered the proper temperature, its sp. gr., or rather its saturating power, must be carefully tried, and, if necessary, readjusted. As, however, it very often happens that the oil of vitriol employed is not so strong as that above referred to, it is better first to test its strength with pure anhydrous carbonate of soda, and to calculate the quantity required by the Rule of Proportion. Every 53 gr. of the dry carbonate are equal to 40 gr. of 'dry sulphuric acid.' Suppose we find the oil of vitriol to contain only 72½ of hydrated acid, then—

100 : 40 :: 72 : 55·55

or, instead of only 40 gr., fully 55½ gr. will be required, which are to be made up with water to 1000 gr., as before. Finally, the diluted acid must be very carefully re-tested, and if found correct, at once put into a well-stoppered bottle, and labelled, for use. Too much care cannot be taken to ensure the *test-liquid*, whether for alkalies or acids, being of the proper strength, of which the specific gravity alone is an insufficient proof. In practice, so small a quantity only of test-acid as that referred to above is, of course, seldom made; but as any larger quantities are mere multiples of the smaller one, the necessary proportions to be employed are easily calculated. The common plan is to prepare one or more gallons or quantities of 10 *lbs.* each, and to preserve the liquid in stoppered green glass 'Winchester-quart bottles,' so that it may be always ready for use.

Although, as may be inferred from the text, sulphuric acid is generally used as the standard acid, yet oxalic acid in pure crystals is recommended by M. Mohr, and answers admirably, and is prepared and used exactly in the same manner.

TABLE II.—*Alkalimetrical Equivalents.*

Grains.		Grains.	
22	Carbonic anhydride (dry).	17	AMMONIA (pure or gaseous).
63	Oxalic acid (crystallised).	43½	Carbonate of ammonia (neutral, hydrated).
49	Sulphuric acid (liquid, *monohydrated*, sp. gr. 1·8485).	59	Sesquicarbonate of ammonia (Ph. L.; translucent, hydrated).
75	Tartaric acid (crystallised).	79	Bicarbonate of ammonia (crystallised).
1000	Dilute sulphuric acid (sp. gr. 1·033).	47	POTASSA (anhydrous).
Water-gr. measure.		56	Hydrate of potassa (pure caustic potassa).
1000	„ „ „ (sp. gr. 1·032).	69	Carbonate of potassa (anhydrous).
		83	„ „ (granulated, commercial).
		87	„ „ (crystallised).
		100	Bicarbonate of potassa (crystallised)
		31	SODA (anhydrous).
		40	Hydrate of soda (pure caustic soda).
		53	Carbonate of soda (anhydrous).
		143	„ „ (crystallised).
		84	Bicarbonate of soda (crystallised).
		83½	Sesquicarbonate of soda (average commercial).
		84	Bicarbonate of soda (crystals, or cryst. powder, free from moisture).
		15	LITHIA.
		24	Hydrate of lithia.
		37	Carbonate of lithia.
		76½	BARYTA (pure, caustic).
		85½	Hydrate of baryta.
		98½	Carbonate of baryta.
		28	LIME (pure, caustic; *i. e. quick-lime*).
		37	Hydrate of lime (*slaked lime*).
		50	Carbonate of lime (*chalk; marble*).
		20	MAGNESIA (pure, calcined).
		42	Carbonate of magnesia (dry, neutral).
		48½	„ „ (ordinary commercial).
		52	STRONTIA (pure, caustic).
		61	Hydrate of strontia.
		74	Carbonate of strontia.

ALKALOID. *Syn.* VEGETABLE ALKALI, ORGANIC BASE; ALKALOÏDES (*pl.*, -IDES, or -IDÆ), L.; ALCALOÏDE, ALCALI ORGANIQUE, Fr. In *chemistry*, a name commonly given to any proximate principle of vegetable origin possessing alkaline or basic properties, however feeble. In its most extended sense, the term embraces all organic bases, whether obtained from the animal or vegetable kingdom, or produced artificially. The alkaloids form a numerous and important class of bodies. They exist in nature nearly always in the form of salts, the acid being often, like themselves, peculiar to the plant, or class of plants, in which they are found; whilst the medicinal activity of the latter, in most cases, almost entirely depends on their presence.

Prep. The following general methods of procuring the alkaloids will be found applicable to such as full directions are not given for under their respective heads:—

1. (When the *base* is *insoluble in water, non-volatile*, and *existing in the plant* in an *insoluble form.*) The bruised plant is boiled or macerated in water acidulated with hydrochloric or acetic acid, and the liquor, after filtration, is neutralised with an alkali (ammonia, potassa, lime, or magnesia); the resulting precipitate is purified by re-solution in dilute acid, digestion with a little animal charcoal, and subsequent crystallisation, or re-precipitation with an alkali; or the first precipitate is purified by dissolving it once, or oftener, in boiling alcohol, which yields the PURE ALKALOID either on cooling or by evaporation.

2. (When the *base* is *insoluble in water*, and *non-volatile*, but *existing in the plant* in a *soluble state.*) The bruised or sliced plant is boiled or macerated in water, and the filtered liquor precipitated and otherwise treated as before.

3. (When the *base* is *soluble in water*, and *non-volatile.*) An infusion made with very dilute acid (hydrochloric or acetic), is concentrated by a gentle heat; and the residual liquor treated with potassa (or concentrated solution of ammonia) and ether (conjointly); after repose, the etherial solution is decanted and evaporated. For those alkaloids which are insoluble in ether (as morphia and cinchonia), the previous process may be adopted.

4. (When the *base* is both *soluble in water* and *volatile.*) The vegetable, in a bruised or divided state, or its extract, is alkalised with potassa and distilled; the distillate is neutralised with dilute oxalic or sulphuric acid, and carefully evaporated to dryness; the residuum is next digested in alcohol, and the resulting tincture agitated with potassa and ether, the

former being in quantity just sufficient to seize on all the acid; lastly, the etherial solution thus formed, on careful evaporation, leaves the alkaloid nearly pure. It may be further purified by cautious distillation.

As some of the alkaloids are soluble in excess of the alkaline precipitant, over-saturation should be carefully avoided; or the precipitant may be used under the form of carbonate or bicarbonate. When lime and magnesia are employed, they are boiled for a few minutes with the solution.

Props. Alcoholic or aqueous solutions of the alkaloids generally exhibit an alkaline reaction with vegetable colours. Like the alkalies, also, they combine with acids to form salts which, when dissolved in water, are capable of producing the ordinary phenomena of saline double decomposition. Their taste is usually intensely bitter.

The majority of the natural alkaloids contain carbon, hydrogen, nitrogen, and oxygen, and are, at ordinary temperatures, solid, and not volatile without decomposition. Some natural alkaloids contain carbon, hydrogen, and nitrogen only; these are, for the most part, liquid at ordinary temperatures, and can be distilled without decomposition. The greater number of the artificial alkalies are composed of carbon, hydrogen, and nitrogen; some, however, contain oxygen in addition. Alkaloids have also been obtained artificially, in which nitrogen is replaced by phosphorus, arsenic, antimony, or bismuth. Most of the alkaloids, as they are obtained in the free state, correspond in function to ammonia, NH_3, rather than to the fixed alkalies; that is to say, they form salts by direct union with acids, without elimination of water or any other substance. In order to make them strictly comparable to the fixed alkalies, they require, like ammonia, the addition of water (H_2O) to their formulæ; they may then be considered as hydrates of compound radicles analogous to ammonium.

Physiological action. The alkaloids generally possess great medicinal power; some of them act with terrific energy, and are the most violent poisons with which we are acquainted. Perfectly pure aconitia is about 200 times more poisonous than arsenic, and at least 50 times more poisonous than ordinary medicinal prussic acid. The greater number act on animals in the same way as the plants which produce them, provided they are given in proportionately small doses. Many of them, when judiciously administered, are most valuable medicines.

Pois., Ant., &c. Some of the alkaloids act as narcotic or stupefying poisons; others, are classed with the narcotico-acrid poisons, or those which produce both narcotism and irritation of the parts they touch. The general symptoms produced by opium and its preparations may be taken as an example of the former; those from aconite and strychnia, of the latter. In large doses of the greater number, narcotism predominates; in smaller ones, irritation; they are rarely coexistent.—*Treatm.* No common antidote to the effects of this class of substances has yet been discovered. The only safe treatment, of at all general application, is to immediately clear the stomach by means of a strong and quick-acting emetic (as *sulphate of zinc*), or the stomach-pump, and to administer copious and continued draughts of astringent vegetable solutions (as of *tannin, nut-galls, oak-bark,* or what is always at hand—*very strong tea* or *coffee*). These may be followed by or combined with a smart purge of *castor oil,* as soon as the stomach is thoroughly cleared of the poison. M. Bouchardat strongly recommends a solution of *iodine,* 3 gr., and *iodide of potassium,* 6 gr., in *pure water,* 16 fl. oz., in cases of poisoning by OPIUM, ACONITE, COLCHICUM, DEADLY NIGHTSHADE, HEMLOCK, NUX VOMICA, &c., or by the alkaloids obtained from them—ACONITINE, ATROPIA, COLCHICINA, CONIA, MORPHIA, STRYCHNIA, &c., or their salts; but *not* where foxglove or digitaline has been taken. The stomach having been well emptied by an emetic, the solution is to be given by wineglassfuls for some time; the vomiting being still encouraged during the early part of the administration of the antidote. In the case of narcotics (as *opium, morphia,* &c.), this is to be followed by the free use of a strong infusion of coffee. According to Dr. Garrod, *purified animal charcoal* is an '*excellent antidote*' to many of the alkaloids, including those above enumerated, when taken in poisonous doses; as it not merely absorbs them, but, for the most part, renders them inert. To be serviceable it should be recently prepared and fresh-burnt; and should be given in doses of about an ounce at a time, diffused in warm or tepid water, and frequently repeated. The vomiting which follows its use, owing to the warm water, proves advantageous; but after a sufficient time, may be lessened by employing less water, or cooler or even cold water. Drowsiness, if present, may be combated by the subsequent use of strong coffee or tea, as before. We have seen this plan succeed in several cases.—*Lesions.* These, like the symptoms, vary. In some cases there are redness and inflammation of the stomach and intestines, and turgescence of the vessels of the lungs and brain; in others, these appearances are either slight or wholly wanting. Where there has been much cerebral disturbance, traces of congestion are usually discernible.

Detec., Tests, &c. The identification of the pure alkaloids is extremely simple; but their detection, when combined with organic and colouring matters, is a task of considerable difficulty. One or other of the following plans may be adopted for this purpose:—

1. (Merck.) The matter under examination is digested, for several hours, with concentrated acetic acid, added in sufficient quantity to produce a strongly acid reaction; the fluid portion

is then strained from the insoluble matter, and the latter being washed with water acidulated with acetic acid, the mixed liquors are gently evaporated to dryness in a water bath; the residuum of the evaporation is boiled first with rectified spirit, and next with rectified spirit acidulated with acetic acid; the mixed liquors are again evaporated, the residuum redissolved or diluted with distilled water, and carbonate of soda or potassa added to feebly alkaline reaction, and the whole, after evaporation to the consistence of a syrup, set aside to repose for 24 hours; it is now again diluted with water, filtered, and the insoluble portion washed with cold distilled water, and digested with concentrated acetic acid; this last solution is diluted with distilled water, and decoloured with pure blood-charcoal (if it be necessary); the fluid, either at once, or after cautious evaporation, may then be tested for the alkaloids, in the usual manner. The charcoal previously used should also be tested in the way described below. This method answers admirably with all the NON-VOLATILE ALKALOIDS, and may be applied to the stomach and viscera, and their contents, and to food, &c., in cases of poisoning.

2. (Stas.) The suspected matter, in a finely divided state, is digested, at 160° to 165° Fahr., with twice or thrice its weight of strong alcohol acidulated (according to the quantity) with ½ *dr.* to 2 or 3 *dr.*, or more, of pure oxalic or tartaric acid. After a sufficient time, and when the whole has become quite cold, it is thrown on a filter, and the undissolved portion, after being squeezed dry, is washed with strong alcohol. The mixed and filtered alcoholic liquids are then evaporated at a temperature not exceeding 95° Fahr., and, if no insoluble matter separates, the evaporation is continued nearly to dryness;[1] but if fatty or other insoluble matter separates during the process of concentration, the concentrated fluid is passed through a moistened filter, and the filtrate evaporated nearly to dryness, as before. The residuum is next digested with absolute alcohol, in the cold, the insoluble portion, after filtration, washed with alcohol, and the mixed filtrates again evaporated in the air, or in vacuo. The acid residue is now dissolved in a little distilled water, and bicarbonate of soda added as long as effervescence ensues. To this mixture 4 or 5 times its volume of ether is added, and after lengthened agitation (the bottle or tube being held in a cold wet cloth), the whole is allowed to repose for a short time. A little of the supernatant ether is now removed to a small glass capsule or watch-glass, and allowed to evaporate spontaneously.[1] When this leaves oily streaks upon the glass, which gradually collect into a small drop, which emits, when gently heated, a disagreeable, pungent, and stifling odour, the presence of a LIQUID VOLATILE BASE or ALKALOID is inferred; whilst a solid residue or a turbid fluid with small solid particles floating in it, indicates a NON-VOLATILE SOLID BASE.[2] In either case the blue colour of reddened litmus is permanently restored by the residuum. If no residuum is left on the capsule, some solution of pure soda or potassa is added to the liquid, the whole well agitated for several minutes, and the ether (after repose) decanted; an operation which is repeated with fresh ether a second, third, and even a fourth time. The base, or bases (if any are present), will now be found in the mixed ethereal solution, which is, therefore, tested as before. The presence of an alkaloid being detected, the mixed ethereal solutions are allowed to evaporate spontaneously, care being taken, if a volatile alkaloid be present, to neutralise the liquid with an acid before the final evaporation. The last residuum is then tested for the particular alkaloid present, as before.[3]

This method, according to Stas, answers well for all the ALKALOIDS which are soluble in ether; including—ACONITIA, ANILINE, ATROPIA, BRUCIA, CODEIA, COLCHICINA, CONIA, DELPHIA, EMETINA, HYOSCYAMINE, MORPHIA (?), NICOTIA, PETININE, PICOLINE, SOLANINE, STRYCHNIA, VERATRIA, &c. By means of it Stas found nicotia in the heart-blood of a poisoned dog. With such alkaloids as are, however, only very sparingly soluble in ether, (as morphia, for instance,) the result must, necessarily, be doubtful. To detect these, as well as all the alkaloids which are insoluble in ether, it is, therefore, necessary, as directed by Otto, to add to the alkaline fluid left by the decantation of the ether, sufficient solution of soda to dissolve the morphia, &c., (if any has separated,) and after the expulsion of the last traces of the ether by a gentle heat, to add a concentrated solution of hydrochlorate of ammonia, and to allow the mixture to repose for some time in the open air. When MORPHIA is present, it separates under the form of small crystals.[4] Or the alkaline liquor may be diluted with distilled water, and treated with charcoal, and this with alcohol, in the manner noticed under method 4 (*below*).

4. (Graham and Hoffmann—slightly modified.) 2 or 3 *oz.* of *purified animal charcoal* are digested in about ½ gal. of the (neutral or only slightly acid) aqueous fluid under examination, with frequent agitation, for 10 to 12 hours, or longer. The *liquid* is then filtered, and the charcoal left on the filter is washed twice with cold distilled water. The charcoal is then boiled for ½ an hour with about ½ a pint of rectified spirit of 80 or 90%; the ebullition being conducted in a flask having a very long tube, open at both ends, fitted air-tight through the cork, to prevent loss of the alcohol

[1] The evaporation according to Stas, should be conducted under a bell-glass over sulphuric acid, with or without rarefaction of the air; or in a tubular retort through which a current of air is made to pass.

[2] A merely disagreeable animal odour, *without pungency*, is here disregarded.

[3] "*Bulletin de l'Académie de Méd. Belgique*," ix, 304; "*Jahrb. f. prakt. Pharm*," xxiv, 313; &c.

[4] Otto's "*How to detect Poisons.*"

by evaporation. The spirit, which now contains the alkaloid (if any was present in the original liquor), is next filtered whilst hot, and the filtrate is submitted to distillation until the whole of the alcohol is removed. A small quantity (commonly a few drops) of solution of potassa is then added to the residual aqueous liquor, followed by 1 to 2 *fl. oz.* of pure ether, after which the whole is well agitated for several minutes, and allowed to repose for a short time. Lastly, the supernatant ether is decanted, and allowed to evaporate spontaneously, when the residuum (if any) left in the capsule may be tested by reagents, as before.

This method was devised for the detection of STRYCHNIA and NUX VOMICA in malt-liquors; but it is equally applicable to the detection of ANY ALKALOID which is soluble in ether. The CHARCOAL TEST may also be employed to detect alkaloids which are insoluble in ether; but then the base must be sought in the aqueous residuum obtained by the evaporation of the alcohol.[1]

The *presence* of the *Alkaloids* and *their Salts*, in *clear solutions*, may be thus determined:—

I. (Fresenius.)—1. The solution is rendered *very slightly* alkaline with dilute solution of potassa or soda, added drop by drop:—

a. No precipitate is formed; total absence of the alkaloids. (See 4, *below*.)

b. A precipitate is formed:—solution of potassa or soda is added, drop by drop, until the liquid exhibits a strong alkaline reaction:—

α. The precipitate redissolves; absence of *Brucia, Cinchonia, Narcotina, Quina, Strychnia*, and *Veratria*; probable presence of MORPHIA.

β. Precipitate does *not* redissolve, or *not* completely; probable presence of one or more of the first six of the above-named alkaloids:—the fluid is filtered from the precipitate, mixed with either bicarbonate of soda or of potassa, gently boiled *nearly* to dryness, and treated with water. If it dissolves completely; absence of *Morphia*; an insoluble residue indicates MORPHIA.

2. The precipitate 1. *b. β.* is washed with cold distilled water, dissolved in a slight excess of dilute sulphuric acid, neutralised with a saturated solution of bicarbonate of soda, and allowed to repose a few hours:[2]—

a. No precipitate; *absence* of *Cinchonia, Narcotina*, and *Quina*:—the solution is gently evaporated nearly to dryness, and treated with cold water:—if it dissolves completely, pass on to 4; if there is an insoluble residue, it may contain *Brucia, Strychnia*, or *Veratria*. (See 3.)

b. A precipitate:—the *filtered fluid* is treated as directed at 2. *a.*; the *precipitate* is washed with cold distilled water, dissolved in a little hydrochloric acid, ammonia is added in excess, and subsequently a sufficient quantity of *ether*, agitation being had recourse to:—

α. The precipitate formed by the ammonia *redissolves* completely in the ether, and the clear fluid separates into two layers; absence of Cinchonia; probable presence of QUINA or NARCOTINA.

β. The precipitate produced by the ammonia does *not* redissolve in the ether, or not completely; probable presence of CINCHONIA, and perhaps also of *Quina* or *Narcotina*. The filtered liquid may be tested for these alkaloids as at *a*.

3. The *insoluble residuum* after the evaporation of the solution 2. *a.*, or of the filtrate 2. *b.*, is now dried in a water bath, and digested with absolute alcohol:—

a. It dissolves completely; absence of *Strychnia*; probable presence of BRUCIA, QUINA (?), or VERATRIA:—the alcoholic solution is evaporated to dryness, and, if *quina* has been already detected, the residue is divided into *two* portions, one of which is tested for *Brucia*, the other for *Veratria*.

b. It does *not* dissolve, or *not* completely; probable presence of STRYCHNIA, and perhaps also of *Brucia* and *Veratria*:—the filtered fluid is divided into two portions, and tested separately as at *a*.

4. The original liquid 1. *a.*, may contain *Salicine*, a proximate vegetable principle closely allied to the alkaloids:—a portion is boiled with *hydrochloric acid* for some time; the formation of a precipitate shows the presence of SALICINE. (See 2, *below*.)[3]

II. (Larocque and Thibierge.) *Terchloride of gold* is recommended, by these writers, as a more decisive test for the alkaloids than the 'double chloride of gold and sodium' commonly employed for this purpose. The following are the colours of the precipitates which it produces with the aqueous solution of their salts:—BRUCIA, milk-brown, passing into coffee-brown, and lastly chocolate-brown:—CINCHONIA, sulphur-yellow:—MORPHIA, yellow, then bluish, and lastly violet; in this last state the gold is reduced, and the precipitate is insoluble in water, alcohol, the caustic alkalies, and sulphuric, nitric, and hydrochloric acid; it forms with aqua regia a solution which is precipitated by protosulphate of iron:—QUINA, buff-coloured:—STRYCHNIA, canary-yellow:—VERATRIA, pale greenish-yellow. All these precipitates, with the exception men-

[1] "*Journ. of the Chem. Soc.*," v. 173.

[2] Before setting the glass aside the liquor should be well mixed, and the glass stirrer vigorously rubbed against the sides of the vessel.

[3] For further information on this subject, see the admirable "*System of Qual. Chem. Anal.*," by Dr. C. R. Fresenius. Churchill.

tioned, are very soluble in alcohol, insoluble in ether, and only slightly soluble in water. Those with *morphia* and *brucia* are sufficiently marked to prevent these alkalies from being mistaken for each other; and those with *brucia* and *strychnia* are, in like manner, easily distinguishable.

The principal Alkaloids and their Salts, in the state of powder, or with 'conia' and 'nicotia,' in the state of an oily looking liquid, may be thus distinguished:—

1.—*a*. The powder is treated with nitric acid:—It is coloured red; probable presence of Brucia, Delphia, Morphia, or commercial Strychnia. If the reddened acid becomes violet on the addition of 'protochloride of tin,' it is BRUCIA; if it becomes black and carbonaceous, it is DELPHIA. If the powder is fusible without decomposition, and strongly decomposes iodic acid, it is MORPHIA; if it is not fusible without decomposition, and does not decompose iodic acid, it is STRYCHNIA.

b. If instead of a red, the powder strikes a green colour with nitric acid, it is SOLANIA; if it is insoluble in 'ether,' and not reddened by 'nitric acid,' it is EMETIA; if soluble in ether, not reddened by 'nitric acid,' but melts and volatilises when heated, it is ATROPIA; if it is thus affected by ether or nitric acid, but does not volatilise, it is VERATRIA. (See 2, *below*.)

2. The powder, or (with 'conia and nicotia') concentrated liquid, is treated with a drop or two of concentrated sulphuric acid:—A red colour is produced; probable presence of *Brucia, Nicotina, Salicine*, or *Veratria*. If the reddened mixture has at first a roseate hue, turning deep red on the addition of nitric acid, it is BRUCIA; if the original substance moistened with solution of potassa evolves the odour of tobacco, it contains NICOTINE; if the red colour produced by the acid is permanent and of an intense blood-hue, and the powder agglutinates into lumps like resin, it is SALICINE; if the colour is at first yellowish, changing to blood-red, and ultimately to crimson and violet, it is VERATRIA.

b. If instead of the substance being 'reddened' by strong sulphuric acid, no particular action ensues in the cold, it contains either *Conia* or *Strychnia*; if a small fragment of bichromate of potassa being now dropped in, produces a rich violet colour, it is STRYCHNIA; if the original matter on being heated, or treated with solution of potassa, evolves a penetrating, disagreeable odour, somewhat analogous to that from 'hemlock,' or to a mixture of those from tobacco and mice, it is CONIA.

The presence of one or more of the alkaloids being shown by any of the preceding methods, a portion of the original clear solution or powder, or of the precipitates or filtrates above referred to, must be treated with their 'characteristic tests,' as given under the individual notices of these articles, so as to set at rest all doubt as to their identity. No single test must ever be relied on, as a positive proof. The presence of *Brucia, Morphia* and *Strychnia*, may be determined in substances which after being mixed with the salts of these alkaloids have undergone the acetous, vinous, or putrefactive fermentation, as shown by Orfila, MM. Larocque and Thibierge, and many other eminent chemists and toxicologists, and confirmed, in numerous cases, by our own experiments. *Opium* and *Morphia* may thus be readily detected in beer, wine, soup, and milk.

Concluding remarks. It is a singular fact that none of the organic bases found in plants have yet been formed artificially, although several analogous substances have been thus produced. Closely allied to the alkaloids there also exists an extensive series of neutral proximate principles, which differ from those substances chiefly in the absence of basic properties, and in most of them being destitute of nitrogen. They are usually bitter, and, like the alkaloids, usually represent the active properties of the plants in which they are found; whilst some of them possess considerable medicinal energy. Of this kind are *asparagine, elaterine, gentianine, picrotoxine, salicine*, &c. These two classes of bodies, though actually distinct, are frequently confounded. See ALKALI, ORGANIC BASES, POISONS, PROXIMATE PRINCIPLES, VEGETABLE SUBSTANCES, NOMENCLATURE, &c.; also the individual alkaloids under their respective heads.

AL'KANET. *Syn.* ANCHU'SA, L.; ORCANETTE, Fr.; ORKANET, Ger.; OR'CHANET *, DYER'S AL'KANET, D. BU'GLOSS*. The *anchu'sa tincto''ria* (Willd.; *lithosper'mum tincto''rium* —Linn.), a deciduous herbaceous plant, with a perennial, dark blood-red root. *Hab*., Asia Minor, Greece, Hungary, &c. It is also largely cultivated in the neighbourhood of Montpellier. The *dried root* (ALKANET ROOT; RADIX ANCHUSÆ, B. A. TINCTORIÆ) is chiefly imported from the Levant. It contains a beautiful blood-red colour, which it freely gives out to oils, fats, wax, spirits, essences, and similar substances, by simply infusing it in them, and is consequently much employed to colour these articles. Wax tinged with it, and applied on warm marble, stains it of a rich flesh-colour, which sinks deep into the stone, and possesses considerable durability. Its spirituous tincture also imparts a deep red to marble.

Prop., &c. The colouring matter of alkanet was regarded by Pelletier as a fatty acid (ANCHUSIC ACID); but it has since been shown to be a species of resin (ANCHUSINE, PSEUDO-ALKANINE, P.-ALKANIUM). According to Dr. John, good alkanet root contains 5½ per cent. of this substance. *Anchusine* melts at 140° Fahr.; is scarcely soluble in water, to which it only imparts a dirty red colour, but is very soluble in alcohol, oils, and acetic acid. Alkalies turn it blue. It is found wholly in

the *root-bark*. In selecting this article, the smaller roots should therefore be chosen, as they possess more bark than the larger ones, in proportion to their weight. Exposure to ammoniacal fumes, or even handling it much with the fingers, changes its red to a crimson or purplish hue.

Uses, &c. It is much employed by druggists and perfumers to colour oils, lip-salves, plasters, pomatums, &c.; by varnish-makers, to tinge their varnishes and lacquers; by statuaries, to stain marble; by dairy-farmers, to colour cheese; by wine-merchants and bottlers (in the form of tincture), to stain beforehand the corks of their port-wine bottles, in order to imitate the effects of age, and as colouring and flavouring for factitious port-wine; and by dyers, and others. A species of crimson rouge was formerly prepared from it (hence its name).

ALLANTO'IC ACID. See ALLANTOIN.

ALLAN'TOIN (-to-ĭn; -tō — Mayne). *Syn.* ALLANTO'IC ACID*, AMNIOT'IC A.†, AM'NIC A.†; ALLANTOÏ'NA, L. A substance discovered by Vauquelin and Buniva in what they imagined to be the liquor amnii of the cow, and hence named by them *amniotic acid*. It was afterwards shown by Dzondi and Lassaigne to exist in the fluid of the allantois, and not of the amnios. It has since been produced artificially by Wöhler and Liebig.

Prep. 1. The *allantoïc fluid* of the *fœtal calf* is evaporated to 1-4th or 1-5th of its volume, and then set aside for some time. The crystals thus obtained are purified by re-solution, digestion with animal charcoal, and re-crystallisation.

2. (Wöhler and Liebig.) Uric acid, 1 part; is dissolved in water, 20 parts; and freshly precipitated and well-washed binoxide of lead is added to the solution until the colour ceases to change; the liquid is next filtered while hot, evaporated until a pellicle forms on the surface, and then set aside to crystallise; the crystals being purified as before.

Prop., &c. Small, but very brilliant prismatic, transparent, colourless crystals; tasteless; neutral; soluble in 160 parts of cold water, and in much less at 212°; nitric acid converts it into ALLANTURIC ACID; oil of vitriol resolves it into ammonia, carbonic acid, and carbonic oxide; hot concentrated solutions of the caustic alkalies change it into ammonia and oxalic acid.

ALLANTOX'ICUM. [L.] *Syn.* ALLANTOTOX'ICUM, L. (prim., Gr.). The poison developed, during putrefaction, in sausages made of blood, liver, &c. "It often proves speedily fatal." (Kraus.)

ALLIA'CEOUS (-sh'us). *Syn.* ALLIA'CEUS, L.; ALLIACÉ, ALLIACÉ, Fr.; KNOBLAUCHARTIG, &c., Ger. Garlick-like; an epithet applied to substances having the odour or properties of garlic or onions.

Alliaceous Plants. Chives, garlic, leeks, onions, rocambole, shallots, &c.

ALLIGA'TION. *Syn.* ALLIGA'TIO, L. In *commercial arithmetic*, a 'rule' for ascertaining the price or value of mixtures, and for determining the proportions of the ingredients that must be taken to produce mixtures of any given price, value, or strength. The first is called ALLIGATION ME'DIAL; the second, ALLIGATION ALTERN'ATE. Its principles and applications are explained under MIXTURES (Arithmetic of).

ALLOP'ATHY. *Syn.* ALLOPA'THIA, L. (from ἄλλος, *other, different*, and πάθος, *affection* or *disease*, Gr.); ALLOPATHIE, Fr. In *medicine*, the method of curing disease by the use of remedies which tend to produce a condition of the system, either differing from, opposed to, or incompatible with the condition believed to be essential to the disease it is sought to cure. It is commonly employed to distinguish the ordinary system of medical practice from homœopathy (which *see*). Hence (an) ALLOP'ATHIST, and the corresponding adjective ALLOPATH'IC (*allopath'icus*, L.).

ALLOT'ROPY. *Syn.* ALLOT'ROPISM; ALLOTRO'PIA, ALLOTROPIS'MUS, L. Literally, a difference in character; another form of the same substance. In *chemistry*, a term invented, by Berzelius, to express the state or condition, or the change of character, assumed by certain substances at different temperatures, or under different treatment, whilst their nature and composition continue the same. It more particularly relates to colour, hardness, solubility, texture, &c. *Boron, carbon, silicon, iron, sulphur*, and *phosphorus*, afford striking examples of the changes here referred to.

ALLOX'ANTIN (-tĭn; *or* -lŏg-zăn'-). $C_8H_4N_4O_7 . 3H_2O$. A crystallisable substance, first obtained by Dr. Prout from uric acid.

Prep. 1. *Uric acid*, 1 part; is boiled in *water*, 32 parts; *dilute nitric acid* being added until solution is complete; the resulting liquid is evaporated to ⅔rds its volume, and then set aside for 10 or 12 hours; the crystals, which are deposited, are purified by re-solution and crystallisation.

2. Sulphuretted hydrogen gas is passed, in a full stream through a moderately strong aqueous solution of alloxan, in the cold. The *alloxantin*, which is deposited as a crystalline mass, is purified by draining, cautious washing with cold water, re-solution in boiling water, and re-crystallisation. The impure mother-liquor from which crystals of alloxan have separated, if diluted with water, may be used for this purpose.

Prop., &c. Crystals, small colourless, transparent, four-sided, oblique rhombic prisms; scarcely soluble in cold water; solution reddens litmus; with baryta water it gives a characteristic violet-coloured precipitate, which disappears on heating; and with nitrate of silver a black precipitate of that metal; the crystals are reddened by ammoniacal vapours.

ALLOY'. *Syn.* ALLIAGE, Fr.; LEGIRUNG, VERMISCHUNG DURCH SCHMELZEN, Ger. In *coinage*, a compound of the precious metals with another, or others, of less value; also the least valuable metal, or metals, in such compounds. In *chemistry* and *metallurgy*, combinations of the metals with each other usually obtained by fusion. When mercury is one of the component metals, the compound is termed an AMALGAM.

Prep., &c. No general rules can be given for this purpose. Alloys of metals differing greatly in fusibility, are commonly made by adding the more fusible one, either in the melted state, or in small portions at a time, to the other melted, or heated to the lowest possible temperature at which a perfect union will take place between them. The mixture is usually affected under a *flux*, or some material that will promote liquefaction, and prevent volatilisation and unnecessary exposure to the air. Thus; in melting lead and tin together, for solder, resin or tallow is thrown upon the surface; in tinning copper, the surface is rubbed with *sal ammoniac*; and in combining some metals, powdered charcoal is used for the same purpose. Quicksilver combines with many metals in the cold, forming AMALGAMS.

Comp. The following *Table* exhibits the composition of the more important compounds of this class:—

Table of the principal Alloys.

NAMES.	COMBINING METALS.
ALBATA	See German silver.
AMALGAMS	Mercury and other metals.
BATH-METAL	Copper and zinc.
BELL-METAL	Copper and tin.
BRASS	Copper and zinc.
BRITANNIA METAL	Tin with antimony, copper, and bismuth.
BRONZE	Tin and copper.
CANNON-METAL	Tin and copper.
DUTCH GOLD	Copper and zinc.
FUSIBLE METAL	Bismuth, lead, and tin.
GERMAN SILVER	Copper, nickel, and zinc, with, sometimes, a little iron and tin.
GOLD (*standard*)	Gold with copper.
„ (*old standard*)	Gold with copper and silver.
GUN-METAL	See Cannon-metal.
MOSAIC GOLD	Copper and zinc.
OR-MOLU	„ „
PEWTER (*common*)	Tin and lead.
„ (*best*)	Tin with antimony, bismuth, and copper.
POT-METAL, COCK-METAL	Copper and lead, with, sometimes, a little zinc.
QUEEN'S METAL	Tin with antimony, bismuth, and copper.
SHOT-METAL	Lead with a little arsenic.
SILVER (*standard*)	Silver and copper.
SOLDER	Tin and lead.
SPECULUM-METAL	Tin and copper and arsenic
STEREOTYPE-METAL	Lead, antimony, and bismuth.
TOMBAC, RED TOMBAC	Copper and zinc.
TUTANIA	See Britannia metal.
TYPE-METAL	Lead and antimony.
WHITE COPPER (*Packfong; White tombac*)	Copper and arsenic.

Prop., &c. Alloys generally possess characteristics unshared by their component metals. Thus; copper and zinc form brass, which has a different density, hardness, and colour to either of its constituents. Whether the metals tend to unite in equivalent proportions, or in any definite ratio, is still undetermined. The evidence afforded by the natural alloys of gold and silver, and by the phenomena accompanying the cooling of several alloys from the state of fusion, goes far to prove that such is the case. (Rudberg.) The subject is, however, one of considerable difficulty, as metals and metallic compounds are generally soluble in each other, and unite by simple fusion and contact. That they do not combine indifferently with each other, but exercise a species of elective affinity not dissimilar to other bodies, is clearly shown by the homogeneity and superior quality of many alloys in which the constituent metals are in atomic proportion. The variation of the specific gravity and melting-points of alloys

from the mean of those of their component metals, also affords strong evidence of a chemical change having taken place. Thus, alloys generally melt at lower temperatures than those required for their separate metals. They also usually possess more tenacity and hardness than the mean of their constituents; but their malleability, ductility, and power of resisting oxygen, is generally diminished. The alloy formed of two brittle metals is always brittle; that of a brittle and a ductile metal, generally so; and even two ductile metals sometimes unite to form a brittle compound. The alloys formed of metals having different fusing-points are usually malleable whilst cold, and brittle whilst hot. The action of the air on alloys is generally less than on their simple metals, unless the former are heated. A mixture of 1 part of tin and 3 parts of lead is scarcely acted on at common temperatures; but at a red heat it readily takes fire, and continues to burn for some time like a piece of bad turf. In like manner, a mixture of tin and zinc, when strongly heated, decomposes both moist air and steam with almost fearful rapidity.

The *specific gravity* of alloys is never the arithmetical mean of that of their constituents, as commonly taught; and, in many cases, considerable condensation or expansion occurs. When there is a strong affinity between two metals, the density of their alloy is generally greater than the calculated mean; and *vice versâ*, as may be seen in the following Table:—

Alloys having a density—

Greater than the mean of their constituents:—

Copper and bismuth,
„ palladium,
„ tin,
„ zinc,
Gold and antimony,
„ bismuth,
„ cobalt,
„ tin,
„ zinc,
Lead and antimony,
Palladium and bismuth,
Platinum and molybdenum,
Silver and antimony,
„ bismuth,
„ lead,
„ tin,
„ zinc.

Less than the mean of their constituents:—

Gold and copper,
„ iridium,
„ iron,
„ lead,
„ nickel,
„ silver,
Iron and antimony,
„ bismuth,
„ lead,
Nickel and arsenic,
Silver and copper,
Tin and antimony,
„ lead,
„ palladium,
Zinc and antimony.

"Every alloy," says Dr. Ure, "is, in reference to the arts and manufactures, a new metal, on account of its chemical and physical properties. A vast field here remains to be explored. Not above sixty alloys have been studied by chemists, out of many hundreds which may be made, and of these very few have yet been practically employed. Very slight modifications often constitute very valuable improvements upon metallic bodies." See ANALYSIS, ASSAYING, BRASS, BRONZE, ELECTROTYPE, GERMAN SILVER, GOLD, METALS, SPECIFIC GRAVITY, &c.

ALL'SPICE. See PIMENTO.

ALLU''VIAL. (-l'ōōv'-yăl). *Syn.* ALLU''VIOUS*; ALLU''VIUS, L.; D'ALLUVION, Fr. In *geology*, applied to partial deposits of mud, sand, gravel, &c., left by rivers and floods upon land not permanently submerged beneath water; in *agriculture*, applied to soils so formed or deposited.

ALLU''VIUM. [L., Eng.] *Syn.* ALLUVIŌN, Fr.; ANFLÖSSUNG, ANSCHWEMMUNG, Ger. In *geol.* and *agr.*, alluvial deposit or soil. See SOILS, &c.

AL'LYL (-lil). C_3H_5. In *chemistry*, the radical of the essential oils containing sulphur, as those of *assafœtida, garlic, horseradish, mustard, onions*, &c., which are either *sulphides* or *sulphocyanides of allyl*. Its probable existence was first shown by Captain Reynolds, who succeeded in producing several of its derivatives. It has since been obtained, in a separate state, by the action of sodium upon iodide of allyl. It is an oily substance with a high boiling-point.

Sulphide of Allyl, $(C_3H_5)_2S$; obtained (artificially) by acting on sulphocyanide of allyl with sulphide of potassium. See OIL OF GARLICK.

Sulphocyanide of Allyl, C_3H_5CNS; obtained by submitting iodide of allyl to the action of sulphocyanide of potassium; or by gently heating a mixed alcoholic solution of sulphide of allyl and bichloride of mercury, with sulphocyanide of potassium. See OIL OF BLACK MUSTARD.

AL'MOND (ah'-mŭnd). *Syn.* AMYG'DALA (also -US, -UM*), L.; AMANDE, Fr.; MANDEL, Ger., Dut., Dan., Swed. The 'almond-tree' (*amyg'dalus commu'nis*—Linn.; Ph. L., E., and D.; *Amandier*—Fr.), a tree of the *nat. ord.* Rosaceæ, indigenous to Persia, Syria, and the north of Africa; but also extensively cultivated in southern Europe. The almond-tree is about the size of the peach-tree, which it much resembles in appearance. It is inca-

pable of ripening its fruit in this country, and is, therefore, only grown here for the sake of its beautiful vernal flowers. There are several varieties, of which the most important are the *sweet* and the *bitter*, so named from the flavour of the *seed* or *kernel*. These, for the most part, resemble each other in appearance. De Candolle ('Prodromus,' ii, 530) gives five varieties of this species:—A. AMA"RA (*bitter-almond*); A. DUL'CIS (*sweet-a*); A. FRAGILIS (frăj'-; *tender-shelled a.*); A. MACROCAR'PA (*large-fruited a., pistachio a., sultana a.*); A. PERSICO'IDES (*peach-a.*).

Per'sian Almond. The peach.

AL'MONDS (-mŭndz). *Syn.* AMYG'DALÆ, L.; AMANDES, Fr.; MANDELN, Ger. The seed or kernels of the almond-tree. They are met with in commerce both in the shell (AMYG'DALÆ CUM PUTAM'INE, -in-e, L.), and shelled (AMYGDALÆ, L.). In the retail shops, most commonly in the latter form. Those rancid, broken, or worm-eaten, should be rejected.

Bitter Almonds. *Syn.* AMYG'DALÆ AMA"RÆ, L.; AMYGDALA AMARA, Ph. E.; AMANDES AMÈRES, Fr.; BITTERE MANDELN, Ger. A variety imported from Mogadore, chiefly characterised by possessing the bitter flavour, and, when rubbed with water, the odour of peach-kernels. They are also smaller and thicker than the sweet almond.

Uses, &c. Bitter almonds are used to relieve the flavour of sweet almonds, to clear muddy water, and to flavour confectionery, liqueurs, &c. By pressure, they yield their bland oil (OIL OF ALMONDS; O'LEUM AMYG'DALÆ, L.); the resulting cake (BITTER-A. CAKE; PLACEN'TA A. AMARÆ, L.) is distilled for the volatile oil (ESSENTIAL OIL OF A.; O. A. A., L.), and is afterwards again pressed into cakes (A.-CAKE) and used to fatten pigs, and for other purposes. Bitter almonds are now seldom employed in medicines, although it is said that they have cured 'intermittents' when bark had failed (Bergius), and that their emulsion has been found useful in pulmonary and dyspeptic affections, hooping-cough, and asthma; and externally, as a lotion in acne. (Thomson.) In large quantities they are poisonous, and even in the smallest quantities have been known to produce nettle-rash (*urticaria*), and other unpleasant symptoms. They have long been in repute as an antidote to intoxication. The ancient bacchanals chewed them at their orgies, to lessen the effects of wine, and to enable them to take it in larger quantities with impunity.

Blanched' Almonds (blăncht'-). *Syn.* AMYG'DALÆ DECORTICA'TÆ, L. Almonds from which the *husk* or *seed-coat* has been removed. This is effected by soaking them for a short time in warm water, until the skin can be easily removed by pressure between the thumb and forefinger. They are then peeled, rinsed in cold water, drained, and dried. When intended for the table, the last is effected by wiping them with a soft towel; but when they are intended to be powdered, or kept, they are dried by a very gentle heat in a stove, or in the sun.

Burnt' Almonds. *Syn.* ROASTED ALMONDS; ALMOND COFFEE. Used to colour and flavour liqueurs and confectionery; and formerly, as a substitute for coffee.

Guia'na Almonds (gĭe-ā'-nă; *g* hard). Brazil-nuts.

In'dian Almonds. The fruit of *terminalia catappa* (Linn.). They are oleaginous, and nutritious; and are used as a substitute for almonds.

Ja'va Almonds (jā'-). The nuts or kernels of *canarium commune* (Linn.). They are eaten, made into bread, and pressed for their oil.

Sweet' Almonds. *Syn.* ALMONDS; AMYG'DALÆ, L.; A. DUL'CES, Ph. D.; AMYGDALA, A. JORDAN'ICA, Ph. L.; A. DUL'CIS, Ph. E., & Ph. L. 1836; AMANDES, AMANDES DOUCES, Fr.; SÜSSE MANDELN, Ger. These are the well-known dessert or table fruit of the name, and are the kind always referred to when 'almonds' (simply) are spoken of or ordered.

Comm. var.—1. JOR'DAN ALMONDS, which are the finest, and are imported from Malaga. Of these there are two kinds; the one, above an inch in length, flat, and with a clear brown cuticle, sweet, mucilaginous, and rather tough; the other, more plump, and pointed at one end, brittle, but equally sweet with the former.—2. VALEN'TIA A. (which come next in quality) are about $\frac{3}{8}$ths of an inch broad, not quite an inch long, round at one end, and obtusely pointed at the other, flat, of a dingy brown colour, with a dusty cuticle.—3. BAR'BARY and ITAL'IAN A., which resemble the latter, but are generally smaller and less flattened.—4. A variety, of medium quality, imported in baskets from Spain.

Uses, &c. Sweet almonds are nutritive, emollient, and demulcent; but frequently disagree with weak stomachs. The husk is apt to occasion indigestion and nausea. Owing to a peculiar idiosyncrasy of some habits, dyspepsia, diarrhœa, œdematous swelling of the face, and urticaria (*nettle-rash*), sometimes, though seldom, follow the use of unblanched almonds. Blanched almonds do not produce these inconveniences, and, therefore, should be preferred for the table. In *medicine*, almonds are employed chiefly under the form of emulsion, confection, &c., and to suspend oily substances in water. Their uses for dietetical purposes are well known. Preparations of them are also employed as cosmetics. The cake left after expressing the oil (ALMOND-CAKE), is used for washing the skin, which it is said to render beautifully soft and clear. *See* ALMOND PASTE, &c.

AL'NIGHT† (awl'-). A cake of wax with a wick in the midst. The forerunner of, and a rude form of the modern dumpy night-lights called MORTARS.

AL'OE (ăl'-o). *Syn.* AL'OË (-o-ē), L., Fr. (*or*

ALOÈS), Ger., Ital., Sp., Belg., Dan., Dut., Swed. The aloe-tree. In *botany*, a genus of plants of the *nat. ord.* Liliaceæ (DC.). The species, of which there are several, are succulent plants or small trees with endogenous stems, and stiff, fleshy, hard, pointed leaves, abounding in a purgative principle (ALOES), which is obtained from them by either evaporating the expressed juice or the decoction. They are all natives of warm climates, and most of them are indigenous to southern Africa.

Hist. אֲהָלִים, *aehleem*, (aloe-trees,) were known to the sacred historians; and both the plant and the inspissated juice are described by Dioscorides[1] and Pliny.[2]

Uses, &c. In Africa, the leaves of the Guinea aloe are made into ropes, fishing-lines, bow-strings, stockings, hammocks, &c. The leaves of another species are used to catch and hold rain-water. The expressed juice and decoction are also used by the natives as a distaff. (Vide *infrà*.) Recent comparative trials, made in Paris, of the strength of cordage and cables formed of hemp, and of the aloe from Algiers, are said to have shown the great superiority of the latter. Fabroni obtained a fine violet colour from the recent juice of the aloe, which has been proposed as a dye for silk.[3]

Amer'ican Aloe. The *aga've Americ'na* (Linn.), is a plant unconnected with the preceding, and belonging to the *nat. ord.* Bromeliaceæ. It is found in all parts of tropical America, and is largely cultivated on the shores of the Mediterranean; and less frequently, as an exotic plant in this country. It grows to the height of about 20 feet, and takes many years to produce its gigantic and magnificent pyramid of flowers; shortly after which it perishes, exhausted, as it were, by its efforts in bestowing its rare beauty on the floral world. The vulgar belief is, that it blossoms only once in a century; but, as stated by the late Mr. Loudon, it flowers sooner or later, according to the culture bestowed on it. Its sap yields a kind of honey (AGA'VE HONEY), and by fermentation, an intoxicating liquor (PULQUE); desiccated juice, mixed with wood ashes, is used as soap, and lathers either with sea or fresh water; leaf-fibre, used as hemp to make thread and twine.

AL'OE-RESIN. *Syn.* RESI'NA AL'OËS, L. The resinous matter deposited by a decoction of aloes as it cools.

Prep. (Ph. L. 1746.) Boil *aloes*, 1 part, in *water*, 8 parts, and allow the decoction, strained whilst hot, to repose until the next day; then wash the deposited RESIN, and dry it by a gentle heat. It is probably a mixture of aloine and oxidised extractive.

AL'OES (-ōze). *Syn.* BITT'ER ALOES; AL'OË (-o-ē), L.; ALOÈS, SUC D'ALOÈS, Fr.; ALOE, GLAUSINDE ALOE, Ger.[4] The inspissated juice or extract of several species of aloe.

Comp., Prep., &c. Aloes is a complex resinous substance containing a body called *aloin*, which is its active or purgative principle. It is completely soluble in boiling water, and in alcohol or rectified spirit. The decoction deposits an impure resin or resinoid on cooling.

Phys. eff., Uses, &c. Aloes is a warm stimulating purgative, in *doses* of 3 to 10 gr.; whilst even 1 or 2 gr. seldom fail to produce one motion without pain or inconvenience. It is considered highly serviceable in hypochondriacal, hysterical, and dyspeptic affections, particularly in phlegmatic habits, and in cases arising from deficiency of bile. As an emmenagogue, and a vermifuge, few medicines are more valuable. It acts on the large intestines, and principally on the rectum; and, therefore, should be administered with caution, or only in small doses, where there is a tendency to prolapsus or piles, and in cases where uterine stimulants (as in pregnancy, &c.) would be improper. "It is remarkable with regard to it, that it operates almost to as good a purpose in a small, as in a large dose; and one or two grains will produce one considerable dejection, and twenty grains will do no more, except it be that in the last dose (case), the operation will be attended with griping, &c. It is one of the best cures for habitual costiveness." (Cullen.) Many of the effects complained of arise from its slow solubility in the primæ viæ, and may be obviated by administering it in a liquid form, or in a solid form combined with *soap*, which renders it freely soluble in the juices of the stomach.

Aloes is more frequently taken than, perhaps, any known purgative. It enters into the composition of a majority of the aperient medicines prescribed by the faculty, and forms the principal ingredient of nearly all the advertised purgative, antibilious, and universal pills of the nostrum-mongers. The fact of *aloetic pills* not acting until about 8 to 10 hours after being swallowed—so that if taken on retiring to rest at night, they do not generally disturb the patient before the usual time of rising in the morning—has contributed more than anything else to make such remedies popular with parties whose habits or business avocations would be otherwise interfered with.

Aloes is also extensively used in *veterinary practice*. It is the most valuable and reliable purgative for the horse of the whole materia medica; but is less to be depended on for cattle, sheep, and hogs. Barbadoes aloes is the best for this purpose. Cape aloes are, however, often employed, when 1-4th more must be given.—*Dose* (of the *former*), for a HORSE, 4 to 8 dr.;[5]—CATTLE, 3 to 6 dr. (followed by a purging drench);—HOGS, 5 to 15 gr.;—

[1] *Lib.* iii, *c.* xxv.
[2] "*Hist. Nat.*," *lib.* xxvii, *c.* v.
[3] "*Annales de Chimie*," xxv, 305.

[4] Also see ALOË (*above*).
[5] Aloes takes from 18 to 30, or even 36 hours, to operate on a horse.

SHEEP, 15 to 30 gr.;[1]—DOGS, (*small* ones) 10 to 30 gr., (*middle-sized*) 20 to 40, or even 60 gr., (*large*) ½ to 1 dr., or even 2 dr.

Aloes is also used in dyeing; and as a colouring matter in stains, lacquers, and varnishes. Aloes, and several of its preparations, are likewise extensively employed to adulterate porter.

Var. These, arranged in the order of their reputed *medicinal value*, are—Socotrine, Hepatic, Barbadoes, Cape, &c.; and *alphabetically*, as given below:—

Barba'does Aloes. *Syn.* ALOES IN GOURDS; AL'OË BARBADEN'SIS, L., Ph. L. & E. Imported from Barbadoes and Jamaica, usually in gourds; sometimes in boxes. The best is the inspissated juice of the cut leaf of *aloë vulga'ris*; an inferior quality is prepared from the decoction.—*Char., &c.* Opaque, lustreless, of a liver colour, a little tending to black, with a bitter nauseous taste, and a very disagreeable odour, especially when breathed on; *powder*, a dull olive-yellow. It is the 'hepatic aloes' of most continental writers, and said to be the Ἀλόη of Dioscorides. It is more active than the other varieties of aloes; but is also more apt to occasion hæmorrhoids, and to gripe, than any of them.

Cab'alline Aloes (-line). *Syn.* FŒT'ID ALOES, HORSE A.; ALOË CABALLI'NA, L. GUINIEN'SIS, L.; ALOÈS CABALLIN, Fr. From *aloë In'dica* (O'Shaughnessy); or from *aloë spica'ta* by long and careful boiling (Lindley). *Used* only by farriers. Scarcely known in English commerce.

Cape Aloes. *Syn.* ALOË CAPEN'SIS, A. LU'CIDA (*Geiger*), L. Imported from the Cape of Good Hope, and obtained from *aloë spica'ta*, and other Cape species. Odour, stronger and even more disagreeable than that of Barbadoes aloes; colour, deep greenish-brown; appearance, shining and resinous; fracture, generally glassy; *powder*, a lively greenish-yellow; almost completely soluble in boiling water, decoction paler than that of other kinds. It is weaker than Barbadoes or even hepatic aloes, and is more apt to gripe, &c., than the latter. A finer kind, known as '*Bethelsdorp aloes*,' imported from Algoa Bay, is more of a liver colour, and softer than the preceding, and hence often called CAPE-HEPATIC-ALOES.

Hepat'ic Aloes. *Syn.* BOMBAY ALOES*, EAST-INDIA A.*, LIVER-COLOURED SOCOTRINE A.*; ALOË HEPAT'ICA, Ph. L. & D.; A. IN'DICA, Ph. E. Imported from Bombay and Madras. It is usually said to be obtained from "uncertain species of aloes;" but it is almost certain that it is "the juice of the Socotrine aloes plant which has been solidified without the aid of artificial heat."[2]—*Char., &c.* "Opaque, of a liver colour, bitter taste, and an unpleasant odour." (Ph. L.) It is less odorous, darker coloured, and more opaque than Socotrine aloes; its powder has also a duller colour; and weak spirit leaves much undissolved matter. Its decoction on cooling frequently deposits a yellow powder. The finer and brighter varieties of *hepatic aloes* are commonly sold for 'Socotrines,' and their medicinal virtues are nearly similar. (See *below*.)

In'dian Aloes (various):—1. Deep brown or black, very opaque, and less soluble than ordinary aloes. Scarcely known in commerce.—2. Several varieties ranging in character from 'Cape aloes' to 'hepatics,' and occasionally to 'Barbadoes,' obtained from several species.

Mo'cha Aloes (-kăh). *Syn.* ALOË DE MOCHÂ, L. Imported from Muscat. An inferior kind of Indian aloes. (Christison.) It is obtained from the same plant as produces genuine hepatic aloes. (Lindley.) It holds an intermediate position between 'Cape' and 'hepatics,' but contains much impurity; the latter often amounting to upwards of 25%. Some specimens are, however, of excellent quality. When melted and 'doctored,' it is sold for Barbadoes, hepatic, and even Socotrine aloes.

Soc'otrine Aloes (-trĭn; sŭk'-‡). *Syn.* SOC'OTORINE ALOES, SMYR'NA A., TUR'KEY A.; ALOË SOCOTRI'NA, Ph. L.; ALOË, Ph. L. 1836; A. SOCOTORI'NA, Ph. E. "The juice of the cut leaf of uncertain species hardened by the air." (Ph. L.) Genuine Socotrine aloes is generally supposed to be obtained from *aloë spica'ta*; but is referred to by De Candolle to a distinct species, *a. Socotri'na*; and by Martius, also to *a. purpuras'cens*. Formerly this variety was brought from the Island of Socotra or Zocotora (hence the name), by way of Smyrna and Malta; but it is now chiefly obtained from Bombay and Madras.—*Char., &c.* Colour, garnet red to golden red; smell, peculiar and aromatic, not unlike a decaying russet apple, especially when fresh-broken, or breathed on, or warmed; taste, permanently and intensely bitter; fracture, conchoidal; softens in the hand, and becomes adhesive, yet retains considerable brittleness; *powder*, bright golden-yellow colour; central portions of the lumps often soft, especially when first imported. "It is brittle, bitter, of a reddish-brown colour, and an aromatic odour. Light permeates thin recently broken lamellæ." (Ph. L.) "In thin pieces, translucent and garnet red; almost entirely soluble in spirit of the strength of sherry. Very rare." (Ph. E.)

Socotrine aloes are always preferred for medicinal purposes, and are the only variety used in perfumery, varnishes, and other nice purposes in the arts.

Strained Aloes. *Syn.* MELTED ALOES; ALOË COLA'TA, L. *Proc.* 1. The *aloes* are melted in a copper pan, by the heat of steam or a water bath, and are then pressed through a strong hair or wire sieve, and allowed to cool.

2. As above, but with the addition of about twice its weight of water; the decoction being strained and evaporated.

[1] Aloes, however large the dose, often fails to purge sheep. In *very large* quantities it is *poisonous* to them.

[2] Pereira, "*Elem. Mat. Med. and Therap.*," vol. ii, 188, 4th Ed.; "*Pharm. Journ.*," vol. xi.

Obs. Mocha, Indian, and other common aloes, treated in this way and coloured, are frequently sold for melted or strained 'Socotrines' and 'hepatics.' The colouring matter usually employed is the precipitated carbonate of iron (sesquioxide), or Venetian red, in very fine powder, with, sometimes, a little annatto. This fraud is not readily detected by mere inspection, by those unaccustomed to these matters; and hence the impunity with which it is perpetrated.

The object in melting aloes is to deprive it of the foreign matters, as sand, leaves, pieces of wood, &c., which the commoner kinds generally contain in large quantities. The action of the heat drives off much of their nauseous smell, at the same time that it deepens their colour, and renders their appearance more translucent and resinous, to the disguise of their original nature. The operation, on the large scale, is usually carried on at night, in consequence of the horribly nauseous fumes evolved, which may be smelt at a great distance, and contaminate the clothes of those engaged in it for a long time afterwards.

AL'OES WOOD. *Syn.* AL'OE-WOOD; EAGLE-WOOD; AGAL'LOCHUM (-kŭm), LIG'NUM AL'OËS, L. AGAL'LOCHI, L. A. VE''RI, L. AQ'UILÆ, L. ASPAL'ATHI, L.; AGALLOCHE, BOIS D'ALOÈS, Fr.; ALOEHOLZ, Ger.; CALAM'BAC, CALAM'-BOUC, Ind.; XYLO-AL'OËS†. A name applied to the *wood* of *alöex'ylon agal'lochum* (Lam.), a leguminous tree of Cochin China; and, though apparently less correctly, to that of *aquila''ria agallochum* and *a. ova'ta* (Lour.), trees of tropical Asia, belonging to a different *nat. order*. Both are highly fragrant and aromatic; *used* in fumigations and pastilles, and occasionally, by cabinet makers and inlayers. The essential oil of the wood, dissolved in spirit, was regarded by Hoffman as one of the best cordials and invigorants known. The same has also been said of a tincture of its resin.

The same name and synonyms are popularly applied to the resin of the above woods (ALOES-WOOD RESIN), of which there are two varieties:—the one, light and porous, and filled with a highly fragrant resinous substance; the other, denser and less resinous. It is an oily concretion in the centre of the tree, the result of disease, which gradually hardens, and, in time, kills it. It is highly fragrant, and is said to be nervine, cephalic, cardiac, and stimulant. The powder is regarded as tonic and astringent. Of all perfumes this is said to be the one most esteemed by oriental nations.

ALOET'IC. *Syn.* ALOËT'ICUS, L.; ALOÉTIQUE, Fr. Of or belonging to aloes. In *medicine, pharmacy*, &c., applied to any preparation containing aloes as a characteristic ingredient; made or obtained from aloes. *Substantively*, an aloetic medicine.

AL'OIN (-o-ĭn). $C_{17}H_{18}O_7$. [Eng., Fr.] *Syn.* AL'ŎIN; ALOI'NA, L. The Messrs. T. & H. Smith, of Edinburgh, have applied this name to a crystalline substance, which they assert to be the pure cathartic principle of aloes. Their process is to evaporate to the consistence of a syrup, in vacuo, a solution obtained by exhausting a mixture of aloes and sand, with cold water, and then to set it aside for a few days. The resulting dark crystalline mass is purified by pressure between folds of bibulous paper, and repeated crystallisation from hot water. Barbadoes aloes are commonly used for the purpose; but soft or semi-liquid Socotrine aloes, or the unevaporated Socotrine-aloes juice, is probably its best source.—*Dose*, 1 to 2 gr.

ALOPE'CIA (-sh'ă). [L.] *Syn.* AL'OPECY, FOX'-EVIL; ALOPÉCIE, Fr.; FUCHSRAUDE, Ger. In *pathology*, baldness from disease, often extending to the beard and eyebrows; as distinguished from 'calvities,' or ordinary baldness arising from attenuation of the scalp or defective nutrition. See BALDNESS.

ALPAC'A. A species of Llama, popularly known as the PERUVIAN SHEEP, an animal intermediate between the camel and sheep, having long silky hair, nearly as fine as that of the Cashmere goat. It was introduced to the British manufacturers in 1834, when only 5700 *lbs.* of it was imported; but it soon became an important article of commerce, the quantity imported having gradually risen to above 2¼ millions of *lbs.* in 1853; whilst the price has risen from about 9*d.* to 2*s.* 7*d.* the *lb.* in the same time. The name is also given to *fabrics* woven from the *wool* of this animal; and to others in fine wool, made in imitation of them. The gigantic factory, &c., erected at Saltaire, Yorkshire, in 1852, for this manufacture, covers about 12 acres of land. See LLAMA.

AL'PHA-ORSELL'IC ACID. See ORSELLIC ACID.

AL'QUIFOU (-ke-fōō). *Syn.* BLACK LEAD-ORE, POTTER'S ORE. A native sulphide of lead used by potters to give a green glaze to coarse wares.

ALSTONIA SCHOLARIS. (Ind. Ph.) *Habitat.* Common in forests throughout India.—*Officinal part.* The bark (*Alstoniæ cortex*). It occurs in thick, irregular, more or less contorted pieces, easily broken. It consists of a rough greyish epidermis, investing a buff or pale cinnamon-coloured bark; internally, still lighter in colour, and of a spongy texture, having a very bitter taste, but devoid of odour.—*Properties.* Astringent tonic, anthelmintic, antiperiodic.—*Therapeutic uses.* In chronic diarrhœa and the advanced stages of dysentery; also as a tonic in debility after fevers and other exhausting diseases.—*Dose.* 3 to 5 grains, either alone or combined, in bowel affections, with small doses of ipecacuanha and extract of gentian.—*Preparations.* TINCTURE OF ALSTONIA (*Tinctura Alstoniæ*). Take of alstonia bark, bruised, 2½ ounces; proof spirit, 1 pint. Macerate for seven days in a closed vessel, with occasional agitation; filter, and add sufficient proof spirit to make 1 pint. Or prepare by

percolation, as Tincture of Calumba.—*Dose.* 1 to 2 fluid drachms.

Infusion of Alstonia: (*Infusum Alstoniæ.*) Take of alstonia bark, bruised, ½ an ounce; boiling water, 10 fluid ounces. Infuse in a covered vessel for an hour and strain.—*Dose.* From 1 to 2 fluid ounces twice or thrice daily. A good serviceable tonic.

AL'TERATIVE (awl'-tĕr-ă-tĭv). *Syn.* AL'TERANT*; AL'TERANS (ăl'-), L.; ALTÉRANT, ALTÉRATIF, Fr. In *medicine*, having power to alter; applied to substances and agents which occasion a change in the habit or constitution, and thus re-establish the healthy functions of the body, or any part of it, without producing any sensible evacuation or other obvious effect.

AL'TERATIVES (-tĭvz). *Syn.* ALTERAN'TIA, L.; ALTÉRATIFS, &c., Fr. Alterative medicines or agents. The preparations of mercury and iodine, when properly administered, are the most useful members of this class; and are those which are now the most generally employed.

ALTHE'IN (ăl-thē'-ĭn). *Syn.* ALTHÆ'INA, L. The name given by Braconnot to a substance identical with *asparagin*, which he discovered in the 'marsh-mallow' (*althæ'a officina'lis*, Linn.).

AL'UDEL (-ū-). In *chemistry*, a pear-shaped glass or earthen pot open at both ends, formerly much used for connecting other vessels in the process of sublimation. A number of them joined together are still employed for the distillation of quicksilver, in Spain.

AL'UM. $K_2SO_4 . Al_2(SO_4)_3 . 24Aq.$ *Syn.* POT'ASH-ALUM, SUL'PHATE OF ALUMINUM AND POTASSIUM, COMMON ALUM; ALU'MEN, A. POTAS'SICUM, L.; ALUN, SULFATE D'ALUMINE ET DE POTASSE, Fr.; ALAUN, Ger.; ALUME, Ital.

The principal alum-works in England, until recently, were those of Lord Glasgow, at Hurlett and Campsie, near Glasgow, and those of Lords Dundas and Mulgrave, at Whitby, Yorkshire (est. 1600); but those of Mr. Spence, at Manchester, and at Goole (Yorkshire), and of Mr. Pochin, at Manchester, are now among the largest, if they be not actually the largest in the world. There are also extensive alum-works at and near Newcastle-on-Tyne; but none of importance, as we know of, in any other part of these realms.

Nat. hist. Alum is found native in some places (NATIVE ALUM), either effloresced on the surface of bituminous alum-schist (Göttwigg, Austria); or united with the soil in the neighbourhood of volcanoes (Solfatara, Naples); when it may be obtained by simple lixiviation and evaporation, a little potash being commonly added to convert the excess of sulphate of alumina present into alum. It is also found in certain mineral waters (East Indies).

Sources. The alum of commerce is usually obtained from schistose pyritic clays, commonly termed alum-ores, aluminous shale, a.-schist, &c.; and from alum-rock, a.-stone, or alunite. At La Tolfa, Civita Vecchia, where the best Roman-alum is produced, the source is stratified alum-stone. On the Continent, and in Great Britain, it is generally pyritaceous clays, volcanic aluminous ores, aluminous shale, or alum-slate. These minerals contain sulphide of iron, alumina, bitumen or carbon, and frequently a salt of potassium. Of late years large quantities of alum have been prepared on the banks of the Tyne from aluminous clay.

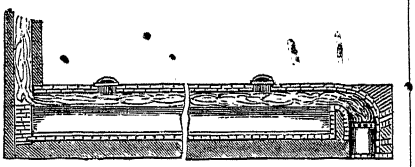
Prep. The manufacture of alum is technically said to be conducted according to the *natural process* when prepared from alum-schist or alum-ore; and according to the *artificial process* when made by acting on clay with sulphuric acid, and adding a potassium salt to the resulting lixivium. The following are the details of these processes:—

a. From ALUM-ORE, ALUMINOUS SCHIST, or SHALE, &c.:—

1. The *mineral* (alum-ore, a.-schist, &c.), is placed in heaps, and moistened from time to time with water, when it becomes gradually hot, and falls into a pulverulent state. This decomposition commonly occurs either wholly, or partially, on the floor of the mine. If the ore does not possess this property on mere exposure to air and moisture, it is broken into pieces and laid upon a bed of brushwood and small coal, to the depth of about four feet, when the pile is fired and fresh lumps of the alum-mineral thrown on, until the mass becomes of considerable height and size. The combustion, as soon as established, is conducted with a smothered fire, until the calcination is complete; care being taken to prevent fusion, or the disengagement of either sulphurous or sulphuric acid, from contact between the ignited stones and the carbonaceous fuel.[1] To promote these ends the pile, at the proper time, is 'mantled' (as the workmen call it) or covered with a layer of already calcined and exhausted ore, in order to protect it from high winds and heavy rains; as also to moderate the heat, and let it proceed gradually, so that the sulphur present may not be lost or wasted by volatilisation. The roasting is finally checked by a thicker 'mantling,' and the whole allowed to cool. By this time the pile has usually lost about one half its bulk, and become open and porous in the interior, so that the air can circulate freely through the mass; the latter, in dry weather, as the heap cools, being usually promoted by sprinkling a little water on it, which, by carrying down some of the saline matter, renders the interior still more open to the atmosphere. The whole, when cold, or nearly cold, is, if

[1] The generality of *alum-minerals* require roasting; and their own bituminous matter is, in many cases, sufficient to produce the heat required, which need not necessarily exceed 600 to 650° Fahr., provided it be continued for a sufficient period. It is only when they are less bituminous or carbonaceous that *slack* or *saw-dust*, &c., is employed.

necessary, still further exposed to the action of air and moisture. The time required to calcine the heap properly, including that taken by the burned ore to cool, varies, according to its size



and the state of the weather, from three to nine, or even twelve months. The residuum of the calcination is next placed in large stone or brick cisterns, and edulcorated with water, until all the soluble portion is dissolved out; the solution is then concentrated in another stone cistern, so made that the flame and heated air of its reverberatory furnace sweep the whole surface of the liquor. (See *engr.*) The evaporation is continued until it just barely reaches the point at which crystals are deposited on cooling; when it is run off into coolers. After the sulphate of iron, always present, has been deposited in crystals, the mother-liquor, containing the sulphate of aluminum, is run into other cisterns, and a saturated solution of chloride of potassium, or of sulphate of potassium, or (sometimes) impure sulphate or carbonate of ammonium, or a mixture of them,[1] is added until a cloud or milkiness ceases to be produced on addition of more.[2] It is next allowed to settle and get thoroughly cold, and the supernatant 'mother-liquor' being

drawn off with a pump or syphon, the precipitate, which is alum in the form of minute crystals (technically termed 'flour'), is well drained, and subsequently washed by stirring it up with a little very cold water, which is then drained off, and the operation repeated a second time with fresh water. A saturated solution of the pulverulent alum ('flour') is next formed in a leaden boiler, and the clear portion is run or pumped off, while boiling hot, into crystallising vessels, called 'roaching casks' (see *engr.*), the staves of which are lined with lead, and nicely adjusted to each other. After the lapse of a week or ten days, the hoops and staves of these 'casks' are removed, when a thick crust of crystallised alum is found, which exactly corresponds in form and size to the interior of the cask. A few holes are then made in the sides of this mass, near the bottom, to allow the contained mother-liquor to drain off, after which the whole is broken up and packed in casks for sale. Sometimes the alum thus obtained, or the lower portion of it, is washed with a little very cold water, and, if discoloured, or small or slimy, is purified by a second crystallisation.

2. As ammonia-alum (Spence's process; see *below*), but using a potash-salt as the precipitant, either wholly or in part, instead of ammonia; and, in the latter case, supplementing the deficiency of potash with ammonia, as there explained.

b. From ALUMINOUS CLAY and OIL OF VITRIOL:—

1. Clay, free or nearly free from 'carbonate of lime' and 'oxide of iron,' is chosen for this purpose. It is moderately calcined (in lumps) in a reverberatory furnace, until it becomes friable; great care being taken that the heat be not sufficient to indurate it, which would destroy its subsequent solubility. It is next reduced to powder, sifted, and mixed with about 45% of its weight of sulphuric acid (sp. gr. 1·45), the operation being conducted in a large stone or brick basin arched over with brickwork. Heat is then applied, the flame and hot air of a reverberatory furnace being made to sweep over the surface of the liquor. The heat and agitation are continued for 2 or 3 days, when the mass is raked out, and set aside in a warm place for a few weeks (6 to 8), to allow the acid the more perfectly to combine with the clay. At the end of this time the newly formed sulphate of alumina is washed out, the solution evaporated until of a sp. gr. of about 1·38 (1·24 for 'ammonia-alum'), and the salt of potash added. The remaining operations resemble those above described. Good alum may be produced by this process at about two thirds the cost of rock or mine alum.

2. (Process of Mr. Pochin.) Fine China clay is heated in a furnace, and mixed with a suitable proportion of sulphuric acid; the latter being considerably diluted with water, in order to moderate its action, which would otherwise be far too violent. The mixture is then passed into cisterns furnished with

[1] For pure POTASH-ALUM a salt of potash only must be employed. When ammonia (usually in the form of gas-liquor or gas-sulphate) is used as the precipitant, the product is AMMONIA-ALUM. The ordinary alums of commerce are now generally mixtures of the two.

[2] The respective quantities required to produce 100 parts of alum from the sulphate of alumina liquor, are—

Chloride of potassium	15·7
Sulphate of „	18·4
„ ammonium	13·9

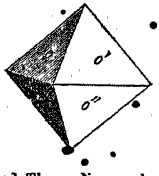
In practice, the exact quantity required may be found by a previous trial of a little of the aluminous liquor; but the indications mentioned in the text will always show the operator when a sufficient dose is added.

movable sides, where, in a few minutes, it heats violently and boils. The thick liquid gradually becomes thicker, until it is converted into a solid porous mass; the pores being produced by the bubbles of steam which are driven through it, owing to the heat resulting from the reaction of the ingredients on each other. This porous mass (ALUM-CAKE; CONCENTRATED ALUM) appears perfectly dry, although retaining a large amount of combined water. It also contains all the silica of the original clay, but in such a state of fine division, that the whole appears homogeneous; whilst it imparts a dryness to the touch which can scarcely be given to pure sulphate of alumina. From this substance a solution of pure sulphate of alumina is easily obtainable by lixiviation, and allowing the resulting solution to deposit its silica before using it; but for many purposes the presence of the finely-divided silica is not objectionable. The sulphate-of-alumina solution so obtained is adapted to all the purposes in dyeing for which alum is now employed; the sulphate of potash or of ammonia in the latter being an unnecessary constituent, and one merely added to facilitate the purification and subsequent crystallisation of the salt. To obtain ALUM from the porous alum-cake (the proper proportion of acid having been used in its preparation, or subsequently added), it is only necessary to precipitate its concentrated solution with a strong solution of a salt of potash, or of ammonia, or a mixture of them, and to otherwise proceed as before.

Ratio. In the above process the sulphide of iron of the shale or schist is converted by atmospheric oxygen into sulphate of iron and sulphuric acid; the sulphuric acid decomposes the clay, setting silica free, and producing sulphate of aluminum. The sulphate of iron is mostly got rid of by concentrating the solution of the mixed sulphates, and the mother-liquors are converted into alum by the addition of the salt of potassium. When chloride of potassium is used, it yields chloride of iron and sulphate of potassium, the latter combining with the sulphate of aluminum, and the former remaining behind in the mother-liquor. See ALUMS (in Chemistry).

Comp. Potassium alum has the formula $K_2SO_4 . Al_2(SO_4)_3 . 24Aq.$

Prop. Alum crystallises in regular octahedrons, often with truncated edges and angles; (see *engr.*) and sometimes in cubes, but only when there is a deficiency of acid in its composition, with the alkali in slight excess of the proper quantity. (Löwel.)[1] It is slightly efflorescent in dry air; soluble in 18 parts of cold water, and in rather less than its own weight of boiling water; tastes sweet, acidulous, and very astringent; is styptic; and reddens litmus. When heated it melts, loses its water of crystallisation, and becomes white and spongy (DRIED ALUM); a strong heat, short of whiteness, decomposes it, with the evolution of oxygen and a mixture of sulphuric and sulphurous anhydride; calcined with carbonaceous matter it suffers decomposition, and furnishes a pyrophoric residuum (HOMBERG'S PYROPHORUS). Ignited with alkaline chlorides, hydrochloric acid is liberated; which also occurs when their concentrated solutions are boiled together. Ammonia precipitates pure hydrate of aluminum from potassium alum; but only a subsulphate from the simple sulphate of alumina. Sp. gr. 1·724; but, when containing ammonia, often so low as 1·710.



[1] The ordinary alum, of commerce, consists of large crystalline masses, which do not present any regular geometrical form; but by immersion in water for a few days, octahedral and rectangular forms are developed on its surface. (Daniell.)

Tests, &c. It is easily recognised by its crystalline form, its taste, and by its complete solubility in water. Its aqueous solution gives a white gelatinous precipitate soluble in excess; a platinum wire moistened with the solution imparts a violet colour to the blowpipe flame; and chloride of barium gives a white precipitate insoluble in nitric acid.

Pur. When pure, its solution is not affected by tincture of galls, sulphuretted hydrogen, ferrocyanide of potassium, nor solution of nitrate of silver. Heated with caustic potassa, or quick-lime, it does not evolve fumes of ammonia.

Adult., &c. The principal impurity, and one which renders alum unfit for the use of the dyer, is iron. This may be readily detected by the blue precipitate it gives with ferrocyanide of potassium, or the black precipitate with sulphide of ammonium, which are very delicate tests.[2] Lime, another very injurious contamination, may be detected by precipitating the alumina and iron (if any) with ammonia, and then adding oxalate of ammonia to the boiled and filtered liquid. The liquid filtered from the last precipitate (oxalate of lime) may still contain magnesia, which may be detected by the white precipitate caused on the addition of an alkaline phosphate. Common alum frequently contains ammonia, from urine, or the crude sulphate of the gas-works, having been employed in its manufacture. Powdered alum is frequently adulterated with common salt, in which case it gives a white curdy precipitate with nitrate of silver, turning black by exposure to the light.

Phys. eff., &c. In small quantities alum acts as an astringent; in larger doses, as an irritant. It acts chemically on the animal tissues and fluids, is absorbed, and has been discovered in the liver, spleen, and urine (Orfila), the last often becoming acid (Kraus). Externally, it is astringent. The almost

[2] Good English alum contains less than 0·1% of iron. The best Roman or Italian alums seldom contain more than ·005% of iron-alum, notwithstanding their exterior colour.

general use of alum, by the English bakers, is one of the most fertile sources of dyspepsia and liver and bowel complaints, in adults; and of debility and rickets in children. Bad teeth and their early decay, is another consequence of the daily use of alum in our food. The bone matter (phosphate of lime) of bread, instead of being assimilated by the system, is either wholly, or in part, converted into a salt of alumina, which is useless and incapable of appropriation. When alum has been taken in poisonous doses an emetic should be given, followed by warm diluents and demulcents containing a little carbonate of soda; and subsequently, by a purgative.

Uses, &c. The applications of alum in the arts and manufactures are numerous and important. It is used to harden tallow and fats; to render wood and paper incombustible; to remove greasiness from printers' blocks and rollers; to prepare a paper for whitening silver and silvering brass in the cold; to help the separation of the butter from milk; to purify turbid water; to dress skins; to fix and brighten the colours in dyeing; to make lake and pyrophorus, &c. &c. It is also extensively used for clarifying liquors, and for many other purposes connected with the arts and everyday life. In *medicine*, alum is used as a tonic and astringent, in doses of 5 to 20 gr.; as a gargle (1 dr. to ½ pint of water); and as a collyrium and injection (10 to 15 gr. to 6 oz. of water). In lead colic, ½ to 1 dr. of alum (dissolved in gum-water), every 3 or 4 hours, is said to be infallible. Powdered alum is frequently applied with the tips of the fingers, in cases of sore throat and ulcerations of the mouth, &c. A teaspoonful of it is said to be one of the very best emetics in croup. (Dr. Meigs.) Alkalies, alkaline carbonates, lime, magnesia, acetate of lead, astringent vegetables, &c., are incompatible with it.

Gen. commentary. In addition to the particulars of its manufacture given above, we may add, that the plan of getting rid of the ferric salts there referred to, has to some considerable extent been successfully replaced by that of precipitating the alum, instead of the sulphate of iron, by adding alkaline matter to the lixivium. The crystalline precipitate is purified by draining, re-solution, and re-crystallisation; whilst the sulphate of iron and Epsom-salts contained in the mother-liquor, are obtained by subsequent evaporation and crystallisation; after which a fresh crop of alum may be got from it, by the use of an alkaline precipitant, as before.

In *estimating* the strength of his solution, the alum-maker takes as a standard, a measure or sp. gr. bottle capable of holding exactly 80 pennyweights of distilled water. The excess of the weight of liquor, in pennyweights, over 80, or that of water, is called so many 'pennyweights strong.' Thus one of 90 pennyweights (90 dwt.) is said to be '10 dwt. strong;' or simply, 'one of 90 dwt.' These numbers correspond to 2½ degrees of Twaddle's hydrometer, and may easily be found by dividing Twaddle's degrees by 2·5 or 2½; or by multiplying them by 4, and pointing off the right-hand figure of the product for a decimal. The result is in alum-makers' pennyweights.

By a patent now expired (Weisman's, 1839), the ferric salts are precipitated by the addition of a solution of ferrocyanide of potassium (prussiate of potash); after which the supernatant clear liquor, which is now a solution of nearly pure sulphate of alumina, is decanted, and evaporated for future operations, until it either forms, on cooling, a concrete mass, which is moulded into bricks or lumps, for the convenience of 'packing,' or until it is sufficiently concentrated to be converted into ALUM by the addition of a salt of potash or of ammonia, in the usual manner. The product, in each case, is perfectly free from iron. By a like addition of the ferrocyanide to a solution of ordinary sulphate of alumina or alum, the dyer may himself easily render them free from iron, or iron-alum; when, as mordants for even the most delicate colours, they are equal to the very best Roman alum.

Another process has been patented (Barlow & Gore, 1851) for the manufacture of alum from the ash or residue of the combustion of Boghead-coal, which, though hitherto regarded as almost valueless, actually contains about 30% of alumina. It has not, however, been found a convenient material for the purpose.

By the latest and most approved processes the least possible quantity of boiling water or liquor is employed for making the solutions, so that they may crystallise without evaporation, and thus economise fuel; and the mother-liquors of previous operations are constantly employed for this purpose, when possible. Nor is anything which is convertible to use, from the drainage of the heaps, to the liquor and slime of the roaching casks, allowed to be wasted.

By whatever process, or from whatever materials alum is obtained, it is absolutely necessary for the successful and economical conduct of its manufacture, that the precise composition of the mineral or minerals employed should be exactly known. This can only be determined by actual analysis, which should be extended to several parts of the same bed, and particularly to the upper and lower strata, which frequently differ in composition from each other, and thus require different treatment, or may be most advantageously employed in combination with each other. The necessity of this will be seen by reference to the composition of the following minerals, of which the top contains a larger proportion of iron-pyrites than the bottom, and the two require to be mixed, to equally diffuse the sulphuric acid generated by the

calcination, &c., to which they are subjected.

The following is the per-centage composition of certain alum shales :—

	Whitby, Yorkshire. (*Richardson.*)			Campsie, near Glasgow. (*Ronalds.*)		
	Top rock.	Bottom rock.		Top rock.	Top rock.	Bottom rock.
Sulphide of iron (*pyrites*)	4·20	8·50	Sulphide of iron (*pyrites*)	40·52	38·48	9·63 (?)
Silica	52·25	51·16	Silica	15·40	15·41	20·47 (?)
Protoxide of iron	8·49	6·11	Protoxide of iron	—	—	2·18
Alumina	18·75	18·30	Alumina	11·35	11·64	18·91 (?)
Lime	1·25	2·15	Lime	1·40	2·22	·40
Magnesia	·91	·90	Magnesia	·50	·32	2·17
Oxide of manganese	traces	traces	Oxide of manganese	·15	—	·55
Sulphuric acid (SO_3)	1·37	2·50	Sulphuric acid	—	—	·05
Potassa	·13	traces	Potassa	·90	—	1·26
Soda	·20	traces	Soda	—	—	·21
Chlorine	traces	traces	Carbon or bituminous matter	27·65 (?)	28·80	(?)
Coal	4·97	8·29	Coal	—	—	8·51
Water	2·88	2·00	Water	—	—	8·54
Loss	4·60	(?)	Loss	2·13 (?)	3·13	1·59 (?)
	100·	100·		100·	100·	100·

Alum-rock, or alum-stone, is a species of impure *alunite*, and is not of very common occurrence. That of Tolfa, near Civita-Vecchia, according to Klaproth, consists of—

Silica	56·5
Alumina	19·
Sulphuric acid (SO_3)	16·5
Potassa	4·
Water	3·
Loss	1·
	100·

which exhibits an excess of about 3% of sulphuric acid, and about 14% of alumina, more than are requisite to form alum with the 4% of potassa; proportions which, therefore, require to be supplemented with a potassium-salt during the process of manufacture. The alum-stone of Mont d'Or contains, according to Cordier, 1·4% of oxide of iron.

The presence of lime in alum-ore is most prejudicial, owing to its affinity for sulphuric acid being greater than that of either alumina or iron. Ores containing it in any quantity are, therefore, unfitted for the manufacture of alum. Magnesia is also prejudicial; but in this case, the sulphate of magnesia left in the mother-liquors is not wholly valueless, as it may be crystallised and sold as 'Epsom-salt,'—a thing which is actually done in some English alum-works.

The potash-salt employed by the alum-makers is either the sulphate or the chloride—chiefly the latter; its sources being the waste liquor of soap-works, saltpetre refineries, and glass-houses. Wood-ashes, though rich in potash, do not answer well unless freed by lixiviation from the large amount of carbonate of lime which is always present in them.

The ammonia-salt used in making alum is generally the crude sulphate prepared from the waste ammoniacal liquor of gas-works, or that from the manufacture of sal-ammoniac by the destructive distillation of animal matter. Both these liquors may be used without previous conversion into sulphate of ammonia whenever there is an excess of sulphuric acid in the aluminous solution.

Soda-salts are seldom, if ever, used as precipitants in the manufacture of alum, on account of the easy solubility of the resulting SODA-ALUM—a property which unfits them for this purpose. See ALUMINA, AMMONIA, DYEING, MORDANTS, POTASSA, SULPHURIC ACID, &c. (also *below*).

Ammo'nia Alum. $(NH_4)_2SO_4 . Al_2(SO_4)_3 . 24Aq.$ *Syn.* (ALUMEN; ALUM; B. P.), ALU'MEN AMMONIA'TUM, L.; ALUN D'AMMONIAQUE, A. AMMONIACAL, Fr. This is an alum in which the sulphate of potassium is replaced by an equivalent of sulphate of ammonium. It is prepared by adding crude sulphate of ammonium to solution of sulphate of aluminum; or gas-liquor, putrid urine, &c., to the acid-sulphate.

Much of the common alum, especially that prepared on the Continent, contains both potassium and ammonium, and recently, enormous works for its manufacture have been established in England. As an astringent, and as a source

of alumina in dyeing, it resembles potash-alum (*i.e.* ordinary alum). It may, however, be readily distinguished from the latter by the fumes of ammonia which are evolved when it is moistened and triturated, or heated, with caustic potassa or quick-lime; and by the residuum of its exposure to a white heat being pure alumina. See ALUM (*antè*).

Bas'ic Alum. A variety of alum found native at Tolfa. On calcination and subsequent lixiviation, it yields ordinary alum. A like substance falls as a white powder, when newly precipitated alumina is boiled in a solution of alum.

Baumé's Alum. Alum-white. See WHITE PIGMENTS.

Dried Alum; Burnt Alum. *Syn.* ALU'MEN US'TUM, A. EXSICCA'TUM (B. P.); ALUN SEC, Fr.; GEBRANNTER ALAUN, Ger.; ALUME CALCINATO, Ital. Alum deprived of its water of crystallisation by heat.

Prep. Take of alum, 4 oz. Heat the alum in a porcelain dish or other suitable vessel, till it liquefies, then raise and continue the heat, not allowing it to exceed 400°, till aqueous vapour ceases to be disengaged, and the salt has lost 47 per cent. of its weight. Reduce the residue to powder, and preserve it in a well-stopped bottle.

Prop., &c. Similar to those of common alum, but it is rather more astringent, and is less soluble. When moistened, or placed in contact with water, it resumes its water of crystallisation with evolution of heat.—*Dose.* 10 to 20 gr.; in colic (especially painters' colic), hæmoptysis, &c. It is chiefly used as an escharotic, to destroy 'proud flesh,' &c.

Chrome Alum. See ALUMS (in Chemistry).

I'ron Alum (-ŭrn). *Syn.* ALU'MEN FER'RICUM, SUL'PHAS FER'RI ET POTAS'SÆ, FER'RI PEROX'IDI POTASSIO-SUL'PHAS, &c., L.

Comp. $K_2SO_4 . Fe_2(SO_4)_3 . 24Aq.$

Prep. Take of peroxide of iron, 9 lbs.; sulphuric acid, 14 lbs.; dissolve, dilute the mixture with water, q.s., and add of potassium sulphate, 10 lbs.; evaporate, and crystallise.

Prop., &c. Crystals, beautiful octahedrons of a pinkish or pale violet colour. It is strongly recommended, by Dr. Tyler Smith, as a chalybeate tonic, and has been used by him, at St. Mary's Hospital, with marked success. It has also been used as a mordant, in dyeing black.—*Dose.* ½ gr. to 5 gr.

Ro'man Alum. *Syn.* RED ALUM*, ROACH A., ROCHE A., ROCK A.*; ALU'MEN ROMA'NUM, A. RU'BRUM, A. RU'PEUM, &c., L.; ALUN ROMAIN, A. DE ROCHE, Fr.; ALUME DI ROCCA, It. In small fragments, covered with a reddish powder (ALUMEN RUBRUM VE"RUM); originally imported from Civita-Vecchia, where it occurs native. It is much esteemed by dyers from being nearly free from iron-alum. That now sold for it in England, is ordinary alum coloured with Venetian red, Armenian bole, or rose-pink (ALUMEN RUBRUM SPU"RIUM). This is done by shaking the fragments in a sieve over a vessel of hot water, and then stirring them up with the colour, until the surface is uniformly tinged with it. In genuine roach-alum the colour not only covers the surface, but also partially pervades the substance of the crystals. The name was formerly also applied to a pure white variety of alum, prepared at Tolfa; but it is now, in English commerce, exclusively given to common alum artificially coloured.

So'da Alum. *Syn.* SULPHAS ALUMINÆ ET SODÆ, L. *Comp.* $Na_2SO_4 . Al_2(SO_4)_3 . 24Aq.$ An alum in which the potassium sulphate of common alum is replaced by a like salt of sodium. It does not occur in commerce. (Vide *suprà* et *infrà*.)

AL'UM-EARTH. Alumina.

ALUM MOR'DANTS. In *dyeing*, mordants having for their basis either common alum or the acetate or sulphate of aluminum. See ALUMINA and MORDANTS.

AL'UM-ROOT. *Syn.* AMER'ICAN SAN'ICLE; HEU'CHERA (Ph. U. S.), L. The *root* of *heuchera americana* (Linn.), a plant of North America. It is powerfully styptic and astringent; and is *used* chiefly as an external application in cancer.

ALUM-WHITE. See WHITE PIGMENTS.

AL'UMS. *Syn.* ALU'MINA (*pl.* of *alu'men*), L. In *chemistry*, a term applied to a series or group of salts having 'common alum' for their type, which they resemble in crystalline form and constitution.

It is found that the aluminum of common alum may be replaced by any other metallic oxide having a like constitution, without affecting the leading characteristics of the salt; and further, that in the newly formed compound, as in potash-alum, the second sulphate may also be replaced under the like conditions. All the alums crystallise in octahedrons or cubes, and they all contain the same number of molecules of water. The alums of commerce (or alums proper) all contain aluminum and an alkaline sulphate.

Prep. All the alums may be made by mixing together solutions of the respective sulphates in equivalent proportions, when crystals may be obtained by evaporation in the usual manner. The presence of sulphuric acid, in slight excess, assists their crystallisation.

AL'UMED (al'ŭmd). Mixed or impregnated with alum. In *dyeing*, mordanted with alum.

ALU'MEN (-l'ōō-). [L.] Alum; the pharmacopœial name of alum. (See *above*.)

ALUMINUM. *Syn.* ALUMINUM (which *see*).

ALUMINOUS. In *mineralogy*, of, resembling, or containing aluminum. In *chemistry*, or *pharmacy*, pertaining or obtained from alum. By spontaneous

ALUMINUM. [En.] obtained in long; trans-MINIUM, Eng., Fr., metallic radical or *alum*, in powder, 4 parts; distributed, united with dissolve; *acetate of lead*, M. Wöhler, who succeed solution and mixture

gray metallic powder (A.D. 1827); and later (1845), under the form of globules exhibiting the leading characteristics of the metal. In 1854, M. Dumas announced to the 'Academy of Sciences,' that M. St. Clair Deville had procured pure aluminum from clay, and exhibited several specimens of considerable size and beauty. The result was a general impression that it might be easily obtained in any quantity, and ultimately at a reasonable price; expectations which have been only partly, though to a great extent, fulfilled, owing to the expense and trouble of the process, notwithstanding recent improvements.

Prep. (M. Deville; A.D. 1854-59.)—A quantity of chloride of aluminum, varying from 200 to 300 grammes (say from 6 to 10 oz.), is introduced into a wide glass or porcelain tube, between two plugs of asbestos to retain it in position, and a current of hydrogen (thoroughly dried by passing first through concentrated sulphuric acid, and then through a tube containing fused chloride of calcium) passed over it; a gentle heat being at the same time applied to the part of the tube containing the chloride, to drive off any free hydrochloric acid which might have been formed by the action of the air upon it. A small porcelain boat, containing sodium, is now introduced at the other extremity of the glass tube, which is then again closed; and when the sodium is fused, the chloride is sufficiently heated to cause its vapour to come into free contact with it. A powerful reaction ensues, with the evolution of much heat, and this continues as long as any undecomposed sodium remains to act on the passing vapour. The mass in the 'boat,' which is now a mixture of the double chloride of aluminum and sodium, in which small globules of the newly reduced metal are suspended, is allowed to cool in the hydrogen; after which it is treated with water, to remove the soluble double chloride. The residuum, consisting of small globules of aluminum, is lastly, reduced to a solid button or mass, by fusion, at a strong heat, under a layer of the fused double chloride of aluminum and sodium.

On a large scale two cast-iron cylinders are employed, instead of the glass or porcelain tube just referred to; the anterior one of which contains the sesquichloride of aluminum, and the posterior one a tray holding the sodium, of which 10 or 12 *lbs.* are commonly operated on at once. These cylinders are united by means of a smaller intermediate one, filled with clean scraps of iron, which serve to separate [illegible] free hydrochloric acid, and chloride of [illegible] may be [illegible] the vapour of the chloride of —a thing which is [illegible] through them. During English alum-works. [illegible]our of the chloride this

The potash-salt employ[illegible] kept heated to from makers is either the sulphate two other cylinders chiefly the latter; its sourced, since the chloride liquor of soap-works, salparatively low temperature, and the reaction between it and the fused sodium, when once commenced, usually generates sufficient heat for the completion of the process.

Occasionally a mixture of the double chloride of aluminum and sodium, 40 parts; chloride of sodium, 20 parts; fluor spar, 20 parts; each separately dried, powdered, and then blended together; sodium, in small pieces, 7½ to 8 parts, are used instead of the last.

It is likewise made from a mixture of kryolite and fused chloride of potassium, of each, in powder, 5 parts; sodium, 2 parts; a cast-iron crucible being employed; the resulting minute globules being collected and fused to a button under a layer of the double chloride of aluminum and sodium.

Prop, &c. Aluminum, when quite pure, closely approaches silver in appearance, except in being rather less white and lustrous than that metal. Ordinary specimens, called pure, have a slight bluish tint or tin-white colour, with a perfect lustre, but far inferior to that of pure silver. Sp. gr. 2·56 (about that of glass), which by hammering may be raised to 2·67. It is both ductile and malleable; fuses at a temperature between the melting-points of zinc and silver; is not affected by either damp or dry air, or by oxygen at ordinary temperatures, or by water whether cold or boiling; even steam, at a red heat, is only slowly decomposed by it. It is not acted on by nitric acid, however concentrated, unless boiling, and then very slowly; nor by dilute sulphuric acid, sulphuretted hydrogen, and the sulphurets, or even the fused hydrates of the alkalies. It is, however, readily dissolved by hydrochloric acid, with the evolution of hydrogen, even in the cold; and by a concentrated mixture of nitric and sulphuric acid. It is feebly magnetic, conducts electricity about 8 times better than iron, and is more electro-negative than even zinc. Commercial specimens, owing to the presence of iron and silicon, and often zinc, usually slowly tarnish in damp air, and possess the other properties described above in a somewhat diminished degree.

In a finely divided state, particularly in the state of powder or minute scales in which it was originally obtained, when heated to redness, it catches fire and burns with great rapidity in the air, and in oxygen gas with intense brilliancy, the product in each case being alumina.

Aluminum unites with the other metals, forming ALLOYS, of which some promise to be of great value in the arts. An alloy of 100 parts of aluminum with 5 parts of silver, may be worked like the pure metal, but is harder and susceptible of a finer polish, whilst its property of not being affected by sulphuretted hydrogen and acids remains unimpaired, even 3% of silver is said to be sufficient to impart to it the full brilliance and colour of pure silver. An alloy containing 16% of gold is softer and scarcely so malleable as the pure metal. With

8% of iron, or 10% of copper, it still remains tough and malleable; but a larger proportion of either of these metals renders it brittle.

The presence of 2 or 3% of zinc destroys its ductility and malleability, and also impairs its colour and lustre; whilst less than even ½% of bismuth renders it brittle in a high degree. Small quantities of aluminum added to other metals change their properties in a very remarkable manner. Thus, copper alloyed with 10% of aluminum has the colour and brilliancy of gold, is harder than bronze, very malleable, and may be worked at high temperatures easier than the best varieties of iron; and with 20% is quite white, and closely resembles silver. With more than 12% of aluminum the alloy is harder, but brittle. The alloy formed of 100 parts of silver with 5 parts of aluminum, is as hard as the silver of our coinage, whilst the other properties of the latter metal remain unaltered.

Uses. The valuable properties of aluminium adapt it to numerous applications in the arts and everyday life. Hitherto these have been very limited, owing to its comparatively high price; which, notwithstanding it has fallen considerably, is still sufficient to prevent its general or even extensive application. The 'eagles' of the French army have been made of it, as well as certain articles of jewelry, plate, &c., as brooches, bracelets, chains, spoons, and other ornamental and useful objects. Owing to its low sp. gr., it has been used as a suitable material for the minute decimal weights of chemists, for military helmets, trumpets, &c. A few cornet-à-pistons, for which its lightness and sonorousness admirably adapt it, have actually been made of it. Its power of resisting oxygen, sulphuretted hydrogen, moisture, &c., would render it invaluable as a coating to metals, particularly iron and lead, to protect them from rust or corrosion, did not its price intervene. As an internal coating for water-pipes, cisterns, &c., no other substance, except gold and platinum, is so well adapted. In *chemistry*, capsules, tubes, &c., either made of or coated with it, may be often advantageously substituted for those of platinum.

In addition to what has been said above, it may be observed that, in preparing aluminum, the chief care should be to avoid accidents or failure by the employment of too high a temperature, and to avoid the product being contaminated with other metals or with carbon. To ensure the purity of the metal is a matter of the greatest difficulty, owing to the facility with which foreign matters are taken up, during the process, from the materials of which the apparatus is composed; and from the substances from which it is prepared being seldom absolutely pure. Indeed, it is not too much to assert that *chemically pure* aluminium has not yet been obtained; and that even a very close approximation to it is of very rare occurrence. Whenever a copper boat is used to hold the sodium, the product is always contaminated with copper. Sesquichloride of aluminum always contains some of the chlorides of iron and silicon, both of which are volatile, and probably takes up a further portion from the porcelain or earthenware used to form the apparatus. Sodium also is seldom uncontaminated with carbon or some compound of it; in which case, and likewise when it is not carefully freed from the naphtha in which it has been preserved, the product always contains carbon. The crucible, whether of porcelain or iron, in which the final fusion is made, also contributes to contaminate the metal. Hence the inferior whiteness and brilliancy of commercial specimens of aluminum; a metal which, in its absolutely pure state, may be reasonably inferred to be as superior in the above respects to silver, as silver is to tin. Commercial aluminum contains from 88 to 94 per cent. only of pure aluminium, and from 1 to 4 per cent. of iron, ½ to 3 per cent. of silicon, and from 1 to 6 per cent. of copper.

Aluminum salts are generally colourless, soluble, and crystallise with difficulty, and are distinguished as follows:—

Tests.—1. Ammonia and the alkaline carbonates throw down a bulky white precipitate (hydrate of aluminum) from solutions of its salts, which is insoluble in excess of the precipitant: —2. Pure potassa and soda throw down white gelatinous precipitates, freely soluble in excess of the precipitant; from which the hydrate of aluminum is reprecipitated by chloride of ammonium, even in the cold:—3. Phosphate of ammonium gives a white precipitate:—4. Iodide of potassium produces a white precipitate, passing into a permanent yellow:—5. Sulphuretted hydrogen gives no precipitate:—6. Sulphydrate of ammonium precipitates alumina from these solutions:—7. Bisulphate of potassium, added to concentrated solutions, gives a precipitate of octahedral crystals of alum:—8. At a red heat its salts part with some of their acid; at a white heat, most of it, if not all:—9. Aluminum compounds, ignited on charcoal before the blowpipe, and afterwards moistened with a solution of protonitrate of cobalt and again strongly ignited, give an unfused mass, which, on cooling, appears blue by day, and violet by candlelight; a test, however, which is inapplicable to fusible compounds of aluminum, and such as are not free, or nearly free, from other oxides.

Aluminum, Acetate of. *Syn.* ACETATE OF ALUMINA. *Prep.* Pure hydrate of aluminum is digested, to saturation, in strong acetic acid, in the cold; and the resulting solution, after being filtered or decanted, is either evaporated by a very gentle heat to a gelatinous, semi-solid consistence (its usual form), or is preserved in the liquid state. By spontaneous evaporation it may be obtained in long, transparent crystals.

Red liquor. From *alum*, in powder, 4 parts; *warm water*, q. s. to dissolve; *acetate of lead*, in powder, 3 parts; the solution and mixture

being effected by lengthened agitation in a *tub* or other *wooden* vessels, and the *clear liquid*, after repose for a sufficient time, decanted or drawn off from the sediment.

From *alum*, 2 parts; (dissolved in) *warm water*, q. s.; *solution of pyrolignite of lime* (20° Baumé), 3 parts; as before, but allowing a longer time for the subsidence of the precipitate, and taking more care in the decantation, than when acetate of lead is employed.

By decomposing a *solution* of *crude sulphate of alumina* with *neutral* or *monobasic acetate of lead*.

Prop. Its characteristic property is the feeble affinity existing between its acid and base, which, when it is used as a mordant, is counterbalanced by that of the fibres of the cloth or yarn to which it is applied. In other respects, it resembles the other simple salts of alumina.

Uses, &c. In *dyeing* and *calico-printing*, as a mordant. In *medicine*, properly diluted, in chronic diarrhœa; and, mixed with syrup of poppies, in slight cases of hæmoptysis (*spitting of blood*). It has been employed, by M. Gannal, as an injection to preserve animal bodies, which it will do for years.—*Dose.* ½ to 1 dr. daily, in divided portions, taken in thin mucilage or syrup, or in barley-water; as an *injection*, 10 to 20 gr., to water, 4 to 6 fl. oz., in gonorrhœa, leucorrhœa, &c.

Aluminum, Chloride of. Al_2Cl_6. *Syn.* SESQUICHLO"RIDE OF ALUMINUM; ALUMIN'II CHLORI'DI, &c., L. *Prep.* A thick paste made of dry *precipitated alumina*, *lampblack*, and *oil*, is strongly heated in a *covered crucible* until all the organic matter is carbonised. The *residuum* is transferred to a *porcelain tube* fixed across a furnace, one end of which is connected with *another tube* containing *dried chloride of calcium*, and the other end with a *small tubulated receiver*. The porcelain tube is then heated to redness, whilst *chlorine*, dried by passing through the chloride-of-calcium tube, is transmitted through the apparatus. In one or two hours, or as soon as the tube is choked, the whole is allowed to cool, and the newly formed SESQUICHLORIDE collected and preserved in *mineral naphtha* for use.

On the *large scale*:—*Chlorine*, dried as before, is passed over a mixture of *pure clay*, *lampblack*, and *coal-tar*, contained in an *iron retort* similar to that used in the manufacture of coal-gas (*previously* ignited by means of a suitable furnace), and connected with a *cool* chamber accurately lined with *tiles of earthenware*. The vapours of the SESQUICHLORIDE condense in this chamber as a yellowish crystalline mass, which is collected and preserved as before.

Prop., &c. It is volatile at a dull red heat; excessively greedy of moisture; and very soluble, with decomposition, hydrochloric acid and alumina being formed. Once dissolved, it cannot be again recovered. Its chief use is in the preparation of aluminum.

Obs. Although alumina, like magnesia, is freely soluble in hydrochloric acid, the sesquichloride of aluminum contained in this solution cannot be obtained in the *anhydrous state*, or even the *solid form*, by its evaporation; the chloride suffering decomposition, with the formation of hydrochloric acid, which is volatilised, and alumina, which is left behind.

Aluminum, Ni'trate of. $Al_2(NO_3)_6$. *Syn.* NITRATE OF ALUMINA; ALU'MINÆ NI'TRAS, L. *Prep.* Similar to that of the acetate and citrate. Its concentrated acid solution deposits rhombic crystals, containing 18 equiv. of water.

Aluminum, Oxide of (Al_2O_3), **and Hydrate of** ($Al_2(HO)_6$). *Syn.* ALUMINA.

Prep. Aluminum is precipitated as a hydrate from *solutions* of *aluminum salts* on the addition of an *alkali* or *alkaline carbonate*; and this precipitate, after being thoroughly washed and dried, on ignition loses its water and becomes anhydrous. The following are the best formulæ for the purpose:—

Alum is dissolved in about 20 times its weight of *distilled water*, and the solution is dropped *slowly* into pure *solution of ammonia*, until the latter is *nearly* but *not* entirely saturated, when the whole is set aside for some time. The clear supernatant liquid is then decanted, and the *precipitate* is carefully and thoroughly washed three or four times with *tepid distilled water*; after which it is collected on a filter, again well washed with *water*, and, lastly, pressed and dried between *bibulous paper*, either without heat, or at a temperature not higher than 120° Fahr. The *product* is *pure hydrate of aluminum*, and is converted into *anhydrous alumina* by exposure to a *white* heat in a covered crucible. The residuum, after ignition, is pure ANHY'DROUS ALUMINA, or SESQUIOX'IDE OF ALUMIN'UM.

A *solution* of *alum* is slowly added to a *solution* of *carbonate of ammonia*, avoiding excess; and the resulting *precipitate*, after being washed and pressed, is dried at a heat of from 120° to 180° Fahr.

Prop., &c. A soft white powder. The hydrate is freely soluble in the acids and in solution of caustic potassa and soda (from which it is precipitable by sal ammoniac); when *anhydrous* (as after ignition), it is scarcely acted on by acids, and when perfectly indurated, or crystallised, it is wholly insoluble; but on ignition with alkalies, alkaline ALU'MINATES are formed, and the alumina is then readily dissolved by acids, forming salts, which are mostly colourless, non-volatile, and soluble; they have a very astringent and somewhat sweetish taste, redden litmus paper, and lose their acids by ignition. Its most remarkable, or rather useful property, is its strong affinity for the fibres of organic bodies, as cotton, flax, silk, wool, &c., which are capable of taking it from its salts; and also for organic colouring matters. Hence its great use in *dyeing*, and in *bleaching liquids* and the *preparation* of *lakes*.

AMALGAMA'TION. [Eng., Fr.] *Syn.* AMALGAMA'TIO, L.; VERQUICKEN, Ger. The act or process by which an amalgam is formed; hence loosely, the mixing or blending of different things. In the *art of the refiner*, the operation of separating *gold* and *silver* from their ores by means of mercury.

AM'ANDINE (-dēne). *Prep.* 1. (Transparent.)—*a.* Fine *new white* or *pale honey*, 4 *oz.*, *white soft-soap* (prepared from lard and potassa), 2 *oz.*; mix thoroughly in a *marble mortar*, adding 1 or 2 teaspoonfuls (if necessary) of *solution of potassa*, until a perfectly homogeneous *paste* or *cream* is produced; then rub in, by *degrees*, and *very gradually*, of *oil of almonds*, 7 *lbs.* (or *q. s.*), previously mixed with *essential oil of almonds*, 1 *oz.*; *essence* (oil) *of bergamot*, ¾ *oz.*; *oil of cloves*, ½ *oz.*; and *balsam of Peru*, 3 *dr.* The *product*, which should have a rich, transparent, jelly-like appearance and behaviour, is, lastly, put into *pots* for *use* or *sale*.

b. (G. W. S. Piesse.) *Simple syrup*, 4 *oz.*; *white soft-soap* (see *above*), 1 *oz.*; *oil of almonds*, 7 *lbs.* (previously scented with—); *essential oil of almonds* and *bergamot*, of each, 1 *oz.*; *oil of cloves*, ½ *oz.*; the whole being mixed, &c., as before. Both the above are of very fine quality. *Glycerin*, in the proportion of about ½ *oz.* to each *lb.* of the products, added with the soap, improves their softening quality.

2. (Opaque.)—*a.* From *white potash-soap* and *gum-mucilage* (thick), of each, 3 *oz.*; new *white honey*, 6 *oz.*; and the *yelks* of 5 large *eggs*; well mixed together, and afterwards intimately blended *first*, with *oil of almonds* (scented as before, or at will), 2 *lbs.*; and *afterwards*, with *thick pistachio-milk* (made of the fresh-peeled nuts and rose-water), 5 *fl. oz.*

b. From *almond-paste*, *honey*, *white potash-soap*, and *glycerin*, of each, 1 *oz.*; *yelk of* 1 *egg*; *oil of almonds*, ½ pint (holding in solution —); *essential oil of almonds*, 1 *dr.*; *balsam of Peru*, ½ *dr.*

Uses, *&c.* To whiten and soften the skin, and to prevent it chapping. A small portion, about half the size of a filbert, with a few drops of *warm water*, produces a very white and rich lather, with which the hands and face are lightly rubbed, and the skin, in a short time, *gently* wiped with a small napkin, whilst the water on it is still milky.

The *manufacture* of AMANDINE is a matter of some difficulty and labour. The *details* essential to success, are given under EMULSINES. It is sometimes *coloured*, which is done by infusing or dissolving in the *oil*, before using it, a little—*spinach-leaves*, for GREEN; and *palm-oil*, or *annatto*, for YELLOW and ORANGE. A beautiful SCARLET or CRIMSON tinge may be given to it by a little *liquid rouge* or *carmine* (ammoniacal), added just before removing it from the mortar. See EMULSINES, OLIVINE, PASTES, &c.

AMANI'TA MUSCA''RIA. The fly-agaric or fly-mushroom. See AGARIC.

AMANI'TINE (-tīn). *Syn.* AMANI'TINA, L. The name given by Letellier to the poisonous principle of *amanita muscaria*, and some other species of fungi. It is brown, uncrystallisable, and soluble.

AMA''RA. (-mārе'-). [L.] In *medicine* and *pharmacology*, the bitter tonics.

AM'ARANTH. *Syn.* AMARANTH'US, L.; AMARANTE, Fr. The flower *love-lies-bleeding* ('amaranthus cauda'tus'—Linn.). In *poetry*, an imaginary flower that never fades. (Milton.) In *chromatics*, a colour inclining to purple.

AMARYTH'RINE (-rith'-rin). A bitter principle found, in certain lichens, associated with *erythrine* (which *see*).

AM'BER. *Syn.* ELEC'TRON, Gr.; ELEC'TRUM, SUC'CINUM (Ph. D.), L.; AMBRE, SUCCIN, Fr.; BERNSTEIN, Ger.; LYNX-STONE †, LA'PIS LYN'CIS †, L. A well-known yellowish, semi-transparent, fossil resin, of which trinkets and the mouth-pieces of pipes are commonly made.

Nat. hist., *&c.* Amber is found in detached pieces on the sea-coast, and is dug up in diluvial soils. That of commerce comes chiefly from the southern coasts of the Baltic, where it is cast ashore between Königsberg and Memel; and from Ducal Prussia, Saxony, Poland, Sicily, and Maryland (U.S.), where it is dug out of beds or mines. It has also been found on the shores of Norfolk, and small pieces are occasionally dug up in the gravel pits round London. It is probably an antediluvian resin; and when found on the coast, is supposed to be disengaged, by the action of the sea, from neighbouring beds of lignite or fossil coal. Much diversity of opinion for a long time prevailed amongst naturalists and chemists as to the origin of amber, some referring it to the vegetable, others to the mineral, and some even to the animal kingdom; its natural history and analysis affording something in favour of each. The *vegetable* origin of amber has, however, been recently shown by various facts, and is now generally admitted. According to Sir David Brewster, its optical properties are those of an indurated vegetable juice. ('Ed. Phil. Journ.,' ii.) Insects and fragments of vegetables are frequently found imbedded in it; and this in a manner which could only have occurred when the resin was a viscid fluid. Microscopical researches have led to the conclusion that it is the production of some species of pine, closely allied to the pinus balsamea. ('Entom. Trans.,' i & ii.)

Manuf. Amber is WORKED in a *lathe*, POLISHED with *whiting and water* or *rotten-stone-and-oil*, and FINISHED OFF by friction with flannel. During the operation the pieces often become hot and electrical, and fly into fragments; to avoid which, they are kept as cool as possible, and only worked for a short period at a time. The workmen are said to often suffer

considerably from electrical excitement. Amber is JOINED and MENDED by smearing the surface of the pieces with *linseed* or *boiled oil*, and then *strongly* pressing them together, at the same time holding them over a *charcoal fire*, or heating them in any other convenient way in which they will not be exposed to injury. The *commoner varieties* are HARDENED and rendered CLEAREE, either by boiling them in *rape oil* for about 24 hours, or by surrounding the pieces with *clean sand* in an iron pot, and exposing them to a gradually increasing heat for 30 or 40 hours. During this process small fragments are kept in the sand at the side of the pot, for the purpose of occasional examination, lest the heat be raised too high, or be too long continued.

Prop., &c. Hard; brittle; tasteless; glossy; generally translucent, but sometimes opaque, and occasionally, though rarely, transparent; colour, generally yellow or orange, but sometimes yellowish-white; becomes negatively electric by friction; smells agreeably when rubbed or heated; fracture, conchoidal and vitreous or resinous; soluble in the pure alkalies, and, without decomposition, in oil of vitriol, which then becomes purple; insoluble in the essential and fixed oils without long digestion and heat; soluble in chloroform; melts at about 556° Fahr.; burns with a yellow flame, emitting at the same time a peculiar fragrant odour, and leaving a light and shiny coal. By dry distillation it yields *inflammable gases*, a small quantity of *water*, a little *acetic acid*, a *volatile oil* (OIL OF AMBER; O'LEUM SUC'CINI, L.) at first pale, afterwards brown, thick, and empyreumatic, and an *acid* (SUCCIN'IC ACID; ACIDUM SUCCIN'ICUM, L.), with *residual charcoal* 12 to 13%. Sp. gr. 1·065 to 1·09, but usually about 1·070. It cannot be fused without undergoing more or less chemical change.

Ident. Amber may be known from *mellite* and *copal*, both of which articles are occasionally substituted for it, by the following characteristics:—1. MELLITE is *infusible* by heat, and burns *white*:—2. A piece of COPAL, heated on the point of a knife, *catches fire*, and runs into *drops*, which *flatten* as they fall:—3. AMBER burns with *spitting* and *frothing*, and when its liquefied particles drop, they *rebound* from the plane on which they fall (M. Haüy):—4. Neither *mellite* nor *copal* yield succinic acid by distillation; nor the agreeable odour of amber when burnt; nor do they become so readily electric by friction.

Uses. It is chiefly made into mouth-pieces for pipes, beads for necklaces, and other ornaments and trinkets. It is also used as the basis of several excellent varnishes. In *medicine*, it was formerly given in chronic coughs, hysteria, &c.—*Dose* (of the powder), 10 to 60 gr.

Remarks. The finer sorts of amber fetch very high prices. A piece 1 *lb.* in weight is said to be worth from 10*l.* to 15*l.* 5000 dollars a few years since were offered in Prussia for a piece weighing 13 *lbs.*, and which, it was stated by the Armenian merchants, would fetch from 30,000 to 40,000 dollars in Constantinople. It is more valued in the East than in England; and chiefly on account of the Turks and other Orientals believing it to be incapable of transmitting infection. In the royal cabinet, Berlin, there is a piece weighing 18 *lbs.*, supposed to be the largest ever found. The *coarser kinds* alone are employed in medicine, chemistry, &c.

Ac'id of Amber* (ăs'-). Succinic Acid.

Bal'sam of Amber. *Syn.* BAL'SAMUM SUC'CINI, L. The *thick matter* left in the retort after the rectification of *oil of amber*; and which it resembles in its properties.

Factī''tious Amber (-tĭsh'-). *Syn.* SUC'CINUM FACTI''TIUM, L. Mellite, copal, and anime, have each been substituted for amber, especially for small fragments of it. Recently an imitation has been produced by acting on *gutta percha* with *sulphur*, at a *high temperature*, which, either alone, or in combination with *copal*, is said to have been extensively passed off for genuine amber.

Liq'uid Amber†. See LIQUID-AMBAR.

Oil of Amber. See OILS.

Re'sin of Amber. See PYRÉTINE.

Salt of Amber. Succinic Acid.

Sol'uble Amber. *Prep.* Fragments of *amber* are cautiously heated in an *iron pot*, and as soon as it becomes semi-liquid, an equal weight of pale *boiled linseed-oil*, previously made hot, is *very gradually* stirred in, and the whole thoroughly blended.—*Used* as a cement for glass and earthenware, and thinned with *oil of turpentine* to make varnishes. It will keep any length of time if preserved from the air.

AMBER-CAMPHOR. See PYRÉTINE (Crystalline).

AM'BER DRINK†. Amber-coloured malt liquor.

AM'BER-SEED. Musk-seed (which *see*).

AM'BER-TREE. The popular name of a species of *anthospermum*, an evergreen shrub, of which the *leaves*, when bruised, emit an agreeable odour.

AM'BERGRIS (-grĭs; -grēse‡). *Syn.* GRAY AMBER*; AMBRAGRI''SEA (grĭzh'-e-ă), L.; AMBREGRIS, Fr.; AMBRA, AMBAR, Ger. An odorous, solid substance, found floating on the sea in tropical climates, and in the cæcum of the *cachalot* or *spermaceti-whale* (physeter macrocephalus). It has been supposed, by some, to be a morbid secretion of the liver or intestines, analogous to biliary calculi; but according to Mr. Beale, it consists of the mere indurated fæces of the animal, perhaps (as suggested by Brande and Pereira), somewhat altered by disease. "Some of the semifluid fæces, dried with the proper precautions, had all the properties of ambergris." (Beale.) It is occasionally found in masses weighing from 60 to 225 *lbs.*

Prop., &c. Solid, opaque, ash-coloured, streaked or variegated, fatty, inflammable;

remarkably light; highly odorous,[1] particularly when warmed, cut, or handled—the odour being peculiar and not easily described or imitated, of a very diffusive and penetrating character, and perceptible in minute quantities; rugged on the surface; does not effervesce with acids; melts at 140° to 150° Fahr. into a yellowish resin-like mass; at 212° flies off as a white vapour; very soluble in alcohol, ether, and the volatile and fixed oils. It appears to be a non-saponifiable fat, analogous to cholesterine. Sp. gr. 0·780 to 0·926.[2]

Pur. From the high price of genuine ambergris it is very frequently, if not nearly always, adulterated. When quite pure and of the best quality, it is—1. Nearly wholly *soluble* in hot *alcohol* and *ether*, and yields about 85⅔ of *ambreine*:—2. It almost wholly *volatilises* at a *moderate heat*, and when *burnt* leaves *no* notable quantity of *ashes*; a little of it exposed in a silver spoon, melts *without bubble* or *scum*; and on the heated point of a knife it is *rapidly* and *entirely* dissipated:—3. It is *easily punctured* with a *heated needle*, and on withdrawing it, not only should the *odour* be *immediately evolved*, but the *needle* should *come out clean*, without anything adhering to it (Normandy):—4. The Chinese are said to try its genuineness by scraping it fine upon the top of boiling tea. "It should dissolve (melt) and diffuse itself generally." *Black* or *white* is bad. The *smooth* and *uniform* is generally factitious.[3]

Uses, &c. It is highly prized for its odour, which is found greatly to improve and exalt that of other substances; hence its extensive use in *perfumery*. In *medicine*, it was formerly given as an aphrodisiac, in doses of 3 to 10 gr. "A grain or two, when rubbed down with *sugar*, and added to a *hogshead of claret*, is very perceptible in the wine, and gives it a flavour, by some considered as an improvement." (Brande.)

Facti″tious Ambergris. An article of this kind, met with in the shops, is thus made:—*Orris-powder, spermaceti*, and *gum-benzoin*, of each 1 *lb.*; *asphaltum*, 3 or 4 *oz.*; *ambergris*, 6 *oz.*; *grain-musk*, 3 *dr.*; *oil of cloves*, 1 *dr.*; *oil of rhodium*, ½ *dr.*; *liquor of ammonia*, 1 *fl. oz.*; beaten to a smooth hard mass with *mucilage*, and made into lumps whilst soft. This fraud is readily detected.

AM′BREINE (-bre-ĭn). *Syn.* AMBREI′NA, L.; AMBREINE, Fr.; AMBARSTOFF, Ger. The fatty, odorous principle of ambergris.

Prep. Digest *ambergris* in *hot alcohol* (sp. gr. 0·827), until the latter will dissolve no more, then filter. The AMBREINE will be deposited as the solution cools, in an irregular crystalline mass, which may be purified by recrystallisation in alcohol.

Prop. &c. Melts at about 99°; volatilises at 212° to 220° Fahr.; nitric acid converts it into AMBREIC ACID. It closely resembles cholesterine.—*Prod.* 85⅔.

AMBRETTE′ (-brĕt′). [Fr.] Musk-seed.

AM′ETHYST (-thist). *Syn.* PURPLE ROCK-CRYSTAL; AMÉTHYSTE, Fr.; AMETHYS′TUS, L. A beautiful sub-species of quartz or rock crystal, of a violet-blue colour of varying intensity, in great request for cutting into seals, brooches, and other like articles of ornament. It was known and prized in the earliest ages of antiquity. Among the ancients, cups and vases were made out of this mineral; and it was an opinion of the Greeks and Persians, that an amethyst bound on the navel would counteract the effects of wine, and that wine drank out of an amethystine vessel would not intoxicate. See GEMS.

Amethyst. In *chromation, dyeing*, &c., a rich variety of deep violet colour. Hence, AMETHYST′INE (-ĭn), &c.

Orient′al Amethyst. A rich violet-blue variety of transparent, crystallised corundum.

AM′IANTH (-e-ănth). *Syn.* AMIANTH′US, AMIAN′TUS, L.; AMIANTE, Fr. The whiter and more delicate varieties of *asbestos*, particularly those which possess a satiny lustre.

AM′IDIN (-e-dĭn). [Eng., Fr.] *Syn.* AM′YDINE; AMIDI′NA, L. A substance noticed by Saussure in *starch-paste*, when long kept. According to Caventou, it is formed at once by the action of *boiling water* on *starch*. It forms the interior substance of the starch-grains, and its properties are intermediate between those of starch and gum. It is, indeed, the soluble part of starch, of which a perfect solution can only be obtained by prolonged ebullition in a large quantity of water.

AMID′OGEN. NH_2. *Syn.* AMMID′OGEN (Goodrich). *Literally*, the generator of amides; in *chemistry*, the name given by Kane to an hypothetical body, composed of two atoms of *hydrogen* and one of *nitrogen*. It forms AMIDES by combining with other bodies.

Amidogen Ba′ses. In *chemistry*, 'amines' in which only *one* equiv. of hydrogen is replaced by an organic radical; and hence called PRIMARY MON′AMINES.

AMMO′NIA. NH_3. *Syn.* AMMONIA GAS, AMMONIACAL GAS, ANHYDROUS AMMONIA, TERHYDRIDE OF NITROGEN; AMMONIAQUE, Fr.; AMMONIAK, Ger. At the present day, the *ammonia* of *commerce* is chiefly prepared from the *ammoniacal liquor* of the *gas-works* and the manufactories of *ivory black, animal charcoal*, &c. In these places a large quantity of crude ammoniacal liquor is produced; to which either *sulphuric* or *hydrochloric acid* is added, by which it is converted into a salt, which may be obtained nearly pure by evaporation, and one or more crystallisations, and, in the case of the *hydrochlorate* and *carbonate*, subsequent sublimation. Other sources and processes have

[1] It has a "pleasant musk-like odour, which is supposed to be derived from the *squid* ('sepia moschata') on which the animal feeds," the "horny beaks" of which "are often found imbedded in the masses." (Pereira.) It has a "a smell resembling that of dried cow-dung." (Redwood, "*Gray's Supplement*," 1857, *p.* 606.)

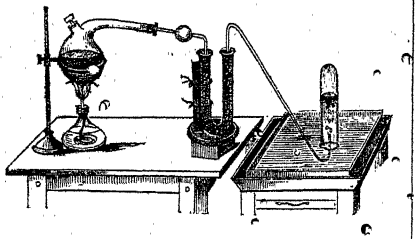
[2] Sp. gr. ·780 to ·896—Brande; ·908 to ·920—Pereira.

[3] Ure's "*Dict. of A., M., & M.*," 5th Ed., i, 128.

been sought out and occasionally adopted for the preparation of the principal salts of ammonia (its *sulphate, carbonate,* and *hydrochlorate*); some of which have been patented, but few of them have got into general use, or have been carried out on the large scale. For many years the manufacture of ammonia and its compounds has incessantly engaged the attention of European chemists.

Ammonia, in a state of combination, is found, in variable quantities, among the saline products of volcanoes, in sea and rain water, in bituminous coal, in urine, in guano, and in the atmosphere, especially that of large towns. The minute stellated crystals sometimes found on dirty windows in London and other populous cities, consist of sulphate of ammonia. (Brande; Fownes; Letheby.) In the *free state* it exists in the juices of some plants, and in the living blood of animals, and it is freely developed during the decomposition of azotised vegetable substances, and during the putrefaction of animal matter.

Prep. A mixture of *fresh hydrate of lime* with an equal weight of *sal ammoniac* (both dry and in fine powder), is introduced into a glass flask or retort, the beak of which communicates with one end of a U-shaped tube filled with small fragments of *recently burnt quick-lime*, and from which attends another glass tube, about 18 inches long, having its further end bent up ready to be placed under a gas-jar, on the shelf of a *mercurial* pneumatic trough. (See *engr.*) The joints being all



made air-tight by collars of *India rubber*, heat is applied by means of a spirit-lamp, and as soon as the air contained in the apparatus is expelled, the gas is collected for use. It cannot be dried by means of *chloride of calcium*. Powdered *quick-lime* may be substituted for the hydrate in the above process; in which case the *evolved gas* is *anhydrous*, but a much greater heat is then required for its liberation.

Comp. Ammonia is a compound of 3 *volumes* of *hydrogen*, and 1 *vol.* of *nitrogen*, condensed into two volumes; and by *weight* of 82·35 parts of nitrogen, 17·65 parts of hydrogen; or, in other words, of one atomic weight of nitrogen and three of hydrogen, having the formula NH_3.

Prop. Gaseous, colourless, invisible; highly pungent, acrid, irritating and alkaline; irrespirable, unless very largely diluted with air; extinguishes combustion; burns slowly in oxygen; sp. gr. 0·589; 100 cub. inches weigh 18·26 gr. Under a pressure of 6·5 atmospheres, at 50° Fahr., it forms a transparent, colourless liquid of the sp. gr. 0·731; at 60° Fahr. this liquid expanded into 1009 times its volume of ammoniacal gas; at —40° Fahr., and the ordinary atmospheric pressure, it forms a subtle colourless liquid, which at —103° Fahr. freezes into a white, translucent, crystalline substance. (Faraday.) It is highly basic; all its salts are either volatilised or decomposed at, or under, a red heat—those with a *volatile* acid sublime unchanged—those with a *fixed* acid lose their ammonia. It is decomposed into its elements by transmission through a red-hot tube; and when in contact with metallic oxides or spongy platinum, at the same temperature, the newly evolved hydrogen unites with the oxygen of the oxide or of the atmosphere, forming water. Water at 50° Fahr. absorbs 670 times its volume of this gas, and the solution has the sp. gr. 0·875. Its concentrated aqueous solution boils at 130°, and freezes at —40° Fahr.

Tests, &c. Ammonia is recognised by—1. Its pungent odour:—2. By turning vegetable blues *green*, and vegetable yellows *brown*; but which soon regain their *previous colours*, especially on the application of heat:—3. By producing *dense white fumes* when brought in contact with those of hydrochloric acid.

Phys. eff., &c. Inhaled, *undiluted* with air, it is an irritant poison, producing spasms of the glottis, convulsions, and death; even when *diluted*, it acts as a powerful acrid, and local irritant; applied to the skin it causes vesication. The use of the pungent odour of common 'smelling salts,' in *syncope, headache*, &c., is well known. *Largely diluted* with air, it has been recently highly extolled in *chronic hoarseness, asthma*, &c.; and as an *antidote* to the fumes of *bromine, chlorine*, and *hydrocyanic acid*. (Smee.)

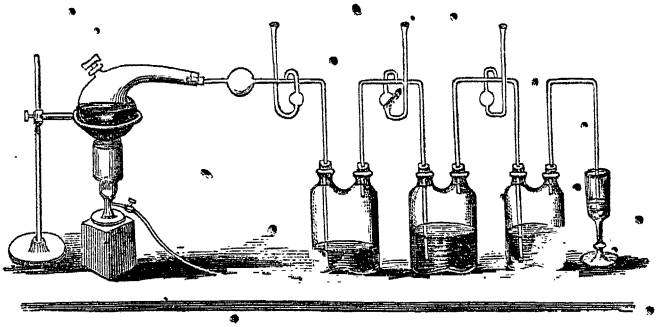
Ant., &c. The vapour of *acetic acid* or common *vinegar*, freely inhaled. It may be produced by sprinkling a little on a piece of hot iron, as a heated shovel. If bronchial inflammation follows, it must be treated by purgatives and a low diet; and, if severe, and the patient be plethoric or robust, by venesection or cupping.

Uses. Ammonia is employed in numerous processes in *chemistry* and the *arts*; but chiefly in the form of 'liquor of ammonia,' 'spirits of hartshorn,' &c., and in combination, under the form of salts. In its *pure* or *gaseous state* it possesses little practical interest.

Ammonia, Solution of. *Syn.* SOLUTION OF AMMONIA, LIQUOR AMMONIÆ, AMMONIUM HYDRATE, AMMONIA, Eng.; AMMONIAQUE LIQUIDE, DISSOLUTION D'AMMONIAQUE, ESPRIT DE SAL AMMONIAC, Fr.; ATZENDER AMMONIUM-LIQUOR, SALMIAK-GEIST, Ger.; LIQUORE DI AMMONIACO, Ital. Ammonia gas readily dissolves in water, one volume of water absorbing

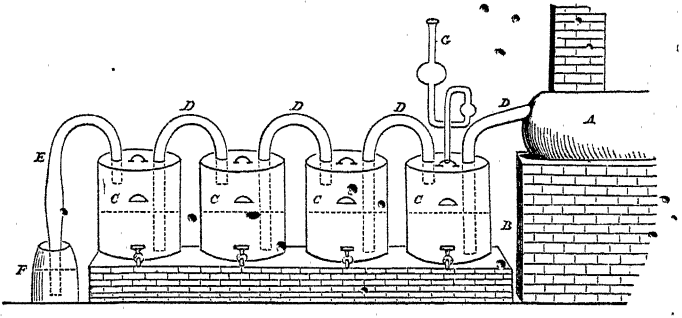
about 670 volumes of ammonia, much heat being liberated, and the solution increases greatly in volume.

This solution is regarded in two very different lights; firstly and most generally, as simply a solution of gaseous ammonia, a view rendered most probable by its general physical and by many chemical reactions; by a few, however, it is looked upon as a solution of ammonium hydrate.



Prepared by distilling, in a tubular retort, equal parts of sal ammoniac, hydrated lime, or slaked lime and water, and passing the gas evolved through a set of Wolff's bottles partially filled with water, as in the figure above.

Commercially, this article is prepared, on the *large scale*, from a mixture of about *equal parts* of *fresh-slaked lime* and *sal ammoniac* or *sulphate of ammonia*, which is heated in an *iron cylinder* or *retort* connected with a set of 'refrigerators;' the latter consisting of a row



A, Cylindrical Iron Retort.
B, Furnace for ditto.
C C C C, Stoneware Receivers.
D D D D, Connecting Pipes.
E F, Waste Pipe and Receiver.
G, Safety Tube.

of *stoneware bottles* with double necks, containing *water*, and kept *very cold*. The *general arrangement* of the *apparatus* used in this manufacture is exhibited above, and, with the accompanying references, will be easily understood. The 'condensers,' when in use, are surrounded with *cloths* (not shown in the *engr.*) kept wet with *very cold* water, whilst constant current of *cold* air is commonly made to pass over them. The pipe (*D*), leading from the retort, is also several feet long, and is advantageously passed through a *wooden screen*, in order that the radiated heat of the retort and brickwork of the furnace, may be intercepted as much as possible.

Two different methods of *proceeding* are adopted in this process. In the *one*, the *dry* pulverulent ingredients are mixed together,

and the resulting gas distilled over into the *water* placed in the receivers. In the *other*, the *lime* is made into a 'pap' with *water*, and the *ammonia-salt*, in *coarse* powder, being added, the whole is rapidly blended together, before closing the retort, and applying heat. In either case a *proportionate quantity* of *water* is put into the condensers, and the operation is nearly similar; but the latter method requires the least heat, and so far as the receivers and refrigerators are concerned, is, perhaps, the one most easily managed. It is that which is always, and necessarily followed, when sulphate of ammonia is employed.

Prop., Uses, &c. Highly pungent, caustic, and alkaline; lighter than water, and presenting in a liquid form most of the characteristics of pure ammonia. When strongest, has a sp.

gr. of ·875, and contains about 39 per cent. of ammonia, but the usual strong ammonia of commerce has a sp. gr. of but ·88. The liquor ammonia fortior, B. P., has a sp. gr. of about ·893, and contains 32·5 per cent. of ammonia, while the *liquor ammoniæ* B. P. has a sp. gr. of about ·940, and contains about 10 per cent. of ammonia. As a *medicine*, it is antacid, diaphoretic, rubefacient, stimulant, and counter-irritant; and is used in various affections in which these remedies are indicated. As a *vesicant* it is superior to cantharides, and as a *caustic* it is used with advantage in the bites of rabid animals, especially those of serpents and insects. Its *vapour* is a common nasal stimulant in faintings, epilepsy, &c. In its *concentrated form* it is a *corrosive poison.*—*Dose.* 5 to 25 drops, in cold water, or milk and water. It enters into the composition of several valuable external remedies, and is in constant employment in the *chemical laboratory*, both as a reagent, and for the preparation of other compounds.

Ant., &c. When the *fumes* have been inhaled, the patient should be exposed to a current of fresh air; and when the *liquid* has been swallowed, *vinegar* or *lemon-juice* mixed with water, may be administered; followed by an emetic, or, on its failure, by the stomach-pump.

Estim. The quantity of gaseous ammonia in *pure* water of ammonia is easily determined from the specific gravity of the liquid, or from its saturating power. When *impure* or mixed with other substances, a *given weight of the sample* is placed in a small retort, the end of which is made to dip into a vessel containing *dilute hydrochloric acid.* A strong *solution of caustic potassa* is then poured into the retort, and heat applied by means of a *small spirit lamp.* When *all* the ammonia is distilled over, the acid solution is evaporated to dryness, by the heat of a *water bath*, and the residuum (*chloride of ammonium*) weighed. *Each grain* of the *chloride* thus found represents ·31804 gr. of pure AMMONIA; 53·5 parts of the *former* being equivalent to 17 of the latter. If the article for examination be a solid substance (as a salt), it may be dissolved in *water*, or in *dilute acid*, before being put into the retort.

In accurate experiments, in the laboratory, *ammonia* is usually WEIGHED either as *chloride of ammonium* (see *above*), or as *ammonio-bichloride of platinum* (NH_4Cl, $PtCl_2$); *every gr.* of the *latter* representing ·07614 gr. of pure AMMONIA. Sometimes, though rarely, the quantity of ammonia is determined from the *volume* of *nitrogen* eliminated from it, of which 14 gr. represent 17 gr. of AMMONIA.

Concluding remarks, Patents, &c. Whatever form or process may be adopted for the preparation of liquid ammonia, it is absolutely necessary to keep the receivers as cool as possible, by means of snow, ice, or a current of very cold water, for the purpose of promoting the absorption of the gas, and to prevent its loss. On the *small scale*, the glass receivers or bottles may be most conveniently surrounded with ice, or a freezing mixture, and two, or more of them, should be furnished with *safety-tubes*, to prevent accidents. On the *large scale*, a capacious oblong retort, usually of *iron* (but sometimes, though seldom, of *lead*), with a large opening or tubulature conveniently situated for inserting the 'charges,' and withdrawing the residuum of the distillation, is employed. The tubulature, or opening, is closed by means of a large and accurately ground iron stopper, or with a door secured by screws, as the case may be. The stopper is well greased before insertion, and is removed by means of a powerful lever. Should it become so firmly fixed that it cannot be displaced in the usual manner, a *cloth* moistened with *cold water*, and carefully wrapped round it, *without touching* the neck of the retort, will generally cause it to contract sufficiently to enable the operator to remove it with facility. Sometimes a large iron kettle, with a movable and accurately fitting lid secured in its place like that of a 'Papin's digester,' and having a large and long tubulature in its centre, is employed instead of a retort, over which it has the advantage of exposing a larger opening for the removal of the residuum of the process. In either case the distillatory vessel is imbedded in sand supported by fire-brick, and is not exposed directly to the heat of the furnace. Before commencing the distillation the joints are all *well luted*, to avoid leakage. An *excellent plan* is to pass the gas, as it leaves the retort, through a *silver* or *pewter* 'worm' or 'refrigerator' set in a tub supplied with a stream of *very cold* water; by which it will be sufficiently cooled before it reaches the 'receivers' to obviate the necessity of any further attention to them than keeping the cloths wrapped round them *constantly* moistened with *cold water.* The *lower* end of the 'worm' should be connected, by means of a balloon-shaped 'adopter,' with the 'still,' and the *upper* end with the first 'receiver;' the use of the balloon being to intercept any volatilised ammonia-salt that might be accidentally driven over by the heat being too high, or too suddenly raised.

The heat should be *gradually* applied, and *very gradually* raised, to prevent any of the sal ammoniac or sulphate being volatilised undecomposed; and even towards the end of the process it should not even approach redness.

The *lime* is best 'slaked' and 'papped' with about 4 parts of *water;* as a lower heat is then required to expel the gas, and it passes over more easily and fully, than when less water is employed. This is absolutely necessary when the sulphate is the ammonia-salt used; as otherwise the residuum of 'sulphate of lime' would become so hard that it could not be easily removed from the retort.

The g[illegible]ng ammonia expelled from the retort, [illegible] distillate of water, it is dis-

connected from the receivers, and (when sal ammoniac has been employed) the heat is raised sufficiently high to fuse the residual chloride of calcium, which is then at once baled or poured out. Glass retorts often suffer fracture at this point; but if they escape now, it generally happens that they are broken when heat is applied for a second operation. Hence, according to Prof. Muspratt, it is rare to find a retort, even when carefully handled, that will stand two operations.

When *crude sulphate of ammonia* is employed it is advisable to have only a *little* water in the first receiver, which is placed there merely to *purify* the gas which passes through it, and to retain any traces of volatile empyreumatic or oily matter which may be carried over with it.

Pure solution of ammonia is most easily obtained from 'sal ammoniac;' but crystallised *sulphate of ammonia*, often crude, is more commonly employed, on account of its lower price.

The *preparation* of *pure solution of ammonia* admits of no other improvements, than such as merely affect the form of the apparatus employed to produce it; and hence, unlike the ammonia-salts of commerce, has been little meddled with by inventors and patentees. Among the plans having for their object the production of an *ammoniacal solution*, more or less concentrated, fitted for many of the purposes of the *arts*, and for the preparation of salts, but *not* for *chemical* and *medical* use, besides those of Reece, Spence, Crane and Jullien, &c., already noticed, may be mentioned—

1. That of Watson (*Patent* dated 1838) in which *gas-liquor* mixed with a proper quantity of *fresh-slaked lime*, is distilled from a spacious retort or still into a receiver containing *cold water*, until much steam passes over with the gas, when the strong alkaline liquor forming the *distillate*, and called the *first portion*, is drawn off. The distillation is then continued, when a weaker and impurer solution is obtained, called the *second portion*. The first portion is then reintroduced into a retort or still with a small quantity of *fresh lime*, and the distillation repeated. The *product* the patentee calls the *first portion* of the *second distillation*. The *latter* is a strong ammoniacal liquor sufficient for all the purposes of scouring, cleaning, conversion into commercial ammonia-salts, &c. It may be further purified by a *third* distillation; the *second* portion of each operation being transferred again to the still with the next fresh charge of gas-liquor.

2. A modification of Coffey's still,[1] patented by Mr. W. E. Newton (1841), under the name of the 'AMMONIA STILL,' is now extensively and successfully employed in this manufacture. By its use *ammonia* may be obtained from 'gas-liquor,' 'bone-spirit,' or any other ammoniacal liquor or solution, and even from solutions of the salts of ammonia, of *almost any density*, and of considerable purity; and this by a process which is continuous and inexpensive. The body of the apparatus is formed of *wood*, the chambers are lined with *lead*, and the diaphragms are of perforated *sheet iron*. The *management* of the *apparatus* varies with the form in which it is desired to obtain the product. When the *ammonia* is required to leave the upper chamber of the rectifier in the form of gas, either pure or impure, the steam which *ascends*, and the current of 'ammoniacal liquor' which *descends*, are regulated in such relative proportions that the latter remains at or near the atmospheric temperature during its passage through some of the upper chambers, becoming successively hotter as it descends, until at length it enters into ebullition; in which state it passes through the lower chambers, either to make its escape, or to enter a cistern provided to receive it. If, on the contrary, the ammonia is required to leave the upper chamber in combination with the vapour of water, the supply of steam entering below, must be in such proportion to that of the ammoniacal liquor supplied from above, that the latter may be at or near the boiling temperature in the upper part of the apparatus. *Crude liquor* and *ammonia-salts*, before being thus submitted to distillation, are, of course, first treated with a proper quantity of *quick-lime*—in the one case, to remove most of the impurities, and in the other, to set the ammonia free by seizing on its acid.[2]

The water or solution contained in the *first* bottle or the *first* receiver is found to be the *strongest*, provided it has been kept well cooled; and that in the *others*, of progressively *decreasing* strength. By mixing the contents of one bottle with another, a solution of almost *any strength* may be made. It is also easy to prepare liquor of ammonia of *any required strength*, or to ascertain the *strength* of that in the receivers, by observing the expansion of the liquid. *Water*, when fully saturated with ammonia, expands from 3 volumes, to 5 vols.; and in less, but corresponding proportion, according to the quantity absorbed. All that is necessary in practice is, that each receiver be furnished with a *gauge-pipe* by which the degree of expansion may be noted. On the *small scale*, graduated glass receivers may be used.

Liquor of ammonia is now seldom made by the druggist, or on the small scale, the large manufacturing chemists supplying it at a very low rate, and of very superior quality. In the *shops*, it is kept of two or three strengths.

The estimation of the strength of ammonia

[1] An *engr.* and description of this still, as employed for *spirit*, is given under DISTILLATION (which *see*).

[2] For a full description of the 'AMMONIA-STILL,' see Newton's "*Patent Journ.*;" "*Pharm. Journ.*," xiii, 64 &c.

solutions in commerce is known as ammonimetry, and depends on the sp. gr., for although the *per-centage richness* of *solutions of ammonia*, or of its *carbonates*, may be determined, with the greatest accuracy, by the methods of ALKALIMETRY, already described; for all the ordinary purposes of *commerce*, and of the *laboratory*, the strength of *pure solutions* of *ammonia* may be inferred, with sufficient correctness, from their *density*; and to this the term AMMONIOMETRY is usually restricted.

The *sp. gr.* of the *sample* being found either by the *hydrometer*[1] or *sp. gr. bottle*, in the usual manner, its *per-centage strength* may be seen by inspection of the following *Table*:—

TABLE *exhibiting the relations between the* SPECIFIC GRAVITY *of Solution of Ammonia and the* PER-CENTAGE STRENGTH, *for every variation of* ·00125 *Sp. Gr., from* ·87500 *to* 1·00000, *at* 62° Fahr. Abridged from the larger *Table* of Mr. J. J. GRIFFIN.

Sp. Gr. of the Liquid Ammonia.	Pure Ammonia per cent., by Weight.	Sp. Gr. of the Liquid Ammonia.	Pure Ammonia per cent., by Weight.	Sp. Gr. of the Liquid Ammonia.	Pure Ammonia per cent., by Weight.
·87500	34·694	·91750	21·837	·96000	10·119
·87625	34·298	·91875	21·477	·96125	9·790
·87750	33·903	·92000	21·118	·96250	9·462
·87875	33·509	·92125	20·760	·96375	9·135
·88000	33·117	·92250	20·403	·96500	8·808
·88125	32·725	·92375	20·046	·96625	8·483
·88250	32·335	·92500	19·691	·96750	8·158
·88375	31·946	·92625	19·337	·96875	7·834
·88500	31·558	·92750	18·983	·97000	7·511
·88625	31·172	·92875	18·631	·97125	7·189
·88750	30·785	·93000	18·280	·97250	6·867
·88875	30·400	·93125	17·929	·97375	6·547
·89000	30·016	·93250	17·579	·97500	6·227
·89125	29·633	·93375	17·231	·97625	5·908
·89250	29·252	·93500	16·883	·97750	5·590
·89375	28·871	·93625	16·536	·97875	5·273
·89500	28·492	·93750	16·190	·98000	4·956
·89625	28·133	·93875	15·846	·98125	4·641
·89750	27·736	·94000	15·502	·98250	4·326
·89875	27·359	·94125	15·158	·98375	4·011
·90000	26·984	·94250	14·816	·98500	3·698
·90125	26·610	·94375	14·475	·98625	3·386
·90250	26·237	·94500	14·135	·98750	3·074
·90375	25·865	·94625	13·795	·98875	2·763
·90500	25·493	·94750	13·456	·99000	2·453
·90625	25·123	·94875	13·119	·99125	2·144
·90750	24·754	·95000	12·782	·99250	1·835
·90875	24·386	·95125	12·446	·99375	1·527
·91000	24·019	·95250	12·111	·99500	1·220
·91125	23·653	·95375	11·777	·99625	·914
·91250	23·288	·95500	11·444	·99760	·609
·91375	22·924	·95625	11·111	·99875	·304
·91500	22·561	·95750	10·780	1·00000	0 or *Water*.
·91625	22·198	·95875	10·449		

*** The *specific gravity* of *mixtures* of *pure solution of ammonia* and *pure water* is precisely the mean of the specific gravities of their constituents. (Davy; Dalton; Christison.) In all *solutions* of *ammonia*, a quantity of *anhydrous ammonia*, weighing 212½ gr., displaces exactly 300 gr. of *water*, and reduces the *sp. gr.* of the liquid to the extent of ·00125. (Griffin.) The *strongest solution* of *ammonia* which it is possible to prepare at 62° Fahr., has the sp. gr. ·87500, and contains 34·694% of pure ammonia, by weight, or 21,251 gr. per gallon. (Griffin.)[2]

[1] An hydrometer specially *weighted* and *graduated* for this purpose, is called an AMMONIM'ETER, AMMONIOM'ETER, or AMMO"NIA-ME'TER (AMMONIM'ETRUM, AMMONIOM'ETRUM, &c., L.).

[2] Mr. Griffin, in his '*System of Ammonimetry*,' calls every 212½ gr. of *anhydrous ammonia* a TEST-ATOM; and every 7 water-gr. measure, a SEPTEM. Thus, a gallon of water (= 10 *lbs.*) contains 10,000 septems. The degrees of his AMMONIA-METER range from 1 to 100, and indicate the number of *test-atoms* of *ammonia* in one *gal.* of the liquid.

Ammonia, Carbonates of. (B. P.) *Syn.* AMMONIÆ CARBONAS. See AMMONIUM, SESQUICARBONATE OF.

AMMONIUM. The name given to a group of atoms, which play the part of a compound basic, radical, or metallic element. This substance, whose formula is NH_4 or $(NH_4)_2$, has never been isolated, although capable of forming most stable salts with the various acid radicals. Several attempts have been made, however, to obtain this compound radical, or group of elements, in a free state, and with more or less success, but on account of its great instability it invariably decomposes when set free into ammonia and hydrogen.

Ammonium salts are some of the most important chemical agents, and are usually recognised as follows, ammonia solution, however, usually acting in exactly the same manner as a solution of ammonium hydrate:—By imparting a *deep blue tint* to solutions of salts of copper. By *exhalation* of *ammoniacal gas* (recognised by its odour), when triturated or mixed and heated with caustic potassa, soda, or lime. Added to a solution of bichloride of platinum, they produce a *heavy yellow, crystalline* precipitate, consisting of *minute octahedrons* easily discernible under the microscope. With protonitrate of mercury, a *black* precipitate. With bichloride of mercury, a *heavy, white* precipitate. With a concentrated solution of tartaric acid, a *crystalline, white* precipitate, nearly similar to that given with salts of potassa. They are nearly all *soluble* in *water, volatile,* and *crystallisable.*

Except the carbonate, they are almost invariably estimated by conversion into ammonia, and estimation by volumetric analyses, as in alkalimetry. In the laboratory, however, for exact purposes, they are converted into the double chloride of ammonium and platinum.

Ammonium Salts:—

Ammonium, Acetate of. $NH_4C_2H_3O_2$. *Syn.* AMMO″NIÆ ACE′TAS, L.; ACETATE D'AMMONIAQUE, Fr.; ESSIGSÄURES AMMONIAK, Ger. *Prep.* 1. Take of *acetate of lime* or of *potassa* and *sal ammoniac,* equal parts; mix and distil at a gentle heat. The oily liquid (BINACETATE OF AMMONIUM, $HNH_4(C_2H_3O_2)_2$), in the receiver forms a radiated crystalline mass on cooling. Dry *gaseous ammonia* passed into this salt, melted by a gentle heat, transforms it into the solid and inodorous *neutral acetate,* $NH_4C_2H_3O_2$.

2. *Strong acetic acid* is saturated with *ammonia* or *carbonate of ammonium,* and the solution evaporated over *sulphuric acid* in vacuo; the resulting crystals, after being carefully drained, are dried by pressure between bibulous paper.

Prop., &c. Long, slender crystals, or a crystalline mass, freely soluble in both alcohol and water, and deliquescent in the air; taste, sharp and cooling, and somewhat sweetish. Its solutions cannot be evaporated without loss of the ammonia; even the salt passes off in large quantities with the vapour of water. Its aqueous solution becomes alkaline on keeping, from decomposition of the acid. Distilled with *anhydrous phosphoric acid,* it is converted into ACETONITRILE. An aqueous solution of this salt was introduced into the Materia Medica by Boerhaave, and has since been extensively used as a *diaphoretic* and *febrifuge,* under the popular name of MINDERE′RUS SPIRIT, after Minderer or Mindererus, who extensively employed it and extolled its virtues. When *pure,* both the salt and its solutions are *neutral* to test-paper, and are *wholly volatilised* by heat. See LIQUOR AMMONIÆ ACETATIS.

Ammonium, Arseniate of. $(NH_4)_3AsO_4$. *Syn.* AMMONIÆ ARSE′NIAS, L. *Prep.* 1. (NEUTRAL.) Saturate a warm *concentrated solution* of *arsenic acid* with *carbonate of ammonium* in *slight* excess; evaporate by a gentle heat, that crystals may form on cooling.

2. **Ammonium, Binarseniate of.** $H(NH_4)_2AsO_4$. As above, but adding an additional equiv. of the *acid,* as soon as any *excess* of ammonia has been expelled by the heat employed to evaporate the solution.—*Dose* (of either). 1-24th to 1-12th gr.; in phthisis, certain skin diseases, &c. See SOLUTIONS (and *below*).

Ammonium, Arsenite of. NH_4AsO_2. *Syn.* AMMONIÆ AR′SENIS, L. *Prep.* From a *hot concentrated solution* of *arsenious acid,* and *sesquicarbonate of ammonium,* as the last.—*Used* (chiefly) to make arsenite of iron. The properties and physiological effects of the above arsenical preparations are for the most part similar to those of arseniate and arsenite of potassa. They are all *poisonous.*

Ammonium, Benzoate of. *Prep.* 1. Dissolve benzoic acid in ammonia solution to saturation, then further add *ammonia* in *slight excess,* and crystallise by refrigeration, or in vacuo.

2. (LIQUID; SOLU′TIO AMMONIÆ BENZOA′TIS, L.) As the last, but without evaporating the solution.

Prop., &c. Very soluble and very difficult to crystallise. If the solution is boiled for a short time and then abandoned to spontaneous evaporation, crystals of ACID BENZOATE OF AMMONIUM are deposited. It is *used* chiefly as a chemical test; but has been recently recommended in chronic bronchitis, old coughs, &c.; and to check the formation of chalk-stones and urinary calculi.—*Dose.* 10 to 15 gr.; (of the *solution*) 15 drops to 1 fl. dr., or more. See BENZOIC ACID.

Ammonium, Bromide of. NH_4Br. *Syn.* AMMO″NII BROMI′DUM, A. BRO′MIS, L.; HYDROBROMATE D'AMMONIAQUE, BROMURE D'AMMONIUM, Fr. A salt which is obtained from *hydrobromic acid, bromide of iron,* &c., by similar processes to those adopted for the iodide. It forms white prismatic crystals; and, in its general properties, resembles bromide of potassium. It is volatile, and easily decomposed.

Used as a nervine in hysterics; especially useful for sleeplessness where there is no organic disease; given in epilepsy when bro-

mide of potasium fails.—*Dose.* 2 to 20 grains.

Ammonium, Carbonates of:

Ammonium, Carbonate of. *Syn.* NEUTRAL CARBONATE OF AMMONIUM. Equal parts of dry sal ammoniac and sodium carbonate are heated to form the neutral ammonium carbonate of commerce, which sublimes. Solid crystalline substance, with a strong ammonical odour, volatile and soluble.

Uses, &c. In the solid form, it is not now used in medicine; but it is indirectly employed in several liquid preparations in which the sesquicarbonate is ordered. It is superior to any other preparation of ammonia for filling smelling bottles; as it is not only more pungent, but does not lose its pungency by keeping. It volatilises more quickly than the sesquicarbonate, and the residuum, unlike that of the latter salt, continues as odorous as ever. It is the basis of several of the most popular and esteemed advertised *smelling salts* of the shops. *Spirit of hartshorn* is an impure solution of this salt, originally obtained by distilling hartshorn or bones.

Ammonium, Sesquicarbonate of. Probably $2NH_4HCO_3 + NH_4NH_2CO_3$, *i.e.* a mixture or compound of bicarbonate of ammonium and carbonate of ammonium. *Syn.* (CARBONATE OF AMMONIA, AMMONIÆ CARBONAS. B. P.). CARBONATE D'AMMONIAQUE, Fr.; KOHLENSAURES AMMONIAK, Ger. It is prepared on a very large scale commercially as follows:—*Sal ammoniac* or *sulphate of ammonia*, and *chalk*, equal parts, both dry and in powder, are mixed as before, and sublimed from a series of *iron retorts* or *iron pots*, into a *well-cooled* and *capacious receiver* lined with *lead* or *earthenware;* or, more generally, into such a receiver connected, by *iron* or *lead* pipes, with a second and similar one containing a *stratum of water*, to absorb the *free ammonia* evolved during the process.

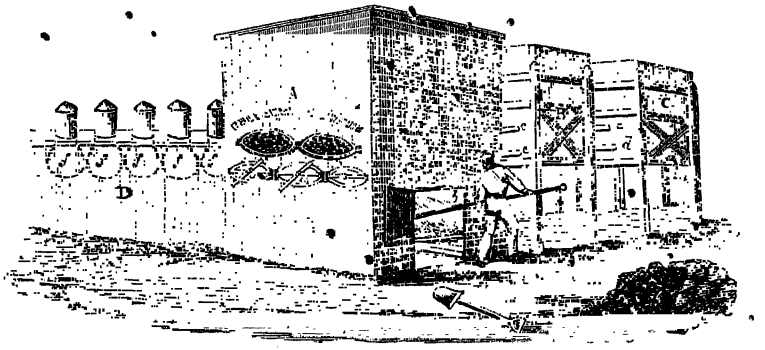
Prop. The carbonate of ammonia, of *commerce,* usually occurs in the form of white, fibrous, translucent, or semi-translucent cakes, generally about two inches thick. It is less volatile and pungent than the neutral carbonate; soluble in 4 parts of water at 55° Fahr., 3·3 parts at 62°, 2·5 parts at 96°, and 2 parts at 120°; boiling water and alcohol decompose it, with the evolution of carbonic acid gas and ammonia; by age or exposure to air, the surface assumes an opaque white colour, from its carbonate flying off, and the remaining bicarbonate being less volatile. Unlike the carbonate, it can neither be resublimed, nor digested or distilled with either alcohol or water, without suffering decomposition. Sp. gr. 0·966.

The exact composition of this salt varies, according to its method of preparation.

Uses, &c. It is commonly employed by *bakers*, to give lightness to their fancy goods, and to make extemporaneous bread and pastry; by the *chemist* and *pharmaceutist*, for the preparation of other salts of ammonia, and in analysis, &c. In *medicine*, it is used as a stimulant, antispasmodic, antacid, and diaphoretic, in *acidity of the stomach, dyspeptic affections, gout, scrofula, hysteria, lowness of spirits, epilepsy,* &c.; and in the *convulsions* attending dentition. It has been recently recommended, by Dr. Barlow, in *diabetes.* It is also employed to make effervescing draughts; and *externally*, as a counter-irritant and stimulant. Its use as a *nasal stimulant* in headaches, fainting, &c., is well known. In *large doses*, it is emetic; in excessive doses, poisonous. Its long-continued use, in quantity, is often productive of very serious consequences —slow fever, debility, emaciation, scurvy, loss of teeth, hæmorrhage, general cachexy, and even death. The *antidotes* and *restorative treatment* are, the *free use* of lemon-juice, wine or malt-liquors, new milk, and antiscorbutic vegetables, with a generous diet, of which the red meats form a large proportion.—*Dose.* As a *stimulant* or *diaphoretic*, 5 to 15 gr., dissolved in cold water; as an *emetic*, 20 to 30 gr., in tepid water, repeated if necessary; as an *effervescing saline draught*, 15 to 30 gr. A few grains (8 or 10) dissolved in a tumbler of *cold water*, is an excellent 'refresher' in lowness of spirits, or after fatigue; and is highly esteemed by drunkards; being, in each case, preferable to 'spirit of sal volatile.'

Concluding remarks, Patents, &c. In extension of the above, it may be added, that on the *large scale*, the distillation is usually carried on in cast-iron retorts, similar in size, shape, and character, to those employed in the manufacture of coal-gas, and of which five, or more, are commonly set horizontally in the same furnace. (See *engr.*) Each retort has its mouth (*a*), through which the 'charge' is introduced, closed with a movable door, which is securely fastened in its place, in the manner shown in the *engr.*; and is furnished, at the upper part of its further end, with an iron pipe (*c*), to carry off the evolved fumes to the condenser or receiver. The latter consists of two large square wooden chambers (*B, C*), lined with lead, and either fitted with movable covers, secured by water-joints, or with doors in the side, to permit of the easy removal of the sublimed salt. The first receiver communicates with the second by means of a large lead tube (*d*) near its centre, and by another tube (*d'*), somewhat smaller, and nearer the bottom, but above the surface of the stratum of water in the second receiver, before alluded to. These chambers have also a lead pipe (*e, e*), stopped during the process with a plug or cock of lead, to allow of the liquid product of the distillation, &c., to be drawn off, or run into another receiver or cistern, at will. Both chambers are placed on strong wooden supports, or scaffolding, to bring them on a level with the retorts. When the *impure* sulphate or other ammonia-salt is used in the manufacture of the *sesquicarbo-*

nate (which is generally the case), the resulting salt being impure and discoloured, is resublimed in *iron pots* (*f*, *f*, *f*), furnished with movable *leaden* heads, which are kept cool by a current of air passing over them; a *little* water being introduced into the subliming pots to render the product translucent. The heat is applied either by means of a flue passing from the *retort-furnace* (*A*, *b*), or by a water bath heated in the same manner; the



latter being the preferable method, as the temperature should *not* be greater than about 200° Fahr., and need not exceed 150° to 155°. These *pots* are arranged in sets, as shown at (*D*) in the *engraving*.

The *charge* of a retort usually consists of about 70 to 72 *lbs.* of *sulphate of ammonia*, or 57 to 58 *lbs.* of the *hydrochlorate* to 1 *cwt.* of *chalk*; or in these proportions. The *product* is about 40 *lbs.* of the *crude salt*, which, by careful resublimation, yields about 39 *lbs.* of marketable carbonate of ammonia.

Carbonate of ammonia, like the chloride and sulphate, is now scarcely ever prepared on the small scale, that of *commerce* being not only cheaper, but sufficiently pure for *all* the purposes of *medicine* and the *arts*. The PRICE ranges from £30 to £35 per *ton*, according to the quality.

Ammonium, Bicarbonate of. HNH_4CO_3. *Prep.* By digesting *cold water* on *sesquicarbonate of ammonia* in considerable excess, until the whole of the pungent neutral carbonate is dissolved out. If the salt is reduced to powder the operation is facilitated.

To powdered *sesquicarbonate of ammonia* add *boiling water* just sufficient to dissolve it, and *immediately* close the vessel; crystals form as the liquid cools, containing 2½ equiv. of water.

Prop., &c. For the most part similar to the sesquicarbonate, except in having a taste and smell which is only faintly ammoniacal, and hence more palatable. Crystallises in oblique prisms, which, as usually obtained, contain about 23½ of water. It requires 8 parts of cold water to dissolve it. It is *distinguished* from the *previous carbonates* by the almost entire *absence* of ammoniacal odour, and by its solution giving no immediate precipitate with chloride of barium, but, by standing, or on the addition of a little liquor of ammonia, a white earthy precipitate, accompanied with the evolution of carbonic acid gas. A *saturated solution* of this salt, evaporated by a *very gentle heat*, or refrigerated, gives small prismatic crystals having neither smell nor taste.

Uses, &c. Similar to those of the other carbonates.—*Dose.* 5 or 7 to 20 or 25 gr.

Ammonium, Chloride of. NH_4Cl. *Syn.* MURIATE OF AMMONIA, SAL AMMONIAC, HYDROCHLORATE OF AMMONIA; CHLORHYDRATE D'AMMONIAQUE, SEL AMMONIAC, &c., Fr.; SALMIAK, Ger. A substance which, as already noticed, appears to have been originally obtained, by sublimation, from the *soot* of *camel's dung*, in Egypt. In this country, at the present day, it is manufactured chiefly from the crude *ammoniacal liquors* obtained as secondary products in the manufacture of coal-gas and animal charcoal.

Prep. 1. From GAS-LIQUOR:—The *crude ammoniacal liquor* of the gas-works is, either at once, or after distillation,[1] neutralised with *hydrochloric* or *sulphuric acid*, the choice being given to the one which is the cheaper and more accessible at the place where the works are situated. When *hydrochloric acid* is employed, the SATURATION is usually effected by allowing the *acid* to flow from a large *wooden vessel* or *tank* lined with *lead* or *gutta percha* into a large *underground reservoir* or *tank* containing the ammoniacal liquor, and having an exit-tube passing into the chimney or shaft of the steam-engine, to carry off the sulphuretted hydrogen and other offensive gases liberated during the mixture. Sometimes the gas-liquor is accumulated in enormous covered *wooden tuns*, capable of holding from 10,000 to 20,000 gallons, or

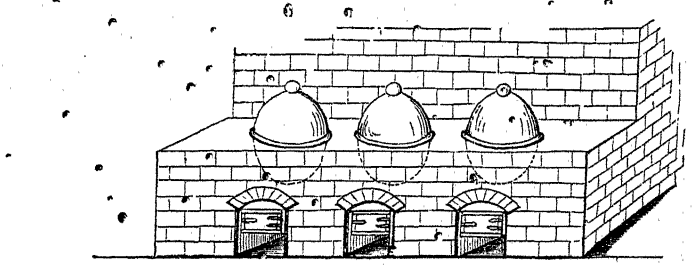
[1] This is now generally conducted in a large *wrought-iron boiler*, connected with a rude modification of *Coffey's still*; the object being to obtain the liquor freer from tar and more concentrated.

more; and the acid is added by raising the *gutta-percha carboys* containing it by means of cranes, and then thoroughly mixing it with the liquor by means of powerful 'agitators,' whilst the offensive fumes are either passed off as before, or made to traverse the fire of the steam-engine before entering the chimney-shaft. The *quantity* of *acid* employed to effect *saturation* must, of course, depend on the ammoniacal strength of the gas-liquor operated on. The usual proportions are 1½ to 2 *lbs.* of the *former*, to each *gal.* of the *latter*; but in all cases sufficient should be added to impart a *very faint* acid reaction to the mixture. This last having been effected, the saline solution, now containing *hydrochlorate of ammonia*, is, after repose, ready to be pumped or run off into the evaporators.

The EVAPORATION of the crude saline solution is usually carried on in large square or rectangular *cast-iron vats*, of very moderate depth, and capable of holding from 1000 to 1500 gallons, or more. These are encased in brickwork, and are *heated* by a furnace, of which the flues pass in a sinuous course beneath the lining of brickwork on which the vats or pans rest. During the concentration of the liquid, the tar, &c., which separates and floats on the surface, and which thus seriously impedes evaporation, is, from time to time, removed by skimming. As soon as the sp. gr. reaches 1·25, *any excess* of *acid* in the solution is *exactly* neutralised with a little fresh *ammoniacal liquor*; by which any waste of acid is prevented, at the same time that any ferric salt present, and which would contaminate the ultimate product, is precipitated as sesquioxide. After settling for a short time, the hot liquor is ready to be transferred to the crystallisers.

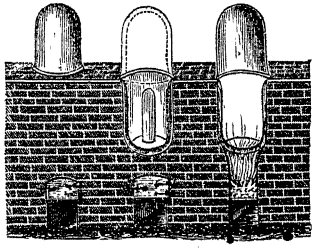
The *vessels* employed in the CRYSTALLISATION are *pans* or *tubs*, usually circular, and about 7 or 8 feet *wide*, by 2½ to 3 feet *deep*; and are generally set on the ground, or are imbedded either partially or wholly in it. The saline liquor being pumped or run into them at a little below the boiling temperature, crystallises as it cools; the only interference being *occasional* stirring or agitation, to prevent the formation of large crystals, which would be inconvenient in the subsequent part of the process. The *time* occupied in the crystallisation varies, according to the size of the 'crystallisers,' and the weather, from 3 or 4 to 8 or even 10 days. The 'mother-liquor' of the 'crystallisers' is pumped back into the evaporating pans for further concentration. The crude blackish salt (*hydrochlorate*) thus obtained is contaminated with tarry and oleaginous matter, free acid, water, &c.; from part of which it is freed by exposing it in a layer about 4 inches deep, on a *cast-iron plate* gently heated by a zigzag flue of a small furnace, until *all* the water is expelled; care being taken that the heat never rises high enough to volatilise the salt. This operation is generally performed under a dome, or the expanded throat of a large chimney. The salt will now have become of a greyish-white colour, and is ready for the next operation.

The crude dry salt of the last process is finally *purified* by SUBLIMATION. For this purpose *cast-iron pots* lined with *clay*, and heated from *below* and by flues round their *sides*, are employed. (See *engr.*) The *crude grey salt* is beaten down into these pots until they are about 2-3rds filled, when the heads or capitols are fitted on, and heat applied. The latter are very heavy, being usually made of *lead* (sometimes of *iron*), and have the form of a dome, or a hemispherical cup, with a small tube or hole at the apex, in which a *plug* is loosely placed, to permit the escape of steam. These domes or heads are so made as to fit *closely* and *firmly* on the flat rim or flange of the 'sublimers;' and are retained in their places, during use, both by their weight, and by 2 or 3 clamps provided for the purpose. They are also furnished with 3 rings, set at equal distances, to allow of their being lifted off, or moved, by means of a pulley and chains. The due *application* and *regulation* of the *heat* is here of the utmost importance. If the temperature employed be too *high*, the sublimed salt will be contaminated with empyreumatic matter, whilst some of it



will be carried beyond the dome and lost; and if it be *extreme*, the head may be altogether blown off, and the contents of the pan scattered about the building; whilst on the other hand, if the heat employed be too *low*, the resulting cake of sal-ammonia will be soft, spongy, and either grey or yellowish. The *proper temperature* is said to be known by two

or three drops of water readily boiling, and being dissipated in vapour, when placed on the head or cover of the sublimer; but it should not 'spit' or 'dance about,' or be raised by the heat out of contact with the metal. The usual practice is to keep the fires "briskly up until the subliners and their surroundings attain a sufficient degree of heat; they are then slackened, and maintained at a mean temperature." (Muspratt.) The sublimation occupies from 5 to 9 days; but it is customary to raise the heads once, or even twice a week, to ascertain the progress made; the fires having been purposely neglected or checked for some hours previously. The process is finally stopped before the whole of the crude salt in the pots is volatilised; since the heat required for that purpose would lead to the decomposition of the carbonaceous impurities, and cause them to emit volatile hydrocarbons, which would materially lessen the purity and beauty of the product. The unsublimed portion in the pots forms a conical mass, which is technically called the '*yolk*.' This is shown in the second *engr.* (see *below*), in which the latest improvements in the form of the subliming apparatus are also exhibited.



The sublimation having been carried to a sufficient extent, the fires are allowed to die out. The domes, after cooling, are lifted off, and the attached hemispherical cakes or 'bells' of SAL AMMONIAC or HYDROCHLORATE OF AMMONIA at once removed. These vary from 2 to 5 inches in thickness, and from 45 or 50 *lbs.* to 1000 *lbs.* and upwards, in weight, according to the size of the sublimers in which they have been produced. They are generally nearly pure, except in the outer part which has been in contact with the metal. From the subliming-house they are taken to the store or packing-house, and after having been scraped, to remove the discoloured portion before alluded to, are either preserved entire, or are broken up into convenient pieces, which are then packed in casks or barrels, and in either state are ready for the market.

When sulphuric acid[1] is used to neutralise the ammoniacal liquor, the process is generally, for the most part, the same as when hydrochloric acid is employed; but here the brown salt obtained by the crystallisation, and subsequent desiccation, is crude SULPHATE OF AMMONIA, instead of the hydrochlorate. It is intimately mixed with about an equal weight of chloride of sodium (common salt) before being put into the sublimers.

In some cases particularly where the ammoniacal liquor is rich in carbonate of ammonia, gypsum is employed as a source of sulphuric acid. (See *below*.)

Another method is to convert the solution of the crude sulphate into a solution of the hydrochlorate, during the process, by the addition of chloride of sodium. Both these last methods are described below.

2. From BONE-LIQUOR, &c.:[2]—The ammoniacal liquor technically called 'bone-liquor' or 'bone-spirit,' and formerly known under the name of 'spirit of hartshorn,' is essentially a *solution* of *carbonate of ammonia* more or less contaminated with volatile empyreumatic oil. Its conversion into SAL AMMONIAC may be easily effected by saturating it with hydrochloric acid, evaporating the resulting neutral solution in *lead* or *iron* boilers until a pellicle begins to form, then pumping or running off the hot liquors into the crystallisers, and, lastly, draining and drying the crystals. The *salt* thus obtained may be purified either by sublimation, or by recrystallisation. The whole series of processes closely resemble those already described, except in being less troublesome, owing to the absence of the tarry and other foreign matters which impede and complicate them when gas-liquor is employed.

Another method adopted, particularly on the Continent, and one equally applicable to any crude ammoniacal liquor rich in free ammonia or its carbonates, is to employ sulphate of lime instead of sulphuric acid to neutralise the alkali. For this purpose the ammoniacal liquor is passed through a series of three or four covered wooden filters lined with lead, each containing a layer of crushed gypsum to the depth of 3 or 4 inches. These filters are usually set on 'stages' one above another, and each communicates with a cistern placed beneath it by means of a leaden pipe furnished with a stop-cock. This last is not opened until the liquor has remained some little time in the filter; and a pump throws back once, or oftener, upon each filter, what has already passed through it, before it is allowed to run into the next lower one. The 'liquor' in each filter is not allowed to stand higher

[1] Sp. gr. 1·33 to 1·38.

[2] That employed in England is chiefly obtained, as already mentioned, from the manufacturers of bone-black or animal charcoal; but, on the Continent, the liquor obtained by a like destructive distillation of various animal offals (blood, flesh, horn, hoofs, woollen rags and waste, hair, scrapings of hides, leather cuttings, &c.) is employed for the same purpose. The preparatory process by which this liquor is obtained is essentially the same in each case; except that with animal offal the temperature should not *exceed a red-brown heat*, in order that the resulting *charcoal* may afterwards serve to make *ferrocyanide of potassium* and *Prussian blue*. These liquors have usually a density ranging between 8° and 9° Baumé (Ure; = sp. gr. 1·056 to 1·063).

than from 2 to 3 inches above the surface of the gypsum; and the lowest or last filter is supplied with fresh gypsum at each separate charge of fresh liquor. A little water is lastly passed through the filters to wash out the portion of ammoniacal liquor absorbed or retained by the filtering media. In this way, the gypsum of the filters is converted into carbonate of lime at the expense of the carbonate of ammonia in the solution; whilst the ammonia of the latter decomposes the gypsum, and becomes converted into sulphate of ammonia, which, with some free ammonia, is found in the filtrate. Sulphuric acid is next added to the filtered liquor, to completely *neutralise* the free and carbonated alkali still existing in it; after which it is evaporated in a leaden boiler, with frequent skimming to remove floating oil, until of the sp. gr. 1·160. Chloride of sodium (common salt), in sufficient quantity to convert all the sulphate of ammonia in the liquid into hydrochlorate, by double decomposition, is now added, with constant stirring; after which the clear portion is either pumped or syphoned off into a somewhat deep reservoir or tank, where it is allowed to settle. The liquid, after sufficient repose, is pumped from the reservoir to the boilers, and evaporated, with frequent agitation, so long as the sulphate of soda now existing in it, falls to the bottom in granular crystals. These crystals are, at intervals, scraped to the cooler portion of the pan or boiler, whence they are removed by copper rakes and shovels, into draining-hoppers, placed near the edges of the pan. The liquor in the boiler is now a strong solution of sal ammoniac, but still containing a little sulphate of soda, from which it has to be freed by crystallisation. With this object, it is further concentrated, and then run or pumped into the crystallisers. In 30 or 40 hours, or longer, the mother-liquor is run or pumped off. The mass of newly formed crystals is then drained, and slightly washed, first with a little weak solution of sal ammoniac, and next with a very little cold water; after which they are again well drained. The crude HYDROCHLORATE OF AMMONIA, thus obtained, is converted into the pure salts, by desiccation and sublimation, as before.

In France, where this method is very generally employed, the sublimation is commonly conducted in stoneware or earthenware balloons or bottles coated with loam, of about 18 to 20 inches in height in the body, and either surmounted with inverted 'cups' or 'heads' 10 or 12 inches high, or simply covered with a tile, when (in the latter case) the sublimate collects in the upper part or neck of the balloon, which is above the action of the fire. A number of these vessels are set on the dome of a furnace, which is perforated with holes or slits, to allow the heat to pass through; whilst their necks or heads are sheltered from the action of the fire by plates of iron or earthenware, having semicircular indentations on their edges, so that when placed together they form a level surface, through which the necks of the sublimers protrude, and fit closely. The fire is nicely regulated, so as to cause the salt to condense in the upper and cooler part of the vessels, or in the heads, as the case may be; and great care is taken to occasionally clear the necks with a skewer, to prevent choking, and consequent bursting.

In Scotland, where a similar process is also commonly pursued, the sublimers, according to Dr. Ure, are generally "cast-iron pots, lined with fire-proof tiles; the condensation being effected in globular heads of green glass, with which each of the iron pots are capped."[1]

Ratio. Gas-liquor contains carbonate of ammonium (chiefly), with chloride, sulphate, hydrosulphate, cyanide, sulphocyanide, &c., of the same radical. On neutralisation with hydrochloric acid, or sulphuric acid, these are converted into chloride or sulphate of ammonium, according to the acid used. By sublimation with chloride of sodium, the sulphate of ammonium is converted, by double decomposition, into choride of ammonium, which sublimes; and sulphate of sodium, which remains in the subliming pot. A similar change occurs when the solution of the sulphate, prior to crystallisation, is decomposed by the addition of chloride of sodium, or any other chloride When the 'gas-liquor' is at once converted into chloride of ammonium by the addition of hydrochloric acid, the sublimation merely purifies the salt. Like changes occur when bone-spirit is employed.

Comp. Chemically considered, this salt consists of equal VOLUMES of gaseous ammonia and hydrochloric acid gas condensed into the solid form; or, by WEIGHT, according to the ammonia-theory, of—

	Atoms.	Equiv. wt.	Per cent.
Ammonia (NH_3)	1	17·	31·78
Hydrochloric acid (HCl)	1	36·5	68·22
Hydrochlorate of Ammonia (NH_3 HCl)	1	53·5	100·

Or, according to the 'ammonium-theory,' of—

	Atoms.	Equiv. wt.	Per cent.
Ammonium ($\dot{N}H_4$)	1	18·	33·65
Chlorine (Cl)	1	35·5	66·35
Chloride of Ammonium (NH_4 Cl)	1	53·5	100·

Prop., &c. The sal-ammoniac, of *commerce*, is found under the form of large white hemispherical, cup-like cakes or masses (or in large fragments which are sections of them), possessing a tough, fibrous, semi-crystalline texture, and very difficult to powder. It is odourless, has a saline taste somewhat sharp or acrid, and

[1] Ure's "*Dict. of Arts, M., & M.*," 5th Edn., i, p. 143.

sublimes without either fusion or decomposition. It slightly reddens litmus; dissolves in rather less than 3 parts of cold water, and in about 1 part of boiling water; is soluble in alcohol; and when crystallised from water, under favorable circumstances, forms distinct octahedra, or cubes, usually small and aggregated together in rays or feathery masses. By slowly evaporating its aqueous solution, it may be sometimes obtained in cakes an inch in thickness. It is anhydrous. Sp. gr. 1·450.

Pur. It should give a *colourless* solution with water; *wholly* sublime with heat; and neither chloride of barium, nor sulphuretted hydrogen, should affect its solution. A solution, to which a few drops of nitric acid have been added, should *not yield* a *blue* precipitate with ferrocyanide of potassium. It often contains sesquichloride of iron, and sometimes lead; both of which may be readily detected by the above tests. Its *complete* volatility may be easily determined by heating, in the flame of a candle, a small fragment held on the point of a knife.

Tests.—1. It is known to be a salt of ammonium by its cooling *ammoniacal* fumes when triturated with lime, or when moistened with caustic potassa or soda:—2. It is shown to be a chloride by its solution yielding, with nitrate of silver, a *white curdy precipitate*, insoluble in boiling nitric acid, soluble in ammonia.

Uses, &c. In the *arts*, chiefly in the coating and soldering of metals, and the preparation of alloys; in dyeing; and in the manufacture of ammonia-alum; also, in large quantities, to give a factitious pungency to snuff. In *chemistry*, as a reagent; and, owing to the cold produced during its solution, to form frigorific mixtures. In *medicine*, it is chiefly used *externally*, as a stimulant and resolvent or discutient; and occasionally, *internally*, as a diuretic, stimulant, resolvent, alterative, tonic, &c., particularly in chronic inflammations of the mucous and serous membranes, in chronic glandular and visceral enlargements and indurations, and in amenorrhœa. In rather large doses, frequently repeated, it is said to prove often highly beneficial in chronic enlargement and induration of the prostate gland (M. René Vanoye); and also in other like cases.—*Dose.* 5 to 20 gr., 3 or 4 times daily, either in powder or solution, mixed with some demulcent; as a discutient or resolvent lotion, 1 to 1½ oz., to ½ pint of *water*, either with or without 4 or 5 fl. oz. of spirits or strong vinegar (often serviceable in chilblains); as a weak lotion, or a collyrium or injection, 1 to 4 dr., to *water*, 1 pint. In *very large doses* it is *poisonous*; the treatment is emetics and mucilaginous or demulcent drinks.

Concluding remarks, Patents, &c. The methods already described are those by which commercial hydrochlorate of ammonia is usually, if not almost entirely obtained; the various improvements or modifications, from time to time introduced, affecting chiefly the minor details, and the form or size of the apparatus and machinery employed, and not the general principles on which the processes are based. One of the most important of these has for its object the *entire removal* of the *iron* present in the crude salt, some of which, if it be not removed before sublimation, is volatilised and contaminates the ultimate product. To obviate this evil, Mr. Brewer passes a few bubbles of *chlorine* through the hot concentrated solution of the salt, *previous* to its crystallisation; by which the protochloride of iron is converted into the perchloride, which, being acted on by the ammonia always present in the liquor, is precipitated as ferric hydrate, with the formation of a small additional quantity of sal ammoniac. The only *precaution* necessary is to avoid employing more chlorine gas than is necessary to peroxidise the iron; as beyond this, a portion of the ammonia-salt itself is decomposed, with the evolution of nitrogen. The temperature of the liquor is kept up, after the action of the chlorine, until the whole of the brown flocculent oxide of iron has subsided, when it is at once decanted or filtered into the crystallisers.

Another modification which has been adopted in two or three places, is to effect *neutralisation* of the crude ammoniacal liquor by distilling it, and passing the fumes in at the *lower end* of a hollow shaft or column filled with *coke*, down which the acid trickles; the resulting solution of sulphate or chloride of ammonium being received in proper cisterns, conveniently situated near the base of the column.

In Mr. Spence's method of obtaining *ammonia-salts* from gas-liquor or bone-spirit, a series of (usually four) *cylindrical boilers*, or *reservoirs*, so placed that the contents of each upper one may be drawn off into the one next below it, are employed. Each boiler has an exit-pipe which carries the vapour generated in it to that next above it, whilst that of the highest boiler passes off to a trunk containing the acid necessary to form the salt. The top boiler is connected with the reservoir of gas-liquor (which is already mixed with *milk of lime*) by a charging pipe furnished with a stop-cock turned by a floating ball, so as to keep the surface of the liquor constantly at the same height. High-pressure steam enters the *lower* boiler, by which its ammonia is driven through the connecting pipe into the next boiler, and so on in succession, until it leaves the highest boiler in a concentrated state, and thus enters the acid-tank. When this last contains moderately strong *hydrochloric* or *sulphuric acid*, the resulting solution of CHLORIDE OR SULPHATE OF AMMONIUM (as the case may be) is sufficiently concentrated to be at once run off into the crystallisers. As soon as the liquor in the *lowest* boiler is exhausted of its ammonia, its contents are drawn off, and replaced by that of the next boiler, which is followed by a like descent throughout the whole series.

Among *improvements* having for their object the substitution of cheap *chlorides*[1] for the more expensive commercial acids, may be mentioned those of—

1. Mr. Laming (*Patent* dated 1843), who employs a strong solution of CHLORIDE OF CALCIUM for converting the *ammonia* of gas-liquor into the *hydrochlorate*.

2. Mr. Hills (*Patent* dated 1846) employs CHLORIDE OF MAGNESIUM[2] in the same way; and by a subsequent patent, proposes to convert the *ammonia* eliminated in the distillation of coal into the *hydrochlorate*, by mixing CHLORIDE OF MAGNESIUM with the coal in the retorts, or by introducing the chloride into a retort appropriated for the purpose. The heat dispels the chlorine of the chloride, in the form of hydrochloric acid, and this, uniting with the ammoniacal vapour, forms hydrochlorate of ammonia, which is retained in the liquor of the condenser. From this liquor, the salt is obtained by evaporation, &c., in the usual way.

3. Mr. Croll (*Patent* dated 1849) converts the crude ammoniacal vapours that issue with the gas from the common retorts into the *hydrochlorate*, and obtains a solution of it, by passing the gas through a solution of crude CHLORIDE OF MANGANESE[3] (1 *cwt.* of the *salt* to about 40 *galls.* of *water*), contained in one of the ordinary vessels used for purifying coal-gas. The manganic solution absorbs the ammonia and its salts, converting them into the *hydrochlorate*, whilst a correspondin proportion of oxide of manganese is precipitated. As soon as the liquor in the purifier is fully saturated, it is drawn off, and replaced by a fresh quantity; whilst the saturated liquor containing the *hydrochlorate*, after subsidence, or filtration, is evaporated, &c., as before. Crude CHLORIDE OF IRON may be substituted for the chloride of manganese, in the above process; as may also SULPHATE OF MANGANESE, but then the product, of course, will be *sulphate of ammonia*, instead of the hydrochlorate.

4. Mr. Laming (*Patent* dated 1850) also proposes the use of various *salts* and *mixtures* for retaining and condensing the ammoniacal vapour of coal-gas, as it passes from the retorts through the purifiers. Of these the principal are CHLORIDE OF CALCIUM obtained by decomposing *chloride of iron* by *hydrate of lime*; CHLORIDE OF IRON, obtained by decomposing *sulphate of iron* with *chloride of sodium*; CHLORIDE OF MAGNESIUM; a mixture of SULPHATE OF LIME and SULPHATE OF IRON; or of moist *precipitated oxide of iron* with *carbonate of lime*, *carbonate of magnesia*, or *magnesian limestone*; or one containing *sulphate of magnesia*, or *chloride of magnesium* or *calcium*, or one, or more of them, in combination with *oxide of copper*, either with or without *lime* or *magnesia*, or with both or either of them or their *carbonates*. These salts, or compounds, are mingled with *sawdust*, or some other porous substance not acted on by the gas, before being put into the purifiers; and after they become saturated with the vapour, the newly formed *hydrochlorate* or *sulphate* (according to the salt or mixture employed), is washed out of the mass with water.

Besides the usual sources of SAL AMMONIAC (and the other ammonia-salts of commerce), it has been proposed to obtain it from *guano*, *peat*, *shale*, &c., as noticed under SESQUICARBONATE OF AMMONIA (*suprà*); the substance employed to effect the *neutralisation* or *decomposition* of the ammoniacal liquor being, in this case, either *hydrochloric acid* or a *chloride*.

In Young's *Patent* (1841) for 'obtaining AMMONIA and its SALTS,' a mixture of 2 parts of *guano*, and 1 part of *hydrate of lime*, is distilled in a retort placed vertically, at a moderate heat, gradually increased until the bottom of the retort becomes red hot. The ammoniacal portion of the fumes evolved are absorbed by the *cold water* contained in a suitable condenser; whilst the other gases eliminated by the process pass off uncondensed. By subsequently passing *carbonic acid gas* into the liquor of the condenser, a solution of CARBONATE, BICARBONATE, or SESQUICARBONATE of AMMONIA is formed. By nearly filling the condenser with *diluted hydrochloric* or *sulphuric acid*, instead of with water, a *solution* of HYDROCHLORATE or of SULPHATE of AMMONIA is obtained.

Stale urine saturated with *hydrochloric acid*, or with *sulphuric acid* diluted with about twice its weight of *water*, yields SAL AMMONIAC, or SULPHATE OF AMMONIA (according to the acid used) on evaporation.

Hydrochlorate of ammonia is now wholly prepared on the large scale, and never by the dealer or retailer, by whom it is only occasionally refined or purified, in small quantities, for chemical and medical purposes. The sal ammoniac of commerce is found to be sufficiently pure for all its ordinary applications in the arts; but when wanted of greater purity, it is broken into pieces, and resublimed from an earthenware vessel into a large receiver of earthenware or glass. The product (REFINED SAL AMMONIAC, DOUBLE-REFINED S. A.; AMMONIÆ HYDROCHLO″RAS PU″RA, SAL AMMONI′ACUS DEPURA′TUS†, L.) is popularly known as FLOWERS OF SAL AMMONIAC (*flo′res sa′lis ammoni′aci*, L.), from being in a finely divided crystalline state.

The chemically pure chloride of ammonium may be prepared by bringing its gaseous consti-

[1] Particularly such *chlorides* as are the 'waste or bye products' of other manufactures.

[2] Of the Epsom-salt works, &c.

[3] Obtained from the chloride-of-lime works. The portion of the precipitated oxide of manganese saved from the process, may be reconverted into the *chloride*, by mixing 3 *parts* of it with 4 *parts* of *common salt*, and heating the mixture to low redness, scarcely perceptible in the dark, for 2 to 3 hours. 140 *lbs.* of the calcined mass, with 40 *galls.* of *water*, forms a solution that may be again pumped into the purifier.

tuents—ammonia and hydrochloric acid—into contact. During the combination much heat, and even light, is generated, and the anhydrous solid salt is precipitated in a minutely divided state, which, under the microscope, is seen to be crystalline. It may be also more easily and conveniently prepared by saturating pure and moderately dilute hydrochloric acid with ammonia or its carbonates, and evaporating the solution until a pellicle forms, when crystals of the HYDROCHLORATE separate as the liquid cools. A similar but rather more violent reaction occurs when gaseous chlorine is brought in contact with gaseous ammonia, or is passed into a nearly saturated solution of ammonia or its carbonates; but in this case nitrogen is evolved at the expense of the ammonia; moreover, the process is attended with danger.

The manufacture of sal ammoniac is usually a distinct business, and is carried on to a very great extent in the neighbourhood of London. Indeed, the London makers now supply the chief portion of that used in England. A large quantity is now, however, made at Manchester and Liverpool. A small quantity is imported from Germany. That from Brunswick is in the form of sugar-loaves. An inferior quality is also imported, in chests, from the East Indies.

The red bands frequently seen in the sal ammoniac of commerce, are said to arise from the workmen falling asleep, and allowing the fire to go down, and then suddenly raising the heat too high. (Muspratt.) They consist chiefly of ammonio-chloride of iron.

Ammonium, Citrate of. $(NH_4)_2HC_6H_5O_7$. *Syn.* DIAMMONIUM CITRATE, CITRATE OF OXIDE OF AMMONIA; AMMO″NIÆ CIT′RAS, L.

Prep. A *concentrated solution* of *pure citric acid*, gently heated, is saturated with *sesquicarbonate of ammonium*, in fine powder, (about 7 parts to 6,) and *slightly* in excess; and the resulting liquid is crystallised by refrigeration in close vessels, or by evaporation in vacuo. If *heat* be employed in the evaporation of the solution, an ACID CITRATE will be formed.

Uses, &c. Chiefly as a chemical test. An *extemporaneous citrate*, made with lemon-juice and drank effervescing, is employed as a saline draught, and a mild aperient and diaphoretic, in fevers, &c.

Ammonium, Ferrocyanide of. $(NH_4)_4FeC_6N_6 . 3Aq.$ *Syn.* FERROCYANATE D'AMMONIAQUE, Fr. *Prep.*—1. Saturate a *solution* of *hydroferrocyanic acid* with *sesquicarbonate of ammonium*, in *slight* excess; evaporate the solution at a heat below ebullition, and crystallise by refrigeration.

2. Digest *ferrocyanide of lead* or of *iron* in a *solution* of *sesquicarbonate of ammonium*, at a gentle heat, for some time; then filter, evaporate, and crystallise.

Prop., &c. It is isomorphous with ferrocyanide of potassium; it is easily crystallisable, very soluble in water, and is decomposed by ebullition.

Ammonium, Iodide of. NH_4I. *Syn.* HYDRIODATE OF AMMONIA; AMMO″NII IODI′DUM, L.; HYDRIODATE D'AMMONIAQUE, Fr. *Prep.* An *aqueous solution* of *hydriodic acid* is neutralised with *ammonia*, or *ammonium sesquicarbonate*, in *slight* excess; and the resulting liquid is either carefully, but rapidly, evaporated to dryness over a water bath, or it is concentrated by the same means, and then caused to deposit crystals by refrigeration; in both cases, care is taken to keep a *slight* excess of *ammonia* present during the evaporation. The crystals are dried by pressure between folds of bibulous paper; and the product, in either form, preserved in a stoppered bottle.

Pure *iodine* is triturated with a little *distilled water*, and *solution of ammonium sulphydrate* added, in small quantities at a time, with continued trituration, until the red colour of the iodine has *entirely* disappeared. The solution, after being gently boiled for a few seconds, to expel the sulphuretted hydrogen present, is filtered, *slightly* alkalised with *ammonia*, and evaporated or crystallised, as before.

Prop., &c. Colourless; deliquescent; freely soluble in water, and in spirit; air and light turn it yellowish or brownish, with partial decomposition. It closely resembles iodide of potassium, than which it is more active, and thought to be better suited to irritable and relaxed habits.—*Dose.* 1 to 10 or 12 gr.

Ammonium, Lac'tate of. *Syn.* AMMO″NIÆ LAC′TAS, L. An uncrystallisable salt prepared by saturating *ammonia*, or its *carbonate*, with *lactic acid*. It has been found useful in *rickets*, and in *dyspepsia* and *worms*, when occurring in debilitated habits. For this purpose it is best taken fresh-prepared, as a draught, flavoured with syrup of orange-peel, 3 or 4 times daily. See LACTATE and LACTIC ACID.

Ammonium, Nitrate of. NH_4NO_3. *Syn.* AMMO″NIÆ NI′TRAS, L.; NITRATE D'AMMONIAQUE, Fr. *Prep.* Saturate *nitric acid* (diluted with 3 or 4 times its weight of *water*) with *sesquicarbonate of ammonium*, evaporate by a gentle heat, and crystallise. When not required in a crystalline form, it is usually evaporated to dryness at about 212° Fahr.; and the heat being carefully raised to about 250°, the *fused salt* is poured out on a *polished slab* of *iron* or *stone*, and when solidified, broken up and put into bottles.

Prop. When the evaporation of the solution is conducted at a heat under 100° Fahr., the salt is obtained in beautiful hexagonal prisms; when at 212°, in long silky fibres; when by rapid evaporation and fusion, it forms a white, compact, and usually foliated mass. It dissolves in about twice its weight of water; is slightly deliquescent; melts at 230°, and is decomposed into nitrous gas and water at 460° Fahr. It deflagrates, like nitre, on contact with heated combustible matter.

Uses, &c. Chiefly to prepare *nitrous oxide or laughing gas* (of which nearly 44 cubic feet may be procured from every *lb.* avoir.); and

with *water*, to form *freezing mixtures*, for which purpose it may be used for any number of times by simply evaporating the solution to dryness, when the salt, obtained unaltered, is ready for another operation. Care, however, should be taken not to expose it to too great a heat, as at a certain temperature it deflagrates with violence. It is occasionally employed in the *laboratory* to promote the combustion of organic bodies during incineration; and sometimes, though seldom, in *medicine*, as a diuretic and diaphoretic. It is said to reduce the frequency of the pulse, and the animal heat, without affecting the head, chest, or stomach. (Wibmer.)—*Dose.* 10 to 30 gr.

Ammonium, Nitro-sulphate of. *Syn.* AMMO″NIÆ NITRO-SUL′PHAS, L. Dissolve *sulphite of ammonium*, 1 part; in *solution of ammonia*, 5 parts; and pass *nitric oxide gas* through the solution; rapidly wash the crystals that form with *solution of ammonia*, dry in bibulous paper, without heat, and preserve them in a well-stopped bottle.—*Dose.* 10 to 12 gr.; in typhoid fevers, &c.

Ammonium, Oxalate of. $(NH_4)_2C_2O_4$. *Syn.* AMMO″NIÆ OX′ALAS, L.; OXALATE D'AMMONIAQUE, Fr. Neutralise a hot *solution of oxalic acid* with *sesquicarbonate of ammonia*; evaporate and crystallise.

Prop. It forms beautiful, colourless, long, rhombic prisms, which effloresce in the air; slightly soluble in *cold* water; freely soluble in *hot* water; heated in a retort, it yields ammonia, carbonate of ammonia, cyanogen, and carbonic acid, together with oxamide, which sublimes.

Uses, &c. In *chemistry*, chiefly as a test for calcium (with which it produces a white precipitate soluble in nitric acid), and to separate lime from magnesium, solutions of the salts of which it does not precipitate. A BINOX′ALATE may also be formed; but it possesses no practical interest.

Ammonium, Phosphate of. $(NH_4)_3PO_4$. *Syn.* AMMO″NIÆ PHOS′PHAS, L. *Prep.* Saturate a *solution* of *phosphoric acid* with *sesquicarbonate of ammonium*, in slight excess; gently evaporate and crystallise by refrigeration. Diuretic, discutient, and antilithic.—*Dose.* 3 to 10 gr., or 20 to 30 drops of a saturated solution, 3 or 4 times a day, in gout, rheumatism, and calculus, accompanied with the lithic acid diathesis; also in rickets and certain forms of dyspepsia.

Ammonium Suc′cinate. *Syn.* AMMO″NIÆ SUC′CINAS, L. *Prep.* 1. *Succinic acid*, 1 part; *water*, 4 parts; dissolve, neutralise with *solution of ammonia*, or of *ammonium carbonate*, in slight excess, and evaporate, and crystallise as directed under the 'benzoate' or 'phosphate.'—*Dose.* 5 to 10 gr.

Ammonium, Sul′phate of. $(NH_4)_2SO_4$. *Syn.* SULPHATE OF OX′IDE OF AMMONIA; AMMO″NIÆ SUL′PHAS, L.; SULFATE D'AMMONIAQUE, Fr.; SCHWEFELSAUER AMMONIUM SALZ, Ger.; Glauber's SECRET SALT†, G. SECRET SAL-AMMONIAC†, SAL AMMONI′ACUM SECRE′TUM GLAUBE″RI†, &c. Crude sulphate of ammonia exists in considerable quantity in the *soot* from pit-coal; and it is obtained, as a secondary product, from the *ammoniacal liquor* of gas-works and animal charcoal manufactories. These last are its chief sources. It is also found native, associated with sal ammoniac, in the neighbourhood of volcanoes, under the name of '*mascagnine*' or '*massagnine*.'

Prep. 1. (Medicinal.) Saturate *dilute sulphuric acid* with *sesquicarbonate of ammonia*, in slight excess; filter, gently evaporate, and crystallise.

2. (Commercial.) From *gas-liquor* or *bone-spirit*, saturated with *weak oil of vitriol*, and the clear portion of the liquid, after repose, decanted, concentrated by rapid evaporation, and crystallised, in the manner noticed under AMMONIUM, CHLORIDE OF.

Prop. Crystals, long, flattened, six-sided prisms; soluble in 2 parts of *cold*, and 1 of *boiling* water; fuses, with loss of one atom of water, at about 280° Fahr.; and is volatilised, with entire decomposition, at about 535°. Even its solution, by long boiling, becomes acid from loss of ammonia. The anhydrous salt does not exist.

Uses, &c. Pure sulphate of ammonia is diuretic, aperient, resolvent, and stimulant.—*Dose*, 10 to 30 gr. It is now seldom employed in medicine. The *crude sulphate* is principally used in the preparation of sal ammoniac and sesquicarbonate of ammonia, and for manure. "A mixture of 10⅞ of this *sulphate* with 20⅞ of *bone-dust*, some *gypsum*, and *farmyard manure*," forms "a very fertilising compost, applicable to a great variety of soils" (Ure); and we may add—greatly superior to a very large portion of what is now so commonly vended under the name of 'guano.'

Concluding remarks, Patents, &c. The manufacture of *sulphate of ammonia*, on the *large scale*, has been unavoidably explained in treating on the salts of that base already noticed. All that is necessary, is to saturate with *sulphuric acid* the solution of ammonia, crude or otherwise, and obtained in any manner; and then to evaporate the solution until the salt crystallises out. At other times, however, instead of adding the *acid* to the ammoniacal liquor, the *latter*, either at once, or after treatment with *lime*, is submitted to distillation, and the evolved alkaline vapour is passed into the acid (previously somewhat diluted), contained in a large receiver or cistern, or a series of them; the salt being obtained from the resulting solution in the usual manner. By *re-solution* and a *second* crystallisation, the sulphate is generally obtained sufficiently pure for all commercial purposes; but when the salt is intended for use as manure, or (unless very rough) for conversion into sal ammoniac, this need not be had recourse to.

Among *modifications* and *improvements*, not previously noticed, may be mentioned—

1. That of Dr. Richardson (*Patent* dated Jan., 1850), who mixes SULPHATE OF MAGNESIA with the crude ammoniacal liquor and thus forms a double sulphate of magnesia and ammonia, from which he obtains the SULPHATE OF AMMONIA by sublimation.

2. That of Michiel (*Patent* dated April, 1850), who prepares *sulphate of ammonia* by means of OXYSULPHATE OF LEAD obtained by roasting *galenâ* (sulphide of lead), by exposing it in a crushed state and thin layers, for 2 or 3 hours, to the heat of a reverberatory furnace. The resulting mixture of sulphate and oxide of lead is reduced to the state of coarse powder, and well worked up with the *ammoniacal liquor*, when SULPHATE OF AMMONIA and sulphide and carbonate of lead are produced by the mutual reaction of the elements present. The *first* is removed by treatment with *water*; and the *residuum* serves for the manufacture of lead compounds, or may be reduced to the metallic state by fusion in the usual manner.

3. That of Mr. Laming (*Patent* dated Aug., 1852), in which a *stream* of SULPHUROUS ACID GAS is transmitted through the liquor containing the ammonia, either in the *free state* or as *carbonate*, by which SULPHITE OF AMMONIA is formed. This *salt* he oxidises, and thus converts into the SULPHATE OF AMMONIA, by agitation and free exposure to the air.

Sulphate of ammonia, like the hydrochlorate, may also be obtained by saturating stale urine with the acid, and subsequent evaporation and crystallisation. See AMMONIA; AMMONIA, CARBONATES OF; AMMONIUM, CHLORIDE OF, and MANURES, &c.

Ammonium, Sulphide of (Neutral). $(NH_4)_2S$. *Prep.* Saturate *strong solution of ammonia* with pure *sulphuretted hydrogen gas*; then add a *second* portion of *solution of ammonia*, equal to that first used, and preserve it in a well-stoppered bottle.

Ammonium, Sulphydrate of. NH_4HS. *Syn.* SULPHIDE OF AMMONIUM, HYDROSULPHIDE OF AMMONIUM, HYDROSULPHATE OF AMMONIA. *Prep.* By passing *sulphuretted hydrogen gas*, to saturation, through a mixture composed of *strong solution of ammonia*, 1 part, and *distilled water*, 4 parts.

Props. Prepared as above, it has a very fœtid odour. When *pure* it is *wholly* volatilised by heat, and does not disturb a solution of sulphate of magnesium. Mineral acids decompose it, with the evolution of sulphuretted hydrogen. By keeping, it decomposes and acquires a yellow colour. This yellow colouration does not, however, render it unfit for use as a reagent; but it must be borne in mind that it will now deposit sulphur when mixed with acids. In this state it proves valuable as a reagent to detect hydrocyanic acid, and as a solvent to separate metallic sulphides thrown down by sulphuretted hydrogen.

Uses, &c. It is principally employed by *chemists*, as a reagent to precipitate metals, to separate metallic sulphides, &c.; and by the *perfumers*, as a mordant in dyeing hair. In *medicine*, it has been used by Cruickshank, Rollo, and others, to check the morbid appetite, and to increase the action of the stomach and general tone of the system in *diabetes mellitus*. It has also been used by Brauw, Gruithuisen, and others, in old *pulmonary* and *vesical catarrhs*. It is a powerful sedative, lessening the action of the circulatory system, causing nausea, vomiting, vertigo, drowsiness, &c.—*Dose.* 3 to 6 drops, three or four times daily, mixed with *pure water*, and *instantly* swallowed. In large doses it is poisonous.

Ant. Very dilute *solution of chlorine*, or of *chloride of lime* or *soda*, followed by a powerful emetic, or the stomach-pump. When the *vapour* has been *respired*, free exposure to fresh air, with the head a little elevated, and copious affusions of cold water, with moderate draughts of brandy-and-water, and the use of the smelling-bottle (ammoniacal) should be adopted. If need be, artificial respiration should be attempted, and the air around the patient should be *slightly* impregnated with the fumes of chlorine or chloride of lime.

Ammonium, Persulphide of. *Syn.* BOYLE'S FUMING-LIQUOR, HOFFMAN'S VOLATILE SPIRIT OF SULPHUR, &c.; AMMO"NIÆ PERHYDROSUL'PHAS, A. PERHYDROSULPHURE'TUM, &c. Authorities differ as to the constitution of this liquid, which, since its introduction by Beguin in 1650, has passed under more 'aliases' than perhaps any other preparation. Its precise position amongst the ammonia-compounds is still undecided.

Prep. 1. (Beguin.) *Sulphur*, 1 ℔; *quicklime*, ½ ℔; *sal ammoniac*, 4 oz.; mix and distil.

2. (Boyle.) *Sulphur* and *sal ammoniac*, of each, 5 oz.; *quick-lime*, 6 oz.; as last.

3. (Liebig.) Agitate the *common hydrosulphate of ammonia* with *pure sulphur*, until the latter ceases to be dissolved; and, after repose, decant the clear liquid.

Prop., &c. An orange-yellow, fuming, fœtid liquid, of an oily consistence, having the characteristics of the common sulphydrate in a remarkable degree. It may prove an excellent medicine. "Useful for wounds and ulcers." (Beguin.) Diluted with three parts of *spirit of wine*, it formed the LIQUOR ANTIPODAGRICUS of F. Hoffman; of which we are told, that about 30 drops acted as a *strong sudorific*; and applied externally, mixed with camphor, "it relieved pain like a charm." (Hoffman.) The sulphides of ammonium are now scarcely ever employed as remedies.

Ammonium, Sulphite of. $(NH_4)_2SO_3.7Aq.$ *Syn.* AMMO"NIÆ SUL'PHIS, L. *Prepared* by passing *sulphurous acid gas* into a *solution* of *ammonia*. It is crystallisable and very soluble in water.

Ammonium, Sulphocyanide of. NH_4CNS. *Prep.* 1. Neutralise *hydrosulphocyanic acid* with *ammonia*, and gently evaporate the solution to dryness, by the heat of a water bath.

2. Digest *hydrocyanic acid* with *yellow sulphydrate of ammonium*, and, after a time, evaporate as before.

A deliquescent, white, saline mass, very soluble in water, but seldom employed out of the laboratory in a pure state. Of late it has been obtained in quantity as a crude product of the gas liquors.

Ammonium, Tartrates of. Of these there are two:—

Ammonium, Neutral Tartrate of. $(NH_4)_2 C_4H_4O_6$. *Syn.* AMMO″NIÆ TAR′TRAS, L. *Prep.* Saturate a solution of *crystallised tartaric acid*, 150 grs.; with *sesquicarbonate of ammonium*, 118 grs.; and either evaporate the solution at a gentle heat, and crystallise; or evaporate to dryness, and powder the residuum.

Prop., &c. Prismatic crystals, or a crystalline mass; soluble and efflorescent. Its *medicinal properties* and *doses* resemble those of citrate of ammonium.

Ammonium, Bitartrate of. $NH_4HC_4H_4O_6$. *Syn.* AMMO″NIÆ BITAR′TRAS, L. *Prep.* To a strong solution of *tartaric acid*, add another of *sesquicarbonate of ammonium*, or of *tartrate of ammonium*, as long as a precipitate falls; which must be collected and dried.

Prop., &c. A crystalline powder, only slightly soluble in water, closely resembling ordinary cream of tartar. It is diaphoretic, diuretic, and deobstruent, and is frequently, though improperly, sold for the preceding preparation.

Ammonium, Valerianate of. $NH_4C_5H_9O_2$. *Syn.* AMMO″NIÆ VALERIA′NAS, L. *Prep.* Saturate *valerianic acid* with *strong solution of ammonia*, and evaporate the resulting liquid to a syrupy consistence at a heat under 175° Fahr.; then add *twice* its *volume* of *alcohol*, and, after agitation, allow it to crystallise by spontaneous evaporation.—*Dose.* 2 to 8 or 10 grs.; in neuralgia, epilepsy, hypochondriasis, hysteria, low fevers of an intermittent kind, &c.; also in dyspepsia and debility complicated with these affections.

AMMONI′ACAL. [Eng., Fr.] *Syn.* AMMONIACA′LIS, L. Pertaining to, or possessing the odour or properties of, ammonia. See AMMONIA, PERFUMES, &c.

AMMONI′ACUM. *Syn.* GUM AMMONIACUM, G. AMMO″NIAC†; GOMME AMMONIAQUE, Fr.; AMMONIAK, Ger. A gummy-resinous exudation from the stem of *dorema ammoniacum*, in tears and masses, of a pale cinnamon colour, brittle, and when broken has a white and shining surface. Collected in Persia and the Punjaub. (B. P.)

Gum ammoniacum has an unpleasant odour, especially when heated, and a nauseous and slightly bitter taste. It is a mild, stimulating expectorant and emmenagogue; and its effects on the system resemble those of assafœtida, except in being weaker. *Externally*, it is resolvent.—*Dose*, 10 to 30 grs. in pills or emulsion.

Strained′ Ammoniacum. *Syn.* PREPARED AMMONIACUM; AMMONI′ACUM PRÆPARA′TUM (Ph. L.), L. *Prep.* (Ph. L. 1851.) Boil *ammoniacum* in *water* just sufficient to cover it; strain the mixture through a hair sieve, and constantly stirring, evaporate in a water bath, until, on cooling, it becomes hard. The *product*, owing to a loss of volatile oil, is much weaker than the unprepared gum-resin. The process is only necessary with rough lump-ammoniacum.

Ammo″niated. *Syn.* AMMONIA′TUS, L. In *pharmacy, perfumery*, &c., applied to preparations containing ammonia.

AMMO″NIO-, Ammon′ico-. In *chemistry*, a common prefix to double salts containing ammonia; as *ammonio-citrate, a.-chloride*, or *a.-tartrate of iron*, &c. See the respective metals.

†,†† The *sp. gr.* of any *sample* of *liquid ammonia*, expressed in three integers, *deducted* from ·998, and the remainder *divided* by 4, gives a number which represents the *per-centage strength*, nearly. (Ure.) This rule may be sometimes conveniently employed for rough calculations, in the absence of *Tables*.

TABLE II.—*Showing the per-centage of* PURE AMMONIA, *and of* AMMONIA-WATER *of* ·9000, *in Water of Ammonia of the given specific gravities, at* 60° Fahr. By Dr. URE.

Sp. Gr. by experiment.	Water of Ammonia of ·900, per cent.	Pure Ammonia, per cent.	Water, per cent.
·9000	100	26·500	73·500
·9045	95	25·175	74·825
·9090	90	23·850	76·150
·9135	85	22·525	77·475
·9177	80	21·200	78·800
·9227	75	19·875	80·125
·9275	70	18·550	81·450
·9320	65	17·225	82·775
·9363	60	15·900	84·100
·9410	55	14·575	85·425
·9455	50	13·250	86·750
·9510	45	11·925	88·075
·9564	40	10·600	89·400
·9614	35	9·275	90·725
·9662	30	7·950	92·050
·9716	25	6·625	93·375
·9768	20	5·300	94·700
·9828	·15	3·975	96·025
·9887	10	2·650	97·350
·9945	5	1·325	98·675

*** *Strengths* corresponding to *sp. gr.* which are not in the above *Tables*, may be found by the 'method of differences' explained under ALCOHOLOMETRY (*p.* 68-9).

AMONTILLADO. [Sp.] See SHERRY and WINE.

AMORPH′OUS (-morf′ŭs). *Syn.* AMORPH′US, L.: AMORPHE. INFORME. DIFFORME. Fr.:

AMORPHISCH, MISGEBILDET, MISSGESTALTET, Ger. Shapeless. In *chemistry* and *mineralogy*, applied to substances devoid of regular or crystalline form; as a lump of chalk, the majority of precipitates, &c. The corresponding substantives are AMORPH'ISM, AMORPH'OUSNESS* (*amorphis'mus*, L.; *amorphisme*, Fr.).

AMPHIB'IA (-fĭb'-y'ă). [L. pl.; prim. Gr.] *Syn.* AMPHIB'IANS (-yănz), AMPHIB'IALS (-y'ălz). Animalst hat possess the faculty of living both in water and on land. In *modern zoology*, it is restricted to those animals which possess both gills and lungs; as the *batrach'ia* or frog tribe. The term is also often applied, *colloquially*, to otters, seals, walruses, crocodiles, &c., none of which can breathe under water, although, from the languid nature of their circulation, they are able to remain a long time in it.

AMPHIB'IOUS (y'ŭs). *Syn.* AMPHIB'IUS, L.; AMPHIBIE, Fr.; BEYDLEBIG, Ger. In *botany* and *zoology*, having the faculty of growing or living both on land and in water. See AMPHIBIA.

AM'PHITYPE (-fe-). See PHOTOGRAPHY.

AMYGDALIN. $C_{20}H_{27}NO_{11}.3Aq$. This substance exists in bitter almonds. It crystallises in pearly white plates, which are odourless and almost tasteless. It is nearly insoluble in hot and cold water and in cold alcohol, but soluble in boiling alcohol.

AMYG'DALOID (-loyd). *Syn.* AMYGDALOID'AL; AMYGDALOÏ'DES (-dēz), L.; AMYGDALOÏDE, Fr. Almond-shaped. In *mineralogy*, amygdaloid is 'toadstone.'

AMYLA'CEOUS (ăm-e-lā'-sh'ŭs). *Syn.* AMYLA'CEUS, L.; AMYLACÉ, Fr. Of or like starch; consisting of or abounding in starch; starchy. See FOOD, NUTRITION, STARCH, &c.

AM'YL (-ĭl). C_5H_{11}. The radical of the fusel-oil compounds (AMYL-SERIES).

Amyl, Ac'etate of (ăc'-). $C_5H_{11}C_2H_3O_2$. *Syn.* PEAR-OIL. *Prep.* From *fusel-oil*, 1 part; *acetate of potassa* (dry), 2 parts; *concentrated sulphuric acid*, 1 part; distilled, with the usual precautions, from a glass retort into a cool receiver. The *distillate* is purified by washing it with *very dilute solution of potassa*, and redistilling it from *fused chloride of calcium*. A little *litharge* added to the liquid in the retort, before rectification, will remove any sulphurous odour, should it be present.

Prop., &c. Liquid, limpid, colourless; insoluble in water; soluble in alcohol; boils at 272° Fahr.; alcoholic solution of potassa converts it into an acetate of that base, with reproduction of fusel-oil.

Obs. The odour and flavour of this preparation are those of the Jargonelle-pear. It is now extensively manufactured, and, after dilution with alcohol, is sold under the name of ESSENCE OF JARGONELLE-PEAR, for flavouring liqueurs and confectionery.

Amyl, Vale'rianate of. $C_5H_{11}C_5H_9O_2$. *Syn.* APPLE-OIL, A.-ESSENCE, &c. This compound is abundantly formed during the preparation of *valerianic acid* from *potato oil*, and is recognised by the offensive odour of rotten apples evolved during the process. By treating the *crude product* of the distillation with a *weak solution* of *pure potassa*, the valerianic acid is removed, and the *volatile oil* obtained nearly pure. Dissolved in *rectified spirit* it forms the 'APPLE-ESSENCE' now so much employed as a flavouring ingredient for confectionery and liqueurs. See FRUIT ESSENCES, VALERIANIC ACID, &c.

AM'YLENE (-e-lēne). C_5H_{10}. [Eng., Fr.] *Syn.* AM'ILENE*; AMYLE'NA, AMYLE'NUM, L. A peculiar volatile, liquid hydrocarbon, discovered by Cahours.

Prep. From *fusel-oil* repeatedly distilled along with either *anhydrous phosphoric acid*, or a *concentrated solution* of *chloride of zinc*; the product being repeatedly rectified, at a low temperature, until the boiling-point sinks to 102° Fahr.

Prop., Uses, &c. An ethereal liquid, lighter than water, having an aromatic odour, slightly alliaceous. Sp. gr. of vapour, 2·68. Its vapour was several times successfully employed, by the late Dr. Snow, as a substitute for ether and chloroform in producing anæsthesia, being, though less agreeable, also less pungent, and consequently easier to breathe, than either of them; but its use has since been given up owing to doubts as to its safety, two or three deaths having followed its inhalation.

ANÆSTHE'SIA (ăn-ēz-the'-zh'ă; -sh'ă; -thēze'-y'ăr). [L.; prim. Gr.] *Syn.* ANESTHÉSIE, Fr. In *pathology*, diminished or lost sense of feeling.

In *surgery* and *obstetrics*, the *production* of *temporary anæsthesia*, for the purpose of rendering operations painless, relieving the pangs of childbirth, &c., is effected by the use of—

ANÆSTHET'ICS. *Syn.* ANÆSTHET'ICA, L.; ANESTHÉTIQUES, Fr. In *pharmacology* and *surgery*, substances or agents which diminish or destroy sensibility, or which relieve pain. In its full extent this term includes both *anodynes* and *narcotics*; but it is now more generally confined to those substances which greatly diminish common sensibility, or entirely remove susceptibility to pain. Among the most useful, safe, and powerful of this class are chloroform, ether, nitrous oxide, and intense cold. The former are administered by inhaling the vapour or gas; the last, by local application.

ANALEP'TIC. *Syn.* ANALEP'TICUS, L.; ANALEPTIQUE, Fr. Restorative; that recruits the strength lost by sickness.

Analep'tics. *Syn.* ANALEP'TICA, L.; ANALEPTIQUES, Fr. In *pharmacology*, &c., restorative medicines and agents.

ANAL'YSIS (-e-sĭs). [Eng. L., Gr.] *Syn.* ANALYSE, Fr.; AUSLÖSUNG, ZERLEGUNG, Ger. In a *gen. sense*, the resolution of anything, whether an object of the senses or of the intellect, into its elementary parts. In *chemistry*, the resolution or separation of a com-

pound body into its constituent parts or elements, for the purpose of either determining their nature, or, when this is known, their relative proportions. It is divided into QUAL'ITATIVE ANALYSIS and QUAN'TITATIVE ANALYSIS; and these again into PROX'IMATE ANALYSIS and UL'TIMATE ANALYSIS. The first consists in finding the components of a compound, merely as respects their nature or names; the second, in finding not merely the component parts, but also the proportions of each of them; the third gives the results in the names of the proximate or immediate principles or compounds which, by their union, form the body under examination;[1] whilst the fourth develops the chemical elements of which it is composed.[2] An analysis may also be made to determine whether a certain body is or is not contained in a compound (as lead in wine); or it may be undertaken to ascertain all the constituents present; the extent of an investigation being merely limited by the object in view.

For success in chemical analysis a thorough acquaintance with the various properties of bodies is required, as well as aptitude in applying this knowledge in discriminating them, and separating them from each other. Judgment and expertness in manipulation are, indeed, essential qualifications. The method pursued must likewise be such as to attain the object in view with unerring certainty, and in the most expeditious manner. "The mere knowledge of the reagents, and of the reactions of other bodies with them, will not suffice for the attainment of this end. This requires the additional knowledge of a systematic and progressive course of analysis, or, in other words, the knowledge of the order, and succession, in which solvents, together with general and special reagents, ought to be applied, both to effect the speedy and safe detection of every individual component of a compound or mixture, and to prove with certainty the absence of all other substances. If we do not possess this systematic knowledge, or if in the hope of attaining an object more rapidly, we adhere to no method in our investigations and experiments, analysing becomes (at least in the hands of a novice), mere guess work, and the results obtained are no longer the fruits of scientific calculation, but mere matters of accident, which sometimes may prove lucky hits, and at others total failures." (Fresenius.)

ANASTATIC PRINTING. See PRINTING and ZINCOGRAPHY.

ANATOM'ICAL. *Syn.* ANATOM'ICUS, L.; ANATOMIQUE, Fr.; ANATOMISCH, Ger. Belonging to anatomy or dissection.

Anatomical Prepara'tions. Objects of interest in both surgical and pathological anatomy, and specimens in natural history, preserved by subjecting them to antiseptic processes, to which is also frequently added injection with coloured fluids (which subsequently harden), amalgams, or fusible metal, in order to display more fully the minute vessels, or the microscopic anatomy of the several parts. See FUSIBLE METAL, INJECTIONS, PREPARATIONS, PUTREFACTION, SKELETONS, SOLUTIONS, &c.

ANCHO'VY (-chŏ'-). *Syn.* ANCHOIS, Fr.; ANCHOVE, ANSCHOVE, Ger.; ACCIUGHE, ANCHIOVE, It.; ANCHOVA, Port., Sp. The *clu'pea encrasic'olus* (Linn.), a small fish of the herring tribe, closely resembling the English sprat. It is common in the Mediterranean, and occurs in the greatest abundance, and of the finest quality about the island of Gorgona, near Leghorn. It is taken in the night, during May, June, and July.

Anchovies are prepared for sale or exportation by salting or pickling them—the heads, intestines and pectoral fins having been first removed, but not the scales—and afterwards packing them, along with rock-salt, in the small kegs in which they are imported into this country. The small fish are valued more than the larger ones. For the table they are often fried to a pale amber colour, in oil or butter; having previously been scraped clean, soaked for an hour or two in water, wiped dry, opened (without dividing the fish), and had the back-bones removed. Before being put into the pan they are usually highly seasoned with cayenne; and after being again closed, are dipped into a rich light batter. They are also divided into fillets, and served as sandwiches, or in curried toasts. Anchovies are also extensively potted (POTTED ANCHOVIES), and made into butter (A.-BUTTER), and into sauce (A.-SAUCE), particularly the last.

The anchovy has a fine and peculiar flavour, and is eaten as a delicacy all over Europe. It was known to the Greeks and Romans, who prepared from it a kind of garum for the table. It is said to be aperitive, stimulant, and stomachic.

The high price of genuine Gorgona anchovies has led the fraudulent dealer to either substitute for them, or mix with them, fish of a less expensive kind. The most frequent SUBSTITUTIONS are Dutch, French, and Sicilian fish of allied species or varieties, sardines, and even the common sprat. The genuine Gorgona fish is about the length of one's finger; and may be known by its silvery appearance; by the greater thickness of its head, which is sharp-pointed, with the upper jaw considerably the longest, and the mouth deeply divided; the dusky brown colour of its back,[3] and the pink salmon colour of its flesh. When only 3 months old, its flesh is pale; when of 6 months, rather pink; when of 10 to 12 months (or in its prime), a beautiful deep pink colour;

[1, 2] Thus, *suet* consists of olein, palmitin, and stearin. These would form the 'terms' of the PROXIMATE ANALYSIS of this substance. But olein, palmitin, and stearin consist of carbon, hydrogen, and oxygen. The ULTIMATE ANALYSIS of suet would, therefore, have reference to the elements carbon, hydrogen, and oxygen.

[3] The *colour* of the *top of the head* and *back* is, in the recent fish, *blue*, with a *tinge of green*. (Yarrell.)

and when much older, darker, but less lively. The fin-rays, varying in number with the age of the fish, are—

	Yarrell.	Hassell.[1]
Dorsal	14,	16 (?).
Pectoral	15,	—
Ventral	7,	—
Anal	18,	19 (?).
Caudal	19,	26 (?).

These fins are delicate in structure and greenish-white; and the membranes connecting the rays almost transparent. "The length of the head, compared with the length of the body alone, is as 1 to 3; the depth of the body but 2-3rds of the length of the head, and compared to the length of the whole fish, is as 1 to 7;" "the tail is deeply forked, the gill-covers are elongated, and the scales of the body large and deciduous." "The breadth of the eye is 1-5th of the length of the whole head."[2] Dutch fish may be generally known by being deprived of the scales, and the French fish by their larger size; and both by the paler or whiter colour of their flesh; and sardines and sprats by the flesh being white. The genuine fish may also be known by the pickle, after repose or filtration, being of a clear pinkish colour, without any red sediment; whilst that from spurious kinds is turbid and red only when agitated, and deposits a heavy red sediment (Armenian bole, Venetian red, or red ochre) on repose. See BUTTER, POTTING, POWDERS, SAUCES, &c.

Brit'ish Anchovies. See SPRATS.

ANCHU'SIC ACID (-kū'-zĭk. See ANCHUSINE.

ANCHU'SINE (-kū'-zĭn).[Eng., Fr.] *Syn.* ANCHU'SIC ACID*, PSEU'DO-ALKANN'INE*, PSEUDO-ALKA''NIUM*; ANCHUSI'NA, L. The resinoid constituting the colouring matter of *alkanet-root* (which *see*).

ANCHYLO'SIS (ăngk-e-). [L.; prim., Gr.] *Syn.* ANKYLO'SIS, ANCYLO'SIS (ăn-se-), L.; ANKYLOSE, Fr., Ger. In *pathology*, stiffness or immobility of a joint naturally movable. *Anchylosis* is either *true* or *complete*, as when the extremities of the bones forming a joint are reunited and immoveble; or, *false* or *incomplete*, where the affection depends upon a contraction of the tendons and ligaments surrounding the joints, which nevertheless admit of a small degree of motion. For the *first* there is no available remedy; for the *second*, gentle and progressive flexion and extension of the part daily (carefully avoiding violence), friction with oleaginous and stimulating liniments, and the use of the hot bath, vapour bath, or hot-air or Turkish bath, and electricity, have been strongly recommended, and have frequently proved successful.

ANCYLO'SIS. See ANCHYLOSIS.

ANDROGRAPHIS PANICULATA. (Ind. Ph.) *Syn.* KARIYÁT. *Habitat.* Commonly in shady places all over India.—*Officinal part.* The dried stalks and root (Andrographidis Caules et Radix, Kariyat, Creyat). The stem, which is usually met with, with the root attached, occurs in pieces of about a foot or more in length, quadrangular, of a lightish brown colour, and persistent bitter taste.—*Properties.* Bitter tonic and stomachic, very analogous to quassia in its action.—*Therapeutic uses.* In general debility, in convalescence after fevers, and in the advanced stages of dysentery.

Preparations:—

Compound Infusion of Kariyát (Infusum Andrographis compositum). Take of kariyát, bruised, ½ an ounce; orange-peel and coriander fruit, bruised, of each, 60 grains; boiling water, 10 fluid ounces. Infuse in a covered vessel for an hour and strain.—*Dose.* From 1½ to 2 fluid ounces, twice or thrice daily.

Compound Tincture of Kariyát (Tinctura Andrographis composita). Take of kariyát root, cut small, 6 ounces; myrrh and aloes, in coarse powder, of each, 1 ounce; brandy, 2 pints. Macerate for seven days in a closed vessel, with occasional agitation; strain, press, filter, and add sufficient brandy to make two pints.—*Dose.* From 1 to 4 fluid drachms. Said to be tonic, stimulant, and gently aperient, and to prove valuable in several forms of dyspepsia, and in torpidity of the bowels.

ANDROPOGON (CYMBOPOGON) CITRATUM. Lemon Grass. (Ind. Ph.) *Habitat.* Commonly cultivated in gardens in India; also in Ceylon, upon a large scale, for the sake of its volatile oil. — *Officinal part.* The volatile oil (*Oleum Andropogi Citrati, Lemon Grass Oil, Oil of Verbena*), obtained by distillation from the fresh plant; of a pale sherry colour, transparent, extremely pungent taste and a peculiar fragrant lemon-like odour.—*Properties.* Stimulant, carminative, antispasmodic, and diaphoretic; locally applied, rubefacient.—*Therapeutic uses.* In flatulent and spasmodic affections of the bowels, and in gastric irritability. In cholera it proves serviceable by aiding the process of reaction. Externally, as an embrocation in chronic rheumatism, neuralgia, sprains, and other painful affections.

Dose. From 3 to 6 drops, on sugar or in emulsion. For external application it should be diluted with twice its bulk of soap liniment or any bland oil.

ANDROPOGON (CYMBOPOGON) NARDUS. CITRONELLE. (Ind. Ph.) *Habitat.* Madras Peninsula and Ceylon. The volatile oil of this plant has similar properties to *A. citratum*, and is used for the same purposes.

ANDROPOGON PACHNODES. (Ind. Ph.) The volatile oil of this plant possesses similar properties to that of *A. citratum*, and is used for the same purposes.

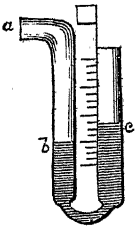
ANELEC'TRIC (ăn-e-). Non-electric; a non-electric.

ANEMOM'ETER (ăn-e-). *Syn.* ANEMOM'ETRUM, L.; ANÉMOMÈTRE, Fr.; WINDMESSER,

[1] Counted, by Dr. A. H. Hassall, in fish in the preserved state.

[2] Yarrell's "*British Fishes.*"

Ger. An instrument or apparatus for measuring the force or velocity of the wind, or of a current of air. Various contrivances have been adopted for this purpose. The *anemometer* of Dr. Lind being also applicable to the determination of the draught of a chimney, and the strength of air-currents in ventilation, may be usefully described here:—



Desc. & appl. The open end (*a*) is kept, by means of a *vane*, presented to the wind, which acting on the surface of the water or other liquid in (*b*), raises the level of the fluid in the arm (*c*.) The *difference* of the *level* of the fluid in the two arms of the instrument is the measure of the force of the wind. To *estimate* the *draught* of a *flue*, or *chimney*, the arm (*c*) is placed in the chimney, and the orifice (*a*) in the apartment.[1]

ANEMOM'ETRY. *Syn.* ANEMOME'TRIA, L.; ANÉMOMETRIE, Fr.; WINDMESSEN, Ger. In *meteorology, physics*, &c., the art or act of measuring the velocity or force of the wind, or of ascertaining its direction.

ANEM'ONE (ă-nĕm'-o-ne). *Syn.* ANEM'ONY; ANEM'ONE, L., Gr.; ANÉMONE, Fr. The wind-flower. In *botany*, a genus of beautiful flowering herbaceous plants, of the *nat. ord.* Ranunculaceæ. The double flowers of some of the species are among the most elegant ornaments of our gardens. Others are used in medicine. They are all acrid and stimulating.

Sea Anem'ones (-o-nēz). *Syn.* AN'IMAL-FLOWERS‡, SEA SUN'FLOWERS‡. Animals of the genus *actin'ia*, so called, from the resemblance of their claws or tentacles, when expanded, to the petals of a flower. They are of various colours, are generally fixed by one end to rocks or stones in the sand, and are very voracious, being accused of occasionally swallowing a mussel or a crab as large as a hen's egg for a meal. They belong to the highly organised *polypes* of Cuvier.

ANEMON'IC ACID. See ANEMONINE.

ANEM'OSCOPE (ăn'-e-mo-Brande, Mayne). *Syn.* ANEMOSCO'PIUM, L.; ANÉMOSCOPE, Fr.; ANEMOSKOP, Ger. An instrument to measure the force and velocity of the wind. See ANEMOMETER.

AN'EROID (-royd).[2] In *physics*, &c., not fluid; or not depending on water or a fluid for its action; applied to a certain form of 'barometer' (which *see*).

ANGEL'ICA (-jĕl'-). [L., Port., Sp.; Ph. E. & D.] *Syn.* GARDEN ANGELICA; ANGÉLIQUE, Fr.; ANGELIKA, A.-WURZEL, ANGELKRAUT, Ger. The *angelica archangel'ica* of Linnæus, an aromatic herbaceous plant with a biennial, fleshy root, indigenous to the north of Europe, but frequently found wild in England, and largely cultivated in our gardens. *Dried root* (ANGELICA, Ph. E.), aperient, carminative, diaphoretic, and tonic; much esteemed by the Laplanders, both as food and medicine;—*fruit* or *seed* (ANGELICA, Ph. D.), resembles the root, but is weaker. The *whole plant* has been extolled as an aromatic tonic. As a *masticatory*, it leaves an agreeable glowing heat in the mouth. The aromatic properties of this plant depend on a peculiar *volatile oil* and *resin*.

Uses, &c. It has been recommended in *diarrhœa, dyspepsia, debility*, and some *fevers*; but is now seldom used in medicine.—*Dose.* 30 grs. to 1 dr. The *dried root* and *seeds* are used by *rectifiers* to flavour gin and liqueurs; and the *fresh root, tender stems, stalks*, &c., are made by the *confectioners* into an aromatic candy. See CANDY, GIN, LIQUEURS, &c.

Angelica Atropurpu''rea. [Linn.] *Syn.* AMER'ICAN ANGELICA; ANGELICA, Ph. U. S. *Hab.*, North America. Resembles garden angelica, but placed by some botanists in a separate, though allied genus. It is a popular remedy for flatulent colic, indigestion, and cardialgia, in the United States; and is there regarded as tonic, cordial, and aprodisiac.

ANGEL'IC ACID. $HC_5H_2O_2$. A volatile substance, noticed by L. A. Buchner, jun., in *angelica-root*. It has a pungent sour smell, and a biting acid taste; is sometimes fluid and oleaginous, and sometimes crystallised in striated prisms.[3]

ANGO'LA. *Syn.* ANGO'LA-WOOL, ANGO''RA-W., ANGO'NA-W., &c.; POIL DE CHEVRON D'ANGORA, Fr.; (Engoor', Engour', or Engu'ri) TIFTIC, Tur. The wool of 'ca'pra Angoren'sis' or the *Angora-goat*, of which the shawls of Cashmere are made, and others in imitation of them. It is also used to make *plush, light cloths* for paletots which are repellent of wet, &c.; and is extensively employed, in France, in the manufacture of lace more brilliant than that of Valenciennes and Chantilly, and at half the price. See ALPACA, SHAWLS, WOOL, &c.

ANGOSTU'RA, Angustu'ra (-türe'-ă). See CUSPARIA.

False Angostura. See BRUCEA, CUSPARIA, and STRYCHNOS.

ANGOSTU''RINE, Angustu'rine (-ĭn). See CUSPARINE.

ANHY'DROUS (-drŭs; *an'hydrous*, as marked by Brande, is less usual). *Syn.* AN'HYDRUS,

[1] The *anemometers* now generally used in meteorological observations are those of Mr. Follet Osler, Dr. Robinson, and Dr. Whewell. For a description of these instruments, see Phillip's "*Report on Anemometry*," the "*Trans. of the Brit. Assoc.*," 1846, "*Trans. Royal Irish Acad.*," &c.

[2] That is—ἀ, *without*, νηρος, (the) *watery*, εἶδος, *form*, as correctly given by Brande. By some strange mistake, Dr. Mayne, in his new "*Expository Lexicon*," gives "ἀ, priv., ἀήρ, air, terminal *-ides*," as the derivation of this word; and marks it '*ane'roid*.'

[3] Schmidt's "*Jahrb.*," 1842.

L.; ANHYDRÉ, Fr.; WASSERFREI, Ger.] Free from water; dry. In *chemistry* and *mineralogy*, a term frequently applied to substances, as acids, alcohol, gases, salts, minerals, &c., which do not contain either free or combined water. GASES may generally be rendered anhydrous, by passing them through a tube containing *fused chloride of calcium*, or (*e.g.* AMMONIA and two or three others) *quick-lime*, in coarse powder; and some of them, by passing them through *concentrated sulphuric acid*. SALTS may generally be dried by cautiously submitting them to the *action* of *heat*, or by *exposure* to a *very dry atmosphere*; and alcohol, and many other volatile fluids, by careful distillation from *chloride of calcium*, or some other highly hygrometric substance.

AN'IL. [Fr., Sp., L.] The *indigof'era anil* of botanists—one of the plants yielding 'indigo'—a native of America, but now largely cultivated in the East Indies. See INDIGO (and *below*).

AN'ILINE[1] (-een). [Eng., Fr.] C_6H_7N. *Syn.* PHENYL'AMINE; ANILI'NA, ANILI'NUM, &c., L. A peculiar volatile organic base first noticed by Unverdorben in *empyreumatic bone-oil*, and afterwards obtained by Runge from *coal-tar*, and by Fritzsche, Zinin, A. W. Hofmann, and others, as a product of various reactions, processes, and decompositions, particularly those attending the destructive distillation of organic bodies.

Prep. Aniline is now almost invariably obtained, on the *large scale*, either directly or indirectly from *coal-tar* or *indigo*; and chiefly from the *basic oil* or *naphtha*, or the *nitrobenzol*, of which the former is the principal source. The following are the leading commercial and experimental processes:

1. From COAL-TAR *or* COAL-TAR NAPHTHA:—The basic oil or basic portion of coal-tar or coal-tar naphtha, forming the latter, denser, and least volatile products of the distillation or rectification of these substances, is strongly agitated, for some time, along with hydrochloric acid in slight excess, a glass globe, or, on the large sale, a suitable vessel of lead, or of enamelled iron, being employed for the purpose; the clear portion of the liquid (containing the hydrochlorates of the bases present) is then decanted and carefully evaporated over an open fire until acrid fumes begin to be disengaged, when it is again decanted or filtered; the clear liquor, or filtrate, is next treated with potassa or milk of lime in excess, by which the bases — chiefly aniline and chinoline—are liberated under the form of a brownish oil; the whole of the resulting mixture is now submitted to distillation, the portion which passes over at or about 360° Fahr., and which consists chiefly of crude aniline, being collected separately; the product is purified by rectification and re-collection, once or oftener, at the same temperature, and lastly, by fresh treatment with hydrochloric acid and, careful distillation with excess of potassa or milk of lime, as before.

2. From NITROBENZOL: — *a.* (Zinin.) An alcoholic solution of nitrobenzol, after saturation with ammonia, is treated with sulphuretted hydrogen, until, after some hours, a precipitation of sulphur takes place; the brown liquid is then repeatedly saturated with fresh sulphuretted hydrogen, until no more sulphur separates, the reaction being aided by occasionally heating or distilling the mixture; an excess of acid is next added, and, after filtering the liquid, and the removal of the alcohol and unaltered nitrobenzole by ebullition or distillation, the residuum is lastly distilled with caustic potassa, in excess. The ANILINE found in the receiver may be rendered quite pure by forming it into oxalate of aniline, repeatedly crystallising the salt from alcohol, and finally distilling it with excess of caustic potassa, as before.

The following is a cheaper and more convenient process; and probably, the best, or one of the best, that has yet been invented for obtaining aniline:—

b. (M. Béchamps.) From nitrobenzol distilled along with basic protacetate of iron: or, what is better—by distilling a mixture of *iron-filings*, 2 parts, and *acetic acid*, 1 part, with about an equal volume of *nitrobenzol*, the reaction being assisted, whenever the effervescence flags, by the application of a gentle heat. The liquor found in the receiver consists of aniline and water, from which the first, forming the lower portion, is obtained, after sufficient repose in a separator; or more easily, by adding a very little ether, which by dissolving in the aniline, causes it to rise to the surface, when it is at once decanted. A very spacious glass or earthenware retort must be employed in the process, as the mass swells up violently; and it must be connected with the receiver, on the small scale, by means of a Liebig's condenser, and, on the large scale, by an ordinary worm-pipe and tub, kept in good action by a sufficient flow of cold water.

3. From INDIGO:—Powdered indigo is added to a boiling and highly concentrated solution of caustic potassa, as long as it dissolves and hydrogen gas is extricated; the resulting brownish-red liquid is evaporated to dryness, and the residuum is submitted to destructive distillation in a retort, which, owing to the intumescence of the mass, should be strong and spacious. The ANILINE is found in the receiver under the form of a brownish oil mixed with ammoniacal liquor, and by separation from the latter, and subsequent rectification, is obtained nearly colourless. It may be further purified, as in the preceding processes.—*Prod.* 18 to 20% of the indigo employed.

4. By fusing, with the proper precautions, a

[1] For a detailed account of the methods of preparing aniline commercially, and of the dyes obtained therefrom, see "*Dictionnaire de Chimie*," par A. Wurtz.

mixture of *isatine* and *hydrate of potassa* (both in powder); a retort connected with a well-cooled receiver, being employed as the apparatus. Said by Profs. A. W. Hofmann and Muspratt, to be "the most eligible process for isolating" aniline.[1]

5. From *anthranilic acid* mixed with powdered glass or sand, and rapidly heated in a retort.

6. By treating an *alcoholic solution of benzine* with a little *zinc* and *hydrochloric acid*.

7. By heating *phenyl-alcohol* with *ammonia* in sealed tubes.

Prop., &c. A thin, oily, colourless liquid, with a faintly vinous odour, and a hot and aromatic taste; very volatile in the air; miscible in all proportions with alcohol and ether; very slightly soluble in water; neutral to ordinary test-paper, but exhibiting an alkaline reaction to dahlia-petal infusion and paper; dissolves camphor, sulphur, and phosphorus, and coagulates albumen; possesses a high refractive power; and precipitates the oxides of iron, zinc, and alumina, from solutions of their salts, and neutralises the acids, like ammonia. With the acids it forms numerous crystallisable compounds of great beauty, and which are easily formed, and are precisely analogous to the corresponding salts of ammonia. These, on exposure to the air, acquired a rose-colour, in many cases gradually passing into brown. Its boiling-point is 359° to 360° Fahr.; *sp. gr.* 1·028.

Tests.—1. Chromic acid gives a deep greenish or bluish-black precipitate with aniline and its salts:—2. Hypochlorite of lime strikes an extremely beautiful violet colour, which is soon destroyed:—3. The addition of two or three drops of nitric acid to anhydrous aniline produces a fine blue colour, which, on the application of heat, passes into *yellow*, and a violent reaction ensues, sometimes followed by explosion:—4. With bichloride of platinum it yields a double salt (PLAT'INO-CHLO"RIDE OF ANILINE, analogous to the like salt of ammonia. These reactions distinguish it from all other substances.

Uses, &c. Chiefly in dyeing, for the production of colouring matter of various rich shades of purple and velvet, some approaching pink, by the action of chromic acid; and of a splendid crimson, by the action of various oxidising agents. It forms the basis of the celebrated new dyes for silks lately patented by Mr. W. H. Perkin, and others, and which are not only more delicate and gorgeous in tint, but also more permanent, than any produced by other substances.

Besides numerous salts, various substitution compounds of aniline have been formed, all of which possess vast scientific interest, and several are likely to prove of importance in the arts. See AMINES, DYEING, INDIGO, PHENYLE, &c. (also *below*).

[1] Muspratt's "*Chemistry*," i, 599.

Aniline, Chro'mates of. *Prep.* 1. (NEUTRAL CHROMATE.) From *sulphate* or *oxalate of aniline* and *chromate of potassa*, by double decomposition.

2. (BICHRO'MATE:—Mr. W. H. Perkin.) *Sulphate of aniline* and *bichromate of potassa*, in equiv. proportions, are separately dissolved in water, and the solutions, after being mixed, allowed to stand for several hours. The whole is then thrown upon a filter, and the black precipitate which has formed is washed and dried. It is next digested in coal-tar naphtha (—? benzol), to extract a brown resinous substance; after which it is digested in alcohol, to dissolve out the colouring matter (BICHROMATE OF ANILINE), which is left behind on distilling off the spirit, as a coppery friable mass. Patented.

Aniline, Cy'anide of. Benzonitrile.

Aniline, Ox'alate of. $(C_6H_7N)_2C_2O_4$. Obtained by saturating an alcoholic solution of oxalic acid with aniline; the salt separating as a crystalline mass. It is very soluble in hot water; much less so in cold water; only slightly soluble in alcohol; and insoluble in ether. It may be crystallised from hot water or boiling alcohol. Used chiefly to form other salts.

Aniline, Sul'phate of. $(C_6H_7N)_2SO_4$. Prepared by saturating aniline with dilute sulphuric acid, and gently evaporating the liquid until the salt separates. By re-solution in boiling alcohol, it crystallises out, as the liquor cools, under the form of very beautiful colourless plates, of a silvery lustre. It is freely soluble in water, and in hot alcohol; scarcely soluble in cold alcohol; and insoluble in ether. It is chiefly employed in the preparation of the new aniline dyes.

ANIMAL'CULE (-kūle). [Eng., Fr.; *pl.* animal'cules.] *Syn.* ANIMAL'CULUM (pl., *animal'cula*[2]), L.; THIERCHEN, Ger. In *zoology* and *physiology*, a microscopic animal, or one so extremely small, that it is either invisible, or not distinctly discernible, without the aid of a lens or microscope; more especially one that is not perceptible to the naked eye. "A *mite* was anciently thought the limit of littleness; but there are animals 27,000,000 of times smaller than a mite." A thousand millions of some of the animalcula found in common water are said to be collectively of less bulk than a single grain of sand; yet their numbers are so prodigious as sometimes to give the fluid they inhabit a pale red or yellow tinge. The *milt* of a single codfish is said to contain more of these minute animals than there are people in the whole earth. Animalcula were first scientifically observed by Leuwenhoek, about the year 1677. Assisted by the microscope he unveiled, as it were, a new

[2] Animalculæ for the *plural*, sometimes heard and met with, is a barbarism; yet one not wholly confined to the vulgar, for we find it in Vincent's edition of Haydn's admirable "*Dict. of Dates*," not merely twice, or oftener, in the text, but as a 'title-word;' and also in some other works, where we might least expect it.

world for future naturalists and microscopists to explore.

AN'IME (ăn'-ĭm-e). [Eng., L., Sp.] *Syn.* GUM-AN'IME, A.-RES'IN; ANIMÉ, Fr.; ANIME-HARZ, KOURBARILLHARZ, Ger.; COURBARIL, JUTAIBA, Nat. A pale brownish-yellow, transparent, brittle resin, which exudes from the *hymenæa courbaril* (Linn.) or locust-tree, the *h. martiana*, and other species of hymenæa growing in tropical America. It contains about ·2½ of volatile oil, which gives it an agreeable odour; melts without decomposition; is (nearly) insoluble in alcohol and in caoutchoucine, but forms a gelatinous mass in a mixture of the two. (Ure.) It burns readily, emitting a very fragrant smell. Sp. gr. 1·054 to 1·057.

Uses, &c. As a fumigation in spasmodic asthma; in *solution*, as an embrocation; and in *powder*, as a substitute for gum guaiacum. In this country, it is chiefly employed to make varnishes and pastilles (which *see*).

AN'ION (-y'ŭn—Br., We.; ă-nī'-ŭn—Smart). *Literally*, 'upward going;' in *electro-chemistry*, a substance which is evolved from the surface where the electrical current is supposed to enter the electrolyte; an electro-negative body, or one which passes to the positive pole, or *anode*, in electrolysis, as opposed to a CATION. See ANODE, IONS, &c.

AN'ISATED. *Syn.* ANISA'TUS, L.; ANISÉ, Fr. In *pharmacy*, the *art of the liqoriste, confectioner*, &c., applied to articles or preparations impregnated or flavoured with aniseed.

AN'ISE (-ĭs). *Syn.* ANI'SUM, PIMPINEL'LA A. (Linn.), A. OFFICINA'LE, L.; ANIS, Fr.; ANIS, GEMEINER ANIS, Ger. An annual plant of the *nat. ord.* Umbelliferæ (DC.); *Hab.*, Egypt, Scio, and the Levant; but largely cultivated in Malta, Spain, Germany, and various other parts of Asia and Europe. "A considerable quantity is cultivated at Mitcham, in Surrey, chiefly for the use of the rectifiers of British Spirits." (Stevenson.) *Fruit*, aniseed. (See *below*.)

AN'ISEED. *Syn.* AN'ISE, AN'ISE-SEED; SEM'INA ANI'SI, FRUC'TUS A., L.; ANIS, A. VRAI, GRAINES D'ANIS, SEMENCE D'ANIS, Fr.; ANIS, ANISAMEN, Ger.; ANIS, Sp.; ANICE, It. The aromatic fruit or seed of the *pimpinella anisum* just noticed.

Prop., Uses, &c. Its aromatic properties depend on the presence of volatile oil. The *seed* and *oil*, and a *spirit* and a *water* prepared from them, are officinal in the pharmacopœias. Both the seed and its preparations are reputed stimulant, stomachic, carminative, pectoral, diuretic, and emmenagogue. They are commonly used to relieve flatulence and colicky pains, and to prevent the griping effects of certain cathartics; and they have long been popular remedies for coughs, colds, and other breath ailments. They are esteemed especially useful in warming the stomach and expelling wind, particularly during infancy and childhood; the *distilled* or *flavoured water* being usually employed. Nurses also take the latter to promote the secretion of milk, to which it at length imparts its peculiar odour and flavour. In *veterinary practice*, the powdered seed is used as a carminative, pectoral, and corroborant. The *essential oil* is said to be poisonous to pigeons. (Vogel; Hillefield.) Aniseed is principally used to flavour liqueurs, sweetmeats, and confectionery.—*Dose* (of the powder), 10 grs. to 1 or 2 drs.;—for *a horse*, ½ to 1 *oz.*;—*cattle*, ¾ to 2 *oz.*

Pur., &c. Powdered aniseed is nearly always adulterated, the adulterant being generally linseed meal. Sometimes, as for the horse, the latter is entirely substituted for it, a few drops of oil of aniseed being added to give it smell. The adulteration is not readily detected by the uninitiated, owing to the strong odour of aniseed; but readily by the microscope. The fruit of *myrrhis odorata* (*sweet cicily*), and of *illicium anisatum* (*star-anise*), also possess the odour and flavour of common aniseed; indeed, most of the essential oil now sold as 'oil of aniseed,' is star-anise oil. See LIQUEURS, OILS, POWDERS, SPIRITS, WATERS, &c.

Star'-Anise. The fruit or seed of *illi''cium anisa'tum* (Linn.), an evergreen tree growing in Japan and China. The odour and properties of both the seed and oil greatly resemble those of common anise. They are both employed by the liqueuriste. See ANISEED (*above*), &c.

ANISETTE' (ăn-ĭz-ĕt'). [Fr.] Aniseed cordial. See LIQUEURS.

ANI'SUM. Aniseed.

ANNEAL'ING. *Syn.* NEALING†§; LE RECUIT, Fr.; DAS ANLASSEN, Ger. The art of tempering by heat; appropriately, the process by which glass, porcelain, &c., are rendered less frangible, and metals which have become brittle by fusion, or long-continued hammering, again rendered tough and malleable.

Glass vessels, and other *articles of glass*, are annealed by being placed in an oven or apartment near the furnaces at which they are formed, called the '*lees*' where they are allowed to cool very slowly, the process being prolonged in proportion to their bulk.

Steel, *iron*, and other *metals* are annealed by heating them and allowing them to cool slowly on the hearth of the furnace, or in any other suitable place, unexposed to the cold.

Cast-iron is rendered tough and malleable, without 'puddling,' by embedding it in *ground charcoal* or *hæmatite*, and thus protected, keeping it exposed at a high temperature for several hours, after which the whole is allowed to cool very slowly.

Prince Rupert's drop may be mentioned as an example of unannealed glass; and common cast iron, of unannealed metals; to which heads the reader is referred.

ANNÔT'TA. *Syn.* ANOT'TO, ANNAT'TO, ANNAT'TA; ARNAT'TO, ARNOT'TO, &c.; ORLEA'NA, TERRA O.*, &c., L.; ROUCOL, ROCOU, ROUCOU, Fr.; ORLEANS, Ger. A colouring matter forming the outer pellicle of the *seeds* of the *bix'a orella'na* (Linn.), an exogenous evergreen tree, common in Cayenne, and some other parts of tropical America, and now extensively cultivated in both the E. and W. Indies. It is usually obtained by macerating the crushed seeds or seed-pods in water, for several weeks, ultimately allowing the pulp to subside, which is then boiled in coppers to a stiff paste, and dried in the shade. Sometimes a little oil is added in making it up into cakes or lumps. A better method is that proposed by Leblond, in which the crushed seeds are simply exhausted by washing them in water (—? alkalised), from which the colouring matter is then precipitated by means of *vinegar* or *lemon-juice*; the precipitate being subsequently collected, and either boiled up in the ordinary manner, or drained in bags, and dried, as is practised with indigo. Annotta so prepared is said to be four times as valuable as made by the old process.

Prop. Good annotta is of a brilliant red colour; brighter in the middle than on the outside; feels soft and smooth to the touch; has a good consistence, and a strongly characteristic, but not a putrid smell. It is scarcely soluble in water; freely soluble in alcohol, ether, oils, and fats, to each of which it imparts a beautiful orange colour, and in alkaline solutions, which darken it; acids precipitate it of an orange red hue; strong sulphuric acid turns it blue. Its most important property is the affinity of its colouring matter for the fibres of silk, wool, and cotton.

Pur. Annotta is very frequently adulterated; indeed, nearly always so. The *adulterants* are generally *meal*, *flour*, or *farina*, and often *chalk* or *gypsum*, with some *pearlash* and *oil*, or even *soap*, to give it an unctuous character, *turmeric*, *Venetian red*, *red ochre*, or even *orange chrome*, to give it 'colour,' and *common salt* and, sometimes, even *sulphate of copper*, to prevent decomposition—the last two being POISONOUS. Sometimes a little *carbonate of ammonia* is also added to it, to improve the colour. When quite pure, it contains about 28% of resinous colouring matter, and 20% of colouring extractive matter, (Dr. John,) and should leave only a small quantity of insoluble residuum after digestion in alcohol; whilst the *ash*, resulting from its incineration, should not exceed 1½ to 2%. The quantity, colour, &c., of the ash, will give an easy clue to the *inorganic adulterants*, if any are present, which may be then followed up by a chemical examination. The presence of *red lead* may be detected by heating it on a piece of charcoal in the reducing flame of the blowpipe, by which a small bead of metallic lead will be obtained. If it contains *chalk*, *ochre*, *gypsum*, &c., the undissolved residuum of the washed ash gives the amount of the adulteration (nearly).

Uses, &c. To *colour varnishes* and *lacquers*; as a *pigment* for painting velvet and transparencies; as a *colouring matter* for *cheese* (1 *oz.* to 1 *cwt.* of curd), for which purpose it is not injurious, if pure; and as a *dye-stuff* for cotton, silk, and wool, particularly the second, to which it imparts a beautiful orange yellow hue, the shade of which may be varied from 'aurora' to deep orange, by using different proportions of pearlash with the water it is dissolved in, and by applying different mordants before putting it into the dye-bath, or different rinsing liquids afterwards. The hues thus imparted are, however, all more or less fugitive.

Annotta Cake. *Syn.* FLAG ANNOTTA; ORLEA'NA IN FO'LIIS, L. From Cayenne; bright yellow, firm and soft to the touch; in square cakes, weighing 2 or 3 *lbs.* each.

Annotta Egg. *Syn.* LUMP ANNOTTA; ORLEA'NA IN O'VULIS, L. Generally inferior.

Annotta, Eng'lish. *Syn.* TRADE A., REDUCED' A.; ORLEA'NA REDUC'TA, L. A fraudulent mess commonly *prepared* from *egg* or *flag annotta*, *gum tragacanth*, *flour* or *farina*, *chalk*, *soap*, *train-oil*, *Venetian red*, or *bole*, *common salt*, *water*, mixed by heat in a copper pan, and formed into rolls. Sold for genuine annotta, from which it is readily distinguished by its inferior quality, and its partial solubility in alcohol.

Annotta, Liq'uid. See SOLUTION OF ANNOTTA (*below*).

Annotta, Pu''rified. See ORELLINE.

Annotta Roll. *Syn.* ORLEA'NA IN ROT'ULIS, O. IN BAC'ULIS, L. From the Brazils; hard, dry, brown outside, yellow within. When pure, this is the variety most esteemed, and the one preferred for colouring cheese.

Annotta, Solu'tion of. *Syn.* ESSENCE OF ANNOTTA, EXTRACT OF A., ANNOTTA-DYE, &c.; SOLU'TIO ORLEA'NÆ, EXTRAC'TUM O., &c., L. A strong aqueous solution of equal parts of annotta and pearlash, the whole being heated or boiled together until the ingredients are dissolved. Sold in bottles. See ANNOTTA (*above*), NANKEEN DYE, &c.

AN'O-. [Gr.] In *composition*, upwards, &c.; as in *anocathar'tic* (emetic). See ANA-.

AN'ODE. *Literally*, 'upward way;' in *electro-chemistry*, the 'way in,' or that by which the electric current is supposed to enter substances through which it passes, as opposed to the CATHODE, or that by which it goes out; the positive pole of a voltaic battery.

AN'ODYNE (-dine). *Syn.* ANO'DYNUS (-dĭnŭs), L.; ANODIN, Fr.; SCHMERZSTILLEND, Ger. That allays pain; soothing; atalgic.

Anodynes. *Syn.* ANO'DYNA (sing., *ano'dynum*), L.; ANODINS, REMÈDES A., Fr. In *medicine* and *pharmacy*, substances and agents which allay pain. Some (as the PAREGORICS) act by actually assuaging pain; others (HYP-

NOTICS) by inducing sleep; whilst a third class (NARCOTICS), give ease by stupefying the senses, or by lessening the susceptibility to pain. Among the principal anodynes are opium, morphia, henbane, camphor, ether, chloroform, chloral hydrate, and other medicines of the like kind; to which must be added spirituous liquors, wines, and the stronger varieties of malt liquor. "The frequent use of anodynes begets the necessity of their continuance." (W. Cooley.)

Anodyne, In'fantile (-īle). *Syn.* ANO'DYNUM INFAN'TILE (-tĭl-e), L. *Prep.* Take of *syrup of poppies*, 1 *oz.*; *aniseed-water*, 3 *oz.*; *French brandy*, ¾ *oz.* (or *rectified spirit*, ½ *oz.*); *calcined magnesia*, ¼ *oz.*; mix. An excellent anodyne and antacid for infants.—*Dose.* A small teaspoonful as required.

ANODYN'IA (-dĭn'-y'ă). Freedom from pain; anæsthesia.

AN'OREXY. *Syn.* ANOREX'IA, L.; ANOREXIE, Fr., Ger. In *pathology*, want of, or morbidly diminished appetite, without loathing of food. It is usually symptomatic of other affections. See APPETITE, DYSPEPSIA, &c.

ANO ZABAGLIONE (-bäl-y'ō'-nā). *Prep.* Put 2 *eggs*, 3 teaspoonfuls of *sugar*, and 2 small glassfuls of *sherry* or *marsala*, into a chocolate cup, placed in *boiling water*, or over the fire, and keep the mixture rapidly stirred until it begins to rise and thicken a little; then add 1 or 2 teaspoonfuls of *orange-flower water* or *rose water*, and serve it up in wine-glasses. A pleasant Italian domestic remedy for a cold.

ANT (ănt). *Syn.* EMM'ET, PIS'MIRE*‡ (pĭz'-); FORMI'CA, L.; FOURMI, Fr.; AMEISE, Ger.; ÆMET, Sax. This well-known little insect belongs to the family *formi"cidæ*, and the order *hymenop'tera*. Like the bee, it is a social animal, lives in communities which may be compared to well-regulated republics, and is of three sexes—male, female, and neuter. Those belonging to the last alone labour and take care of the ova and young. The *red ant* contains FORMIC ACID (*acid of ants*), and a peculiar RESINOUS OIL. Both of these may be obtained by maceration in *rectified spirit*. A tincture so prepared, and flavoured with aromatics, constitutes Hoffman's EAU DE MAGNANIMITÉ, once greatly esteemed as an aphrodisiac. See FORMICA, FORMIC ACID, FORMYLE, &c.

ANTAC'ID (-tăs'-ĭd). *Syn.* ANTAC'IDUS, L.; ANTACIDE, &c., Fr.; SÄURETILGEND, &c., Ger. An agent which neutralises acids or removes acidity. (See *below*.)

ANTAC'IDS (-tăs'-ĭdz). *Syn.* ANTAC'IDA, L.; ANTACIDES, &c., Fr. Antacid substances. In *medicine*, &c., substances which remove or prevent acidity of the stomach, and thus tend to relieve heartburn, dyspepsia, and diarrhœa.

The *principal antacids* are *potassa*, *soda*, *ammonia*, *lime*, and *magnesia*, with their *carbonates* and *bicarbonates*. AMMONIA is one of the most powerful, and when the acidity is conjoined with nausea and faintness, or is accompanied with symptoms of nervous derangement or hysteria, is undoubtedly the best; when great irritability of the coats of the stomach exist, POTASH is to be preferred; when the acidity is accompanied with diarrhœa, *carbonate of lime* (prepared chalk), *lime-water*, or *Cararawater*; and when with *costiveness*, MAGNESIA. They may all be advantageously combined with some simple aromatic, as *ginger*, *cinnamon*, or peppermint. Their *preparation*, *doses*, *administration*, &c., will be found under each in its alphabetical place; and *formulæ* containing them, under DRAUGHTS, LOZENGES, MIXTURES, &c.

ANTAL'GICS (-tăl'-). *Syn.* ANTAL'GICA, L. Medicines which relieve pain; anodynes.

ANTALKALI'NES (ănt-ăl'-kă-lĭnz). *Syn.* ANTALKALI'NA, L. Agents or medicines which correct alkalinity. All the acids, except the carbonic, are antalkaline.

AN'TE-. In *composition*, before, contrary, opposite; generally in the *first* sense. See ANTI-.

ANTHELMIN'TICS, Anthelmin'thics (-thĕl-). See VERMIFUGES and WORMS.

AN'THIARINE (-ĭn). See ANTIARINE.

ANTHOK'YAN. *Syn.* SUCCUS VIOLÆ PREPARA'TUS, L. The expressed juice of the sweet or purple violet (*viola odora'ta*—Linn.), defecated, gently heated in glass or earthenware to 192° Fahr., then skimmed, cooled, and filtered; a little rectified spirit is next added, and the following day the whole is again filtered. It must be kept well corked, and in a cool situation.

Uses, &c. Chiefly to make syrup of violets, to colour and flavour liqueurs, and as a chemical test. The London druggists obtain it principally from Lincolnshire.

AN'THONY'S FIRE, Saint (-to-nĭz). See ERYSIPELAS.

AN'THOTYPE. See PHOTOGRAPHY.

AN'THRACINE (-sĭn). Paranapthaline.

AN'THRACITE (-sīte). [Eng., Fr.] *Syn.* ANTHRAC'OLITE, GLANCE'-COAL, STONE-COAL‡, MINERAL CHAR'COAL*; ANTHRACI'TES, L.; GLANZKOHLE, Ger. A species of coal found in the transition-rock formation, consisting chiefly of dense carbon. It has a conchoidal fracture, a semi-metallic lustre, and a sp. gr. usually varying from 1·4 to 1·6. It burns without either flame or smoke, emits an intense heat, and leaves scarcely any ash; but it is difficult to kindle, and requires a lively draught for its combustion. It is the common fuel in the United States of America, although, until recently, scarcely employed in Europe, and that chiefly in a few iron-works and steam furnaces. Its adoption in this country would not merely at once remove the smoke nuisance, but would produce a vast annual saving to the community. By contracting the throat of the chimney a little, and avoiding the use of the

poker, it may be burnt in a common grate. The Americans use a little charcoal as kindle, and seldom supply fresh coal to the fire oftener than once or twice a day.

The inferior varieties of anthracite are technically and provincially called culm; as is also the small and waste of the better kinds.

For the *analysis, geology, calorific value*, &c., of anthracite, *see* COAL, CULM, EVAPORATION, FUEL, HEAT, &c.

AN'THRACOKA'LI. [Eng., L.] *Syn.* ANTHRAKOKA'LI, ANTHRAK'ALI; AN'THRACOKA'LI, Hamb. C. 1845. *Prep.* 1. (Polya.) Carbonate of potassa, 6 oz.; quick-lime, 3½ oz.; water, 4 pints; proceed as directed for 'liquor of potassa,' then evaporate the clear liquid, in an iron capsule, to about 6 fl. oz., add of finely powdered mineral coal, 5 oz., boil, with constant stirring, to dryness, and continue the stirring at a reduced heat, until the whole is converted into a homogeneous black powder, which must be at once placed in small, dry, and well-stoppered phials.

2. (Hamb. C. 1845; Ph. Baden. 1841.) Hydrate of potassa, 7 dr.; melt, add of kennel-coal, 5 dr., and then proceed as before.

Prop., &c. A deliquescent black powder, with a caustic taste, and empyreumatic smell; 10 grs. with 1 fl. oz. of water, after filtration, forms a clear, dark brown solution, giving a precipitate with acids, without effervescence. —*Dose.* 1 to 3 grs., twice or thrice daily; and externally, made into a pommade or ointment (½ to 1 dr., to lard, 1 oz.); in skin diseases (particularly herpetic eruptions), scrofula, chronic rheumatism, &c. It has been highly extolled by Dr. Gibert, and by its inventor, Dr. Polya; but apparently undeservedly.

Anthracokali, Sulphuretted. *Syn.* ANTHRACOKA'LI SULPHURE'TUM, L. *Prep.* (Polya.) As formula 1 (*above*), but adding sulphur, 4 dr., immediately after stirring in the powdered coal.—*Dose, use*, &c., as the last. See FULIGOKALI.

ANTHRACOM'ETER. *Syn.* ANTHRACOM'ETRUM, L.; ANTHRACOMÈTRE, Fr.; KOHLENSÄUREMESSER, Ger. An apparatus used to determine the heating power or commercial value of coal, or other fuel; also an instrument for finding the proportion of carbonic acid in any gaseous mixture.

ANTHYPNOT'ICS (-thip-). *Syn.* ANTIHYPNOT'ICS (-hip-), &c. See AGRIPNOTICS.

AN'TI-. [Gr., *ἀντι*, against.] In *composition*, before, against, contrary to, corrective of, &c., more especially representing antagonism or opposition; whilst the Latin *ante-*, is generally used in the sense of before, having reference to precedence either of place or time.

Anti- is a common prefix in English words derived from the Greek and Latin, especially those connected with pharmacology and medicine, the final *i* being either dropped or retained (but generally the first) before a, e, and h; as in antac'id (-tăs'-), antibil'ious, anti-emet'ic, anthelmin'tic, antiscorbu'tic, antisep'tic, &c., whether used as adjectives or substantives. These compounds, which are very numerous, are in general self-explanatory.

AN'TIARINE (-in; -ti'—Brande). [Eng., Fr.] *Syn.* AN'THIARINE, Eng., Fr.; ANTIARI'NA, ANTHIARI'NA, ANTIA''RIA, UPA'SIA (-zh'ă), L. The active principle of the upas-poison of Java. It is extracted from the partially inspissated juice (upas-poison) of the upas-tree by alcohol, and may be obtained under the form of small pearly crystalline scales, by careful evaporation.—*Prod.* About 3½ %. (Mulder).

Prop., &c. Soluble in 27 parts of boiling water; freely soluble in alcohol; scarcely so in ether; heat decomposes it. It is a frightful poison, to which no antidote is known. Even a minute quantity introduced into a wound, rapidly brings on vomiting, convulsions, and death. "It renders the heart insensible to the stimulus of the blood." (Sir B. Brodie.)

ANTI-ATTRI''TION (-trish'-). [Eng., Fr.] *Syn.* AX'LE-GREASE, FRICTION COMPO', LU'BRICATING COMPOUND, &c. *Prep.* 1. Good plumbago (black lead), finely powdered and sifted, so as to be perfectly free from grit, is gradually added, through a sieve, to 5 times its weight of good lard contained in an iron pan and rendered semi-fluid, but *not* liquid, by a gentle heat; the mass being vigorously stirred with a strong wooden spatula, after each addition, until the mixture is complete, and the composition smooth and uniform. The heat is then gradually raised until the whole liquefies, when the vessel is removed from the fire to a cool situation, and the stirring, which should have been unremitted, continued until the mixture is quite cold. It is applied, in the cold state, with a brush, about once a day, according to the velocity of the parts; and is said to be fully 3-4ths cheaper in use than oil, tallow, tar, or any of the ordinary compo's. When intended for uses in which it will be exposed to warmth, and consequent waste by dripping, a part, or even the whole of the lard is replaced by hard strained grease or tallow, or a little bees'-wax is added during its manufacture.

2. *Black lead*, 1 part; *tallow* or *grease*, 4 parts; ground together until perfectly smooth, either with or without *camphor*, 3 to 5 *lbs.* per cwt. Expired patent.

3. *Scotch soda*, 60 *lbs.*; *water*, 30 *galls.*; dissolve in a capacious boiler, add *palm oil* and *hard tallow*, of each 1¼ *cwt.*, and having withdrawn the heat, stir vigorously as before, until the mass is homogeneous and nearly solidified. In hot weather the proportion of tallow is increased, and that of the palm oil diminished; in winter, the reverse. *Used* for the axles of railway carriages and other coarse purposes. For express trains all tallow is usually employed, irrespective of the weather or season.

4. *Bean* or *rye flour*, 1 *cwt.*; *water*, 6 *cwt.*; mix to a smooth paste, raise the heat until the mixture boils, and stir in first of *milk of lime* (of about the consistence of cream), 7 *cwt.*; *resin-oil*, 10 *cwt.*; and stir vigorously until cold. Inferior.

5. (Booth's.)—*a.* From *Scotch soda*, ½ *lb.*; *boiling water*, 1 *gall.*; *palm oil* or *tallow*, or any mixture of them, 10 *lbs.*; as before, observing to continue the stirring until the mixture has cooled down to 60° or 70° Fahr.

b. Soda, ½ *lb.*; *water* and *rape-oil*, of each, 1 *gall.*; *tallow* or *palm oil*, ½ *lb.*; as last. Expired patent.

6. (Mankettrick's.) From *caoutchouc* (dissolved in oil of turpentine), 4 *lbs.*; *Scotch soda*, 10 *lbs.*; *glue*, 1 *lb.*; (dissolved in) *water*, 10 *galls.*; *oil*, 10 *galls.*; thoroughly incorporated by assiduous stirring, adding the caoutchouc last.

7. (Liard, Fr.) *Finest rape-oil*, 1 *gall.*; *caoutchouc* (cut small), 3 *oz.*; dissolve with heat.

Uses &c. To lessen friction in machinery, prevent the bearings rusting, &c. The simplest are perhaps the best. No. 1 & 3 are those most generally employed. Of late years several different liquid hydrocarbons obtained from coal, and particularly paraffin oil, have been extensively employed in this way. See Friction, Lubrication, &c.

Antibil'ious (-yŭs). *Syn.* Antibilio'sus, L.; Antibilieux, Fr. An epithet of medicines that are supposed to remove ailments depending on disordered action of the liver. *Aperients*, *mercurials*, and *aloetic purgatives* generally, belong to this class. See Abernethy Medicines, Bile, Pills, &c.

Anticar'dium. See Reviver (Black).

An'tichlore (-klōre). Among *bleachers*, any substance, agent, or means, by which the pernicious after-effects of chlorine are prevented. Washing with a weak solution of sulphite of soda (which converts any adhering 'bleaching salt' into sulphate, sulphide, or chloride), is commonly adopted for this purpose. Recently chloride of tin, used in the same way, has been recommended. A cheap sulphite of lime, prepared by agitating milk of lime with the fumes of burning sulphur, and draining and air-drying the product, has been lately patented in England and America, by Prof. Horsford, under the name of 'Antichloride of Lime.' See Bleaching, &c.

An'tidote (-dōte). [Eng., Fr.] *Syn.* Anti'dotum, Antid'otus, L.; Antidot, Gegengift, Ger. In *medinine*, *toxicology*, &c., a substance administered to counteract or lessen the effects of poison.

The *principal poisons*, with their *antidotes*, are noticed under their respective heads. Also *see* Poisons, Toxicology, &c.

Antifer'ment (pop. and more us., in *this* sense, *an'tiferment'*). [Eng., Fr.] *Syn.* Antifermen'tum, L. Any substance which prevents or arrests fermentation. Several nostrums are sold under this name in the cider-districts. The following are tried and useful formulæ:—

Prep. 1. *Sulphite* (not sulphate) *of lime*, in fine powder, 1 part; *marble-dust*, ground *oyster-shells*, or *chalk*, 7 parts; mix, and pack tight, so as to exclude the air.

2. *Sulphite* (not sulphate) *of potassa*, 1 part; new *black-mustard seed* (ground in a pepper-mill), 7 parts; mix, and pack so as to perfectly exclude air and moisture.—*Dose* (of either), ½ *oz.* to 1½ *oz.* per *hhd.*

3. *Mustard-seed*, 14 *lbs.*; *cloves* and *capsicum*, of each, 1½ *lb.*; mix, and grind them to powder in a pepper-mill.—*Dose.* ¼ to ½ *lb.* per *hhd.*

Uses, &c. The above formulæ are infinitely superior to those commonly met with in trade; and are quite harmless. A portion of any one of them added to cider, or perry, soon allays fermentation, when excessive, or when it has been renewed. The first formula is preferred when there is a tendency to acidity. The second and third may be advantageously used for wine and beer, as well as for cider. That of the third formula greatly improves the flavour and the apparent strength of the liquor, and also improves its keeping qualities. See Cellar-management, Fermentation, &c.

Anti-fric'tion metal. *Prep.* 1. From *tin*, 16 to 20 parts; *antimony*, 2 parts; *lead*, 1 part; fused together, and then blended with *copper*, 80 parts. *Used* when there is much friction or high velocity.

2. *Zinc*, 6 parts; *tin*, 1 part; *copper*, 20 parts. *Used* when the metal is exposed to violent shocks,

3. *Lead*, 1 part; *tin*, 2 parts; *zinc*, 4 parts; *copper*, 68 parts. *Used* when the metal is exposed to heat.

4. (Babbet's.) *Tin*, 48 to 50 parts; *antimony*, 5 parts; *copper*, 1 part.

5. (Fenton's.) *Tin* with some *zinc*, and a little *copper*.

6. (Ordinary.) *Tin*, or *hard pewter*, with or without a small portion of *antimony* or *copper*. Without the last it is apt to spread out under the weight of heavy machinery. *Used* for the bearings of locomotive engines, &c.

Obs. These alloys are usually supported by bearings of brass, into which it is poured after they have been tinned, and heated and put together with an exact model of the axle, or other working piece, plastic clay being previously applied, in the usual manner, as a late or outer mould. Soft gun-metal is also excellent, and is much used for bearings. They all become less heated in working than the harder metals, and less grease or oil is consequently required when they are used. See Alloys, Friction, &c.

Antigug'gler. A small bent tube of glass or metal inserted into casks and carboys, to admit air over the liquor whilst it is being

poured out or drawn off, so that the sediment may not be disturbed.

ANTIMO″NIAL (-mōne′-y″ăl)[1]. [Eng., Fr.] *Syn.* ANTIMONIA′LIS, L. Pertaining to, composed of, or containing antimony. In *medicine* and *pharmacy*, applied to preparations or remedies (ANTIMO″NIALS; ANTIMONIA″LIA, L.) in which antimony, or one of its compounds, is the leading or characteristic ingredient.

ANTIMO′NIATED. *Syn.* ANTIMONIA′TUS, L. Mixed or impregnated with antimony; antimonial.

ANTIMON′IC ACID. *Syn.* ACIDUM ANTIMON′ICUM, L.; ACIDE ANTIMONIQUE, Fr.; ANTIMONSÄURE, Ger.

Prep. 1. Pure metallic antimony, in coarse powder, or small fragments, is digested in excess of concentrated nitric acid, until the oxidation and conversion is complete; the excess of nitric acid is then removed by evaporation nearly to dryness, and the residuum thrown into cold distilled water; after which the powder (ANTIMONIC ACID) is collected on a calico filter, washed with distilled water, and dried by a gentle heat. Pure.

2. *Metallic antimony* (in powder), 1 part; *powdered nitre*, 6 or 8 parts; are mixed and ignited or deflagrated in a silver crucible; the mass, when cold, is powdered; the excess of alkali washed out with hot water, and the residuum (ANTIMO″NIATE OF POTAS′SIUM) decomposed with *hydrochloric acid*; lastly, the precipitate (ANTIMONIC ACID) is washed and dried as before.

That obtained by the first process is dibasic, and has the formula $H_2Sb_2O_6$, while that produced by the second process is tetrabasic, and has the formula $H_4Sb_2O_7$; the former is called simply *antimonic* acid, the latter *metantimonic acid*.

Prop. *Antimonic acid* is a soft white powder, sparingly soluble in water, reddens litmus, and is dissolved, even in the cold, by strong hydrochloric acid and by potash. The hydrochloric solution, mixed with a small quantity of water, yields, after a while, a precipitate of antimonic acid; but if diluted with a large quantity of water, it remains clear. Ammonia does not dissolve it in the cold. By heating with a large excess of caustic potash it is converted into metantimonic acid.

Metantimonic acid is more readily dissolved by acids than antimonic acid, and is dissolved by ammonia, after a while, even at ordinary temperatures. It is also perfectly soluble in a large quantity of water, and is precipitated therefrom by acids. It is very unstable, and easily changes into antimonic acid, even in water.

ANTIMONIC ANHYDRIDE (Sb_2O_5). *Syn.* ANTIMONIC OXIDE, ANHYDROUS ANTIMONIC ACID, PENTOXIDE OF ANTIMONY. Antimonic or metantimonic acid, heated to a temperature below redness loses water and yields the anhydride, Sb_2O_5. Antimonic anhydride is a yellowish-white powder, tasteless and insoluble in water and acids. Boiled with a solution of caustic potash, it is dissolved. If fused with carbonate of potassium, carbonic anhydride is expelled, and a salt is produced from which antimonic acid is precipitated by acids.

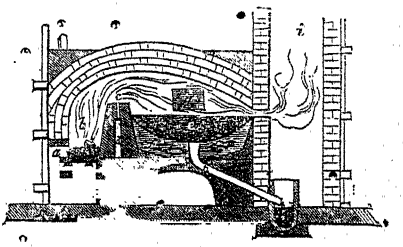
ANTIMONIOUS ACID. See ANTIMONY, TETROXIDE of.

AN′TIMONETTED. *Syn.* ANTIMO″NIURETTED; ANTIMONIA′TUS, L. Combined with or containing antimony. See HYDROGEN, &c.

AN′TIMONY (-te-mŭn-e). *Syn.* METAL′LIC ANTIMONY*, REG′ULUS OF A.†; ANTIMO″NIUM, A. METAL′LICUM, STIB′IUM, METAL′LUM ANTIMO″NII†, A. REG′ULUS†, &c., L.; ANTIMOINE, Fr.; ANTIMON, SPIESSGLANZ, SPIESSGLAS, SPIESSGLANZMETALL, Ger.; ANTIMONIO, It., Sp. The term formerly applied to the native sulphide or greyish-black semi-crystalline ore of antimony; but now solely appropriated to the pure metal.

Sources. Metallic antimony, in combination with silver and iron (NATIVE ANTIMONY), with sulphur (GRAY SULPHIDE OF A.), or with nickel (NICKELIF′EROUS SULPHIDE OF A.), is found in Bohemia, Hungary, Germany, Sweden, France, England, Borneo, and America; and oxidised, combined with oxide of iron, &c. (ANTIMO″NIAL O′CHRE, RED ANTIMONY, WHITE A.[2]), forming ores, either small in quantity or of little value, in various parts of the world. Of these, the only one in sufficient abundance for smelting, is the common sulphuret, known as 'grey antimony' or 'stibnite.'

Prep. Native antimony is freed from impurities by fusion. The sulphide, after being melted from the gangue, is commonly oxidised by exposure on the concave hearth of a reverberatory furnace, and is then reduced to the metallic state by fusion in crucibles with coal-dust, crude tartar, or some other deoxidising agent. To free the product from iron, it is generally fused, or re-fused, with



(*a.*), (*b.*) Grate and fire-place.
(*c.*) Bridge.
(*d.*) Air-channel.
(*e.*) Concave space for ore, resting on a solid bed (*f.*) formed of *sand* and *clay*.
(*g.*) Door for introducing the ore, and abstracting residuary slag.
(*h.*) Pipe to convey away the liquid metal.
(*i.*) Chimney.

[1] *Antimonial* (—Mayne) is a barbarism.

[2] White A. occurs in considerable quantities in Borneo and is used after roasting as a white pigment for iron and other surfaces.

little antimonic oxide; and when the ore contains arsenic, some iron or its oxide, and an alkaline carbonate or sulphate, are used in the same way. It is seldom prepared on the small scale. The following formulæ are in use, or are recommended:—

1. On the SMALL SCALE:—

a. From *tersulphide of antimony*, in coarse powder, 2 parts; *iron-filings*, 1 part; fused together in a covered crucible, at a heat gradually raised to dull redness.

b. From the *teroxide* or the *oxychloride of antimony*, fused together, as before, with twice its weight of crude tartar.

c. (Ph. Castr. Ru. 1840.) *Sulphide of antimony*, 16 parts; *cream of tartar*, 6 parts; both in powder; throw the mixture, in small quantities at a time, into a vessel (an earthen crucible) heated to redness; when the reaction is over, (having closely covered the vessel,) fuse the mass, and after a quarter of an hour, pour it out, and separate the metal from the slag.

d. From *sulphide of antimony*, 8 parts; *crude tartar*, 6 parts; *nitre*, 3 parts; as last.

e. (Wöhler.) *Sulphide of antimony*, 10 parts; *nitre*, 12 parts; *dry carbonate of soda*, 15 parts; deflagrate together; powder the resulting mass, and wash it thoroughly with boiling water; lastly, smelt the dried residuum with black flux. All the preceding are nearly pure; the impurity, if any, being traces of copper, lead, or iron.

f. (Berzelius.) From *metallic antimony*, in fine powder, 2 parts; *teroxide of antimony*, 1 part; fused together. The product will be pure provided the antimony employed is free from lead.

g. (Muspratt.) From *antimony*, 9 parts; *peroxide of manganese*, 1 part; fused together; the resulting metal being re-fused with 1-10th of its weight of carbonate of soda.

2. On the LARGE SCALE—*commercial*:—

a. See *above* (before 1 *a.*).

b. From *sulphide of antimony*, 100 parts; iron (in *very small* scraps), 40 parts; *dry crude sulphate of soda*, 10 parts; *powdered charcoal*, 2½ parts; fused together.—*Prod.* 60 to 65 parts of antimony, besides the scoriæ or ash, which is also valuable.

c. (Berthier.) *Sulphide of antimony*, 100 parts; *hammerschlag* (rough oxide of iron from the shingling or rolling mills), 60 parts; *crude carbonate* or *sulphate of soda*), 45 to 50 parts; *charcoal powder*, 10 parts; as last.—*Prod.* 65 to 70 parts.

Prop., &c. Bluish-white, lustrous, with a lamellar texture, and a crystalline or semi-crystalline fracture, with fern-leaf markings on the surface, when pure (*star antimony*); extremely brittle (may be powdered); imparts brittleness to its alloys (even 1-1000th part added to gold renders it unfit for the purposes of coinage and the arts); melts at 809-810° Fahr., or just under redness; fumes, boils, and volatilises at a white heat, and, when suddenly exposed to the air, inflames with conversion into the teroxide, which is deposited in beautiful flowers of crystals; when perfectly pure and fused without contact with air or foreign matter, it bears an intense heat without subliming (Thénard); allowed to cool slowly from a state of perfect fusion, it crystallises in octahedrons or dodecahedrons; tarnishes, but does not rust by exposure to air or moisture at common temperatures; hot hydrochloric acid dissolves it, with the formation of TRICHLORIDE OF ANTIMONY; nitric acid, when concentrated, converts it into ANTIMONIC ACID; and when dilute, into TRIOXIDE OF ANTIMONY. Sp. gr. 6·7 to 6·8.[1]

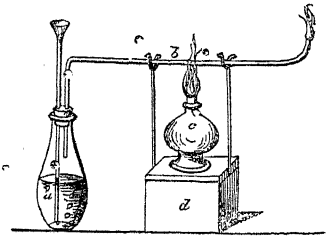
Tests. Metallic antimony may be recognised by the above properties; its oxide, salts, &c., by the following reactions:—1. Sulphuretted hydrogen gives, with acid solutions, an orange-red precipitate, which is sparingly soluble in ammonia,[2] and insoluble in dilute acids; but readily soluble in pure potassa and alkaline sulphides, and in hot hydrochloric acid with the evolution of sulphuretted hydrogen gas:—2. Sulphydrate of ammonium gives an orange-red precipitate, readily soluble in excess of the precipitant, if this latter contains sulphur in excess; and the liquor containing the re-dissolved precipitate gives a yellow or orange-yellow precipitate on the addition of an acid:—3. Ammonia and potassa, and their carbonates, give (except in solutions of tartar emetic) a bulky white precipitate; that with ammonia and its carbonate being insoluble in excess of the precipitant; that with potassa, readily so; whilst that with carbonate of potassium is only soluble on the application of heat:—4. A rod of zinc throws down metallic antimony, as a black powder, from all its solutions not containing free nitric acid. If the experiment be made with a few drops of a solution of antimony containing a little free hydrochloric acid, and a small platinum dish or capsule be employed, the part covered by the liquid is soon stained brown or blackish, and the stain is irremovable by cold hydrochloric acid, but may be easily removed by warm nitric acid:—5. By ebullition of the acidulated liquid along with copper gauze, foil, or wire, as noticed under '*Reinsch's Test*.'[3] The peculiar violet-grey of the deposit is characteristic, and may easily be distinguished from that given by arsenical solutions:—6. Mixed with dilute sulphuric acid and poured on some metallic zinc in a gas-generating flask, provided with a small bent tube (see *engr.*), it yields ANTIMONETTED HYDROGEN (Marsh's test), recognised by burning with a bluish-green flame, and furnishing dense white fumes which adhere readily to any cold substance (as a porcelain plate) held over it; or, if the plate be depressed upon the flame, a deep black, and almost lustreless spot of

[1] When perfectly pure, 6·715—Ure.

[2] The like precipitate from a solution of antimonic acid in hydrochloric acid, dissolves readily in ammonia, particularly when heated.

[3] See ARSENIOUS ACID.

metallic antimony; the fumes and spots in both cases being insoluble in water, and in dilute solution of chloride (crude hypochlorite) of soda. On heating the centre of the tube to redness with a spirit lamp, the bluish-green colour of the flame lessens in intensity, and a mirror of metallic antimony, of silvery lustre, forms inside the tube at the ignited part. On passing dry sulphuretted hydrogen through the tube, still heated by a spirit lamp, this mirror assumes a reddish-yellow colour, approaching black in its thicker parts;



(*a.*) Flask containing the suspected fluid, dilute sulphuric acid, and zinc.
(*b.*) Small tube, at the one end having an almost capillary orifice, where the gas is inflamed.
(*c.*) Spirit-lamp.
(*d.*) Support.

and by exposure to a feeble stream of hydrochloric acid gas, almost immediately, or in a few seconds, disappears, being carried off by the gas, which, if passed into a little distilled water, yields a solution of chloride of antimony, which may be further submitted to any of the usual tests.[1] If the substance be in the solid state, it must be reduced to powder and dissolved in water; or if insoluble in that menstruum, a solution must be obtained by digestion in either hot hydrochloric or nitrohydrochloric acid, before proceeding to examine it by this method.

Estim. Antimony is generally WEIGHED under the form of *tersulphide*; but sometimes as *antimonious anhydride*, and—though more seldom—as *pure metal*:—

1. A solution being obtained as above, if necessary, it is strongly acidulated with tartaric acid, and the antimony thrown down as a sulphide by a stream of sulphuretted hydrogen. After warming the solution and allowing it to cool, the precipitate (TERSULPHIDE) is collected on a filter, dried, and weighed. A small portion digested in strong hydrochloric acid, will completely dissolve if it be the pure sulphide; in which case the quantity of ANTIMONY sought will be equal to $71\frac{1}{2}\%$ ($71{\cdot}5\%$) of the weight of the sulphide found (very nearly).[2] Should only part of the precipitate be soluble, a known weight of it may be introduced into a flask, and a considerable quantity of fuming nitric acid added, drop by drop, and afterwards, a little hydrochloric acid, the mixture being digested, at a gentle heat, until the reaction is complete, and the whole of the sulphur is dissolved. The resulting solution diluted with water, strongly acidulated with tartaric acid, and solution of chloride of barium added as long as it disturbs the liquid, yields a precipitate, of which the weight, after it has been thoroughly washed, dried, and gently ignited, multiplied by 136, gives the quantity of SULPHUR in the sample; and which, deducted from the weight of the *sulphide* first found, gives the quantity of pure ANTIMONY, as before.

2. The quantity of pure ANTIMONY in commercial samples may be determined by treating them (in powder) with nitric acid, which oxidises the antimony and leaves it in an insoluble state, whilst it dissolves the other metals. The resulting oxide is collected on a filter, washed, dried, ignited in an open porcelain crucible, and weighed—its weight multiplied by ·7898 gives the quantity of pure metal sought.

3. Dissolve a known weight of the sample in hydrochloric acid, immerse a blade of pure metallic tin in the solution, and keep the liquor acidulous, and in a state of gentle ebullition by the heat of a sand bath, when the whole of the ANTIMONY will be precipitated under the form of a black powder, and may be collected, washed, dried, and weighed. This is particularly adapted to alloys of antimony and tin. See *Tests* (above) and *Pur.* (below).

Pur. The antimony of commerce generally contains a little arsenic, with variable quantities of iron, lead, sulphur, and tin. These impurities may be thus detected:—

1. (Arsenic.) By fusing the sample, in powder, mixed with about an equal weight of tartrate or bitartrate of potassium, in a covered crucible, for 2 or 3 hours, and placing the resulting button, which is an alloy of antimony and potassium, in a '*Marsh's apparatus*' along with a little water, when the disengagement of hydrogen gas will commence, and may be tested in the usual manner. See ARSENIC.

2. (Iron.) Dissolve the powdered sample in nitrohydrochloric acid, dilute the solution with a large quantity of cold water, filter, and pass a current of sulphuretted hydrogen through the filtrate as long as it produces a precipitate; again filter, boil the filtered liquor for a few minutes to drive off the sulphuretted hydrogen, and then test it with ferrocyanide of potassium, which will give a blue precipitate if iron be present; or supersaturate the last filtrate with ammonia, and then add hydrosulphydrate of ammonium, when, under like conditions, a black precipitate will be formed.

3. (Lead.) Digest the powdered sample in hot nitric acid, which will dissolve out the LEAD but leave the antimony behind. The whitish powdery residuum may be washed, dried, ignited, and weighed, as above; the clear

[1] See ARSENIOUS ACID.
[2] *Tersulphide of antimony* dried at 212° Fahr. still retains traces of water, which is not wholly expelled until the heat reaches 390—392°, when it acquires a black colour and a crystalline appearance.

decanted liquor may be now mixed with the first washings, evaporated to dryness, the residuum re-dissolved in water, and the solution submitted to reagents (*see* LEAD). If lead is found to be present, a solution of sulphate of sodium may be added until it ceases to disturb the liquid, and the resulting precipitate (sulphate of lead) washed, dried, and gently ignited (alone) in a porcelain crucible; the weight of the ignited residuum furnishes a number which, multiplied by ·683, gives the weight of the LEAD sought.

4. (Sulphur.) The solution in nitrohydrochloric acid, when tested with either nitrate or chloride of barium, gives a white precipitate of sulphate of barium, insoluble in both water and acids, which when dried, ignited, and weighed, and the weight multiplied by ·136, gives the quantity of SULPHUR, as before. In this case, as with the sulphides (see *above*), free sulphur may be removed by digesting and washing the powdered sample in bisulphide of carbon, previous to its solution in the acid, by which the violence of the subsequent reaction will be lessened.

5. (Tin.) Two samples of equal weight are taken; the one is tested for ANTIMONY, as described above; the other is dissolved in a mixture of equal parts of hydrochloric and nitrohydrochloric acid, and a blade of zinc immersed in the solution (see *above*); the mixed precipitate of tin and antimony which forms is collected on a weighed filter, washed, dried, and weighed. The weight of antimony in the first sample subtracted from that now obtained, leaves a remainder which indicates the quantity of TIN in the original sample.

Phys. eff., &c. Nearly all the salts and preparations of antimony are emetic and cathartic, and in large doses *poisonous*—occasioning vomiting, profuse alvine dejections, acute colic, and inflammation of the stomach and bowels, often serious, though rarely resulting in death. TARTAR EMETIC and BUTTER OF ANTIMONY are those from which accidents have principally occurred.—*Ant., &c.* Copious vomiting, if it has not already occurred, should be promoted, and the *recently* prepared hydrated sulphide of iron administered in considerable doses, followed or accompanied by mucilaginous drinks and diuretics. If much prostration follows, wine and stimulants may be had recourse to. In the absence of hydrated sulphide of iron, a solution of tannin, or decoction of galls; cinchona, or oak bark, or even powdered cinchona, mixed with tepid water, may be administered.

Uses. In the *arts*, antimony enters into the composition of several useful alloys, as TYPE-METAL, PEWTER, BRITANNIA-METAL, MUSIC-PLATE METAL, &c. It is added to the alloy for concave mirrors, to give them a finer texture; to bell metal, to render it more sonorous; and to various other metals to increase their hardness and fusibility; for the latter purpose it is employed in the casting of cannon balls.

Concluding remarks. In 'roasting' or oxidising the native sulphide of antimony on the bed of the reverberatory furnace, as in the common method before referred to, care must be taken to regulate and gradually raise the heat, which, until towards the end of the process, need not be extreme, and then only should it approach dull redness. Without this precaution much of the undecomposed sulphide will be lost by volatilisation. During the whole time the 'charge' should also be well stirred with an iron spatula, to ensure the constant exposure of every part of it to the atmosphere. The process is complete when the whole mass assumes a greyish-white appearance. Earthen crucibles are commonly employed for the subsequent reduction, and after being charged and covered over with ground charcoal, are heated in a reverberatory furnace. The product is the crude metallic antimony of commerce. It is generally REFINED by smelting it with about 1-8th of its weight of the refined sulphide, and about 1-4th of its weight of carbonate or sulphate of soda; but if there be much iron present, more of the sulphide—even 1-4th—may be required; for unless there be sufficient sulphur to combine with the whole of the iron, the arsenic will not be oxidised, but remain as a contamination. When cold, the metal is carefully separated from the slag, and is frequently re-fused with a little fresh carbonate of soda (1 to 1½ part); after which it is cast into pigs, lumps, or ingots. The crude metal, thus treated, commonly yields 94½ of REFINED METAL of tolerable purity.

Should lead have been present in the sulphide or ore, it remains after a second, or even a third fusion, although proportionately reduced in quantity; and it can only be completely separated in the humid way. It is, therefore, always desirable to select an ore free from lead.

Antimony, Ash of. *Syn.* ANTIMONY-ASH, CALCINED ANTIMONY*; CI'NIS ANTIMO"NII, ANTIMO"NIUM CALCINA'TUM*, L. Prepared by roasting the common grey sulphide of antimony on an iron plate set under a chimney, to carry off the fumes. The product is a mixture of teroxide of antimony, with some unburnt sulphide, and a little antimonious acid.

Prop., &c. Ash-grey; emetic in small doses. *Used* chiefly as a cheap substitute for teroxide of antimony by the manufacturers of tartar emetic; also to make metallic antimony.

Antimony, Butter of. See ANTIMONY, TRICHLORIDE OF.

Antimony, Calx of. *Syn.* CALX ANTIMO"NII, L. Sometimes applied to *antimony-ash*, but more commonly to crude, unwashed *diaphoretic antimony*.

Antimony, Calx of (Sulphurated). *Syn.* ANTIMO"NII CALX SULPHURA'TA, L. *Prep.* (Hufeland.) *Calcined oyster-shells*, 10 parts;

sulphur, 4 parts; *crude antimony*, 3 parts; powder, mix, and calcine in a luted crucible for an hour. Emetic, resolvent, and alterative.—*Dose.* 1 to 6 grs.; in gout, rheumatism, scrofula, &c.

Antimony, Ce'ruse of. *Syn.* ANTIMO''NII CERUS'SA, L. *Prep.* (Bate.) As diaphoretic antimony (over which it possesses no advantage), merely using the metal instead of the sulphide.

An old preparation made by igniting *antimony* in the sun's rays, by means of a lens, was called ANTIMONII CERUSSA SOLA''RIS.

Antimony, Chlo''rides of (klōre'-īdz):—

1. Antimony, Trichloride of. $SbCl_3$. *Syn.* TERCHLORIDE OF ANTIMONY, ANTIMONIOUS CHLORIDE, CHLO''RIDE OF ANTIMONY, SESQUICHLORIDE OF A., BUTTER OF A., CAU'STIC ANTIMONY†, &c.; ANTIMO''NII CHLORI'DUM, A. TERCHLORI'DUM, A. BU'TYRUM*, &c., L.; CHLORURE D'ANTIMOINE, BEURRE D'ANTIMOINE, &c., Fr.; ANTIMON-CHLORID, SPIESSGLANZ-BUTTER, Ger. This is the substance of which common chloride, or butter of antimony, of the shops, is an impure concentrated solution containing free acid.

Prep. 1. SOLID, ANHYDROUS:—

a. Pure commercial *tersulphide of antimony*, in coarse powder, 1 part; *concentrated hydrochloric acid*, 5 parts; are mixed in a capacious stoneware or glass vessel set under a chimney with a quick draught, to convey away the fumes, the whole being constantly stirred, and, as the effervescence slackens, a gradually increasing gentle heat applied until solution is complete; the resulting liquid is put into a retort, and distilled, until each drop of the distillate, as it falls into the aqueous liquid which has previously passed over into the receiver, produces a copious white precipitate; the receiver is then changed, and the distillation continued, when pure TRICHLORIDE OF ANTIMONY passes over, and solidifies on cooling to a white and highly crystalline mass, which must be carefully excluded from the air.

b. From *pure metallic antimony*, 2 parts; *bichloride of mercury*, 5 parts; both in fine powder; mixed and distilled in a retort with a large neck, by a gentle sand-heat, into a suitable receiver. Chemically pure.

2. LIQUID:—

a. (LI'QUOR ANTIMO''NII CHLORI'DI, B. P.) *Syn.* SOLUTION OF CHLORIDE OF ANTIMONY.

Prep. Take of *black antimony*, 1 *lb.*; *hydrochloric acid*, 4 pints; place the black antimony in a porcelain vessel; pour upon it the hydrochloric acid, and, constantly stirring, apply to the mixture, beneath a flue with a good draught, a gentle heat, which must be gradually augmented as the evolution of gas begins to slacken, until the liquid boils. Maintain it at this temperature for fifteen minutes; then remove the vessel from the fire, and filter the liquid through calico into another vessel, returning what passes through first, that a perfectly clear solution may be obtained. Boil this down to the bulk of two pints, and preserve it in a stoppered bottle.

Characters and Tests. A heavy liquid, usually of a yellowish-red colour. A little of it dropped into water gives a white precipitate, and the filtered solution lets fall a copious deposit on the addition of nitrate of silver. If the white precipitate formed by water be treated with sulphuretted hydrogen it becomes orange-coloured. The specific gravity of the solution is 1·47. One fluid drachm of it mixed with a solution of a quarter of an ounce of tartaric acid in four fluid ounces of water, forms a clear solution, which, if treated with sulphuretted hydrogen, gives an orange precipitate, weighing, when washed and dried at 212°, at least 82 grains.

b. (Commercial.)—*a.* Take of *ash* or *calx of antimony*, 3¼ *lbs.*; *common salt*, 2 *lbs.*; *oil of vitriol*, 1½ *lb.*; *water*, 1 *lb.*; proceed as before. *Prod.*, 2½ *lbs.*

c. From *roasted sulphide* or *glass of antimony*, 7 *lbs.*; *salt*, 28 *lbs.*; *oil of vitriol*, 21 *lbs.*; *water* 14 *lbs.*; as before.

d. From *crude sulphide of antimony* (powdered), 25 *lbs.*; *strongest commercial hydrochloric acid*, 1 *cwt.*; *nitric acid*, 3½ *lbs.*; as before; the product being coloured with a little *pernitrate of iron*, and made up to the sp. gr. 1·4. The quality is improved, and the process more easily conducted, if the crude antimony is roasted *before* dissolving it in the acid. The same applies to the other formulæ.

Prop., &c.—*a.* SOLID. When *pure*, and *nearly free* from *water*, it somewhat resembles butter, melts with a gentle heat, and partially crystallises on cooling; is very deliquescent, and quickly passes into an oily liquid when exposed to damp air; very soluble in strong hydrochloric acid; water, according to its quantity, more or less decomposes it. When *perfectly pure* and *anhydrous*, it forms a white and highly crystalline mass, rapidly decomposed by air and moisture.—*b.* SOLUTION. The sp. gr. of the solution of the shops varies from 1·25 to 1·4, in which state it is a transparent fuming yellow liquid (unless when artificially coloured), and extremely acid and caustic. Submitted to distillation, it at first parts with its water and excess of acid, after which the salt itself is volatilised. By changing the receiver as soon as the distillate concretes on cooling, or produces a copious white precipitate on falling into the liquid already passed over, the *pure* ANHYDROUS TRICHLORIDE may be readily obtained.

Phys. eff., Ant., Lesions, &c. See ANTIMONY.

Uses. In *medicine*, only *externally*, and chiefly as a caustic or escharotic to the wounds caused by rabid and venomous animals, and to repress excessive granulations in ulcers. In *pharmacy*, as a source of both oxychloride and oxide of antimony. The residuum in the retort when corrosive sublimate is used, is sulphide of mercury, and was formerly called CINNABAR OF ANTIMONY.

2. Antimony, Pentachlo″ride of. Sb_2Cl_5. *Syn.* PERCHLO″RIDE OF ANTIMONY; ANTIMO″NII PENTACHLORI′DUM, L. *Prepared* by passing a *stream* of *chlorine gas* over *metallic antimony* in fine powder, and gently heated. A mixture of TRICHLORIDE and PENTACHLORIDE OF ANTIMONY is found in the receiver, from which the latter may be separated by careful distillation. It is a colourless volatile liquid, forming a crystalline compound with a small quantity of water, but decomposed by a larger quantity.

Antimony, Cro′cus of. *Syn.* SAFF′RON OF ANTIMONY, LIV′ER OF A.; CRO′CUS ANTIMO″NII, C. METALLO″RUM, HE′PAR ANTIMONII, L.; CROCUS D'ANTIMOINE, SAFFRAN D'A., Fr. *Prep.* 1. From *black sulphide of antimony* and *saltpetre*, equal parts, deflagrated together by small portions at a time, and the fused mass (separated from the scoriæ) reduced to fine powder.

2. (ANT. CROCUS, Ph. L. 1788.) *Sulphide of antimony*, 1 lb.; *nitre*, 1 lb. *common salt*, 1 oz.; as before.

Prop., &c. Its medicinal properties closely resemble those of diaphoretic antimony. It is a mixture of sulphate of potassium, antimoniate of potassium, teroxide of antimony, oxysulphide of antimony, sulphide of potassium, and undecomposed trisulphide of antimony, in variable and undetermined proportions. When repeatedly washed or boiled in water, and dried, it forms the WASHED SAFFRON OF ANTIMONY (C. A. LO′TUS, L.) of *old pharmacy*, and has then lost its sulphate of potassium, caustic potash, and sulphide of potassium. Formerly used to make tartar emetic. See LIVER OF ANTIMONY.

Antimony, Crude. Native sulphide of antimony melted from the gangue.

Antimony, Diaphoret′ic. *Syn.* CALX OF ANTIMONY, CALCINED′ A., ANTIMO″NIATE OF POT′ASH, STIB′IATED KA′LI†, DIAPHORETIC MIN′ERAL†, &c.; ANTIMO″NIUM DIAPHORET′ICUM, A. CALCINA′TUM, CALX ANTIMO″NII, C. A. ANGLO″RUM†, POTAS′SÆ ANTIMO″NIAS, KALI STIB′ICUM†, &c., L. var.; ANTIMOINE DIAPHORÉTIQUE, BIANTIMONIATE DE POTASSE, Fr. An old preparation with numerous synonyms, of which the first two of the above are those which are now chiefly in use.

Prep. 1. *Sulphide of antimony*, 1 part; *nitre*, 3 parts; powder, mix, and deflagrate by spoonfuls in a red-hot crucible, then calcine for half an hour, and when cold powder the residuum.

2. WASHED DIAPHORETIC A., W. CALX OF A.; ANTIMONIUM DIAPHORETICUM LO′TUM, A. D. ABLU′TUM (Ph. Bor. 1847), A. CALCINA′TUM (Ph. L. 1788); ANTIMOINE DIAPHORÉTIQUE LAVÉ, &c., Fr.:—*a.* (Ph. L. 1788.) As the last, but the powder is subsequently deprived of soluble matter by repeated washings with water, after which it is collected and dried.

b. (Ph. Bor. 1847.) *Metallic antimony*, 1 part; *nitre*, 2 parts; as above, but drying the *washed powder* at a heat not exceeding 104° Fahr.

Prop., &c. A white or greyish-white powder, without either smell or taste; gently diaphoretic and laxative; its activity greatly depending on the quantity of acid in the stomach.—*Dose.* 1 to 5 grs., or even 10 grs.; for *horses*, 1 to 3 or 4 *drs.* It was formerly in high repute; but is now almost superseded by the present pharmacopœial preparations.

Antimony, E′thiops of. *Syn.* Æ′THIOPS ANTIMONIA′LIS, L. *Prep.* 1. From *metallic mercury*, 1 part; *sulphide of antimony*, 2 parts; triturated together until the globules of the former *entirely* disappear.—2. *Sulphide of antimony*, 3 parts; *black sulphide of mercury*, 2 parts; triturated together for some time. An old remedy in certain skin diseases, still highly esteemed by some provincial practitioners.—*Dose.* 3 to 5 grs., gradually increased to 20 or 30 grs.

Antimony, Flow′ers of. *Syn.* FLO″RES ANTIMO″NII, L.; FLEURS D'ANTIMOINE, Fr. *Prep.* Throw *powdered sulphide of antimony*, by spoonfuls at a time, into an ignited tubulated retort with a short and very wide neck, until as many 'flowers' collect in the receiver as are required. An impure oxysulphide of antimony, with variable portions of trioxide, and undecomposed tersulphide. Emetic in doses of 1 to 3 grs.

Antimony, Flowers of (Ar′gentine). [-in.] *Syn.* WHITE OX′IDE OF ANTIMONY, SNOW OF A.†; ANTIMO″NII FLO″RES ARGENTI′NI, A. NIX†, L.; FLEURS ARGENTINE D'ANTIMOINE, OXYDE BLANC D'ANTIMOINE, Fr. *Prep.* Melt *metallic antimony* in a vessel freely exposed to the air, and furnished with a cool place for the 'flowers' to rest on, and collect them as deposited; or, and what is better, heat the metal to a full red or white heat in a covered crucible, and then suddenly expose it to the air, when it will inflame, and the oxidised vapour condense as 'flowers' on any cool surface (as a partially inverted wide-mouthed flask) held at a little distance over it. The product is TRIOXIDE OF ANTIMONY in a crystalline form, and received the name of *argentine flowers* from its silvery whiteness and beauty.

Antimony, Flowers of (Helmont's). *Syn.* FLO″RES ANTIMO″NII HELMON′TII. An old preparation formed by dissolving sulphide of *antimony* in *aqua regia*, expelling the free water and acid by heat, and subliming the residuum with an equal weight of sal ammoniac. Violently emetic, even in small doses, and unfit for internal use.

Antimony, Flowers of (Red). *Syn.* FLO″RES ANTIMO″NII RU′BRI, L. From *sulphide of antimony*, and *sal ammoniac*, both in fine powder, mixed and sublimed together. Resembles the last.

Antimony, Ful′minating. See FULMINATING COMPOUNDS.

Antimony, Glass of. *Syn.* VIT′RIFIED ANTIMONY*, V. OX′IDE OF A.*, GRAY O. OF A.*;

ANTIMO"NII VIT'RUM, ANTIMO"NIUM VITRIFICA'TUM, A. VITRIFAC'TUM (Ph. L. 1788), OX'YDUM ANTIMONII VITRIFICATUM, &c., L.; VERRE D'ANTIMOINE, OXYSULFURE D'ANTIMOINE SILICATÉ, Fr. *Prep.* (Ph. L. 1788.) Roast *sulphide of antimony* in a shallow earthen vessel, over a moderate fire, stirring it constantly with an iron rod, until it turns whitish-grey and ceases to emit fumes at a red heat; put the residuum into a covered crucible which it shall only two thirds fill, and expose it to an intense heat (gradually raised), until it fuses, then pour it out on an iron plate. If calcined too much, a little more crude antimony may be added to make it run well.

Comp., Prop., &c. A mixture of sulphide and oxide of antimony contaminated with a little silica and iron. In fine powder it is emetic, in doses of 1 to 3 grs.; but owing to the uncertainty and violence of its operation, is now seldom employed. It has been used as a cheap source of the TEROXIDE by the manufacturers of tartar emetic.

Antimony, Glass of (Cera"ted). *Syn.* ANTIMO"NII VIT'RUM CERA'TUM, L. *Prep.* (Dr. Young & Ph. L. 1746.) *Glass of antimony,* in very fine powder, 1 oz.; *yellow wax,* 1 dr.; melt together in an iron ladle, and keep it over a gentle fire free from flame, (constantly stirring,) for about half an hour, or until it acquires a snuff colour, then pour it out on a piece of white paper (or a plate), and when cold, powder it.—*Dose.* 2 to 10 grs., in dysentery, &c.

Antimony, Li'ver of. *Syn.* HE'PAR ANTIMO"NII, L.; HÉPAR D'ANTIMOINE, OXYSULFURE D'ANTIMOINE SILICATÉ, Fr. *Prep.* From *sulphide of antimony,* 1 part; and *dry carbonate of sodium* or *potassium,* 2 parts; melted together, and heated until it acquires the proper colour, and then cooled, and powdered.

Comp., Uses, &c. A mixture of trioxide of antimony, sulphide of potassium, carbonate of potassium, and undecomposed trisulphide of antimony. It is chiefly *used* by *farriers,* in *doses* of 1 to 2 drs., as an alterative purge for horses, in greasy heels, &c.; and sometimes by *chemists,* as a source of the crude oxide. Crocus of antimony, before noticed, sometimes passes under the name, and is sold for it.

Antimony, Ore of. *Syn.* ANTIMONY-ORE. Native sulphide of antimony.

Antimony, Oxide of. The B. P. name for Antimony, Trioxide of (which *see*).

Antimony, Oxides of. Antimony forms with oxygen three definite compounds, viz. the—

Trioxide or antimonious oxide	Sb_2O_3	
Tetroxide or antimonoso-antimonic oxide	Sb_2O_4	or $Sb_2O_3.Sb_2O_5$
Pentoxide or antimonic oxide	Sb_2O_5	

Antimony, Trioxide of. Sb_2O_3. *Syn.* TEROXIDE OF ANTIMONY, ANTIMONIOUS OXIDE (B. P. OXIDE OF ANTIMONY, Eng.; ANTIMONII OXIDUM, L.). *Prep.* (B. P.) Take of *solution of chloride of antimony,* 16 *fluid oz.; carbonate of soda,* 6 *oz.; water,* 2 *galls.; distilled water,* a sufficiency. Pour the antimonial solution into the water, mix thoroughly, let the precipitate settle, remove the supernatant liquid by a siphon, add one gallon of distilled water, agitate well, let the precipitate subside, again withdraw the fluid, and repeat the processes of affusion of distilled water, agitation, and subsidence. Add now the carbonate of soda previously dissolved in two pints of distilled water, leave them in contact for half an hour, stirring frequently, collect the deposit on a calico filter, and wash with boiling distilled water until the washings cease to give a precipitate with a solution of nitrate of silver acidulated by nitric acid. Lastly, dry the product at a heat not exceeding 212°.

Char. & Tests. A greyish-white powder, fusible at a low red heat, insoluble in water, but readily dissolved by hydrochloric acid. The solution, dropped into distilled water, gives a white deposit, at once changed to orange by sulphuretted hydrogen. It dissolves entirely when boiled with an excess of the acid tartrate of potash.

Uses. Chiefly in making tartar emetic and some other salts of antimony; also in the preparation of *pulvis antimonialis.* Therapeutically, it is a diaphoretic and febrifuge.—*Dose.* 1 to 4 grains.

Antimony, Pentoxide of. See ANTIMONIC ANHYDRIDE.

Antimony, Tetroxide of. Sb_2O_4 or $Sb_2O_3.Sb_2O_5$. *Syn.* ANTIMONOSO-ANTIMONIC OXIDE, ANTIMONIOUS ACID. Found natural as *Cervantite* or *Antimony-ochre.* Prepared by heating antimonic anhydride, by roasting the trioxide or trisulphide, or by the action of excess of nitric acid on finely powdered metallic antimony. Thus prepared, it is a white solid, unalterable by heat; slightly soluble in water, more so in hydrochloric acid.

Antimony, Oxychloride of. SbOCl. *Syn.* POWDER OF ALGAROTH. Thrown down as a white precipitate when trichloride of antimony is poured into water. Continued washing with water deprives it of nearly the whole of its chlorine, and converts it into the trioxide, a change which is more completely effected by aqueous solutions of the alkalies or their carbonates.

Antimony, Oxysulphide of. The compound $Sb_2O_3.2Sb_2S_3$ occurs native as *red antimony, Antimony blende, Kermesome, Rothspiessglanzerz, Crocus of antimony, Glass of antimony,* and similar preparations, are believed by some authorities to be crude oxysulphides of antimony.

Antimony, Red. See OXYSULPHIDE OF ANTIMONY, before noticed.

Antimony, Reg'ulus of. *Syn.* REG'ULUS

ANTIMO″NII, L. Metallic antimony obtained by fusion. Alloys formed by fusing *antimony* with *iron, tin, lead,* or *copper,* and a little *tartar,* were respectively called MAR′TIAL REGULUS OF ANTIMONY (*r. antimo″nii martia′lis,* L.), R. A. JOVIA′LIS (L.), R. A. SATURNI′NUS (L.), R. A. VEN′ERIS (L.), &c. (See *below.*)

Antimony, Ru′by of. *Syn.* MEDIC′INAL (-dĭs′-) REG′ULUS OF ANTIMONY; ANTIMO″NII RUBI′NUS, REG′ULUS MEDICINA′LIS, R. A. M., &c., L. From *crude sulphide of antimony,* 5 parts; fused with *carbonate of potassa,* 1 part; and the purified portion separated from the scoriæ. See LIVER OF ANTIMONY.

Antimony, Saff′ron of. See CROCUS OF ANTIMONY.

Antimony, Smelt′ed. *Syn.* ANTIMO″NIUM PURIFICA′TUM, L. *Crude antimony* melted and poured into small conical moulds.—*Uses, &c.* Same as the ordinary tersulphide.

Antimony, Snow of. See FLOWERS OF ANTIMONY.

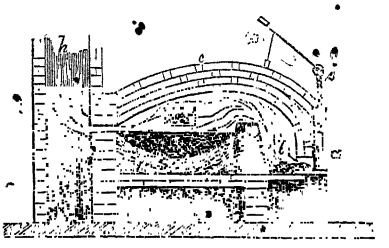
Antimony, Pentasulphide of (Sb_2S_5), is a yellowish red powder, obtained (1) by passing hydrosulphuric acid gas through a mixture of pentachloride of antimony, water, and tartaric acid; or (2) through antimonic anhydride suspended in water. It is insoluble in water; hot hydrochloric acid decomposes it, producing trichloride of antimony, sulphur, and hydrosulphuric acid. With the more basic metallic sulphides it unites to form a class of salts called *sulphantimonates.*

Antimony, Trisulphide of. Sb_2S_3. *Syn.* TERSUL′PHIDE OF ANTIMONY, SUL′PHIDE OF A., SUL′PHURET OF A., BLACK S. OF A., SESQUISUL′PHURET OF A., &c.; L'ANTIMOINE SULFURE, SULFURE D'ANTIMOINE, &c., Fr.; SCHWEFEL-SPIESSGLANZ, ANDERTHALB, &c., Ger. This is the grey or greyish-black substance commonly known as *crude antimony, black antimony,* or *sulphide of antimony,* in commerce, and from which the other compounds of antimony are chiefly obtained.

Nat. hist., Sources, &c. See ANTIMONY.

The crude ore is freed from earthy impurities in the following manner.—The *crushed ore* is submitted to 'eliquation' in order to separate the SULPHIDE from the gangue or earthy matter with which it is contaminated; after which it is remelted and run into 'loaves' or large cakes, in which form it is sent to market. Formerly the operation was performed by introducing the *ore* into large pots or crucibles having a hole in the bottom; and which, after being *closely* covered, were set in a circle around a suitable furnace, by which they were heated. At the present time, the process is commonly conducted in a 'reverberatory furnace,' similar to that figured in the *engraving.*

Native trisulphide of antimony treated in this way and ground to powder constitutes the BLACK ANTIMONY (ANTIMONIUM NIGRUM), B. P.



(*a.*), (*b.*) Grate and fire-place.
(*c.*) Bridge.
(*e.*) Concave space for ore formed by a solid bed (*f*) of *clay* and *sand,* and having a 'hole' near the bottom extending nearly horizontally through the wall of the furnace, to 'run off' the fused sulphide.
(*g.*) Door for introducing ore, and removing residuum.
(*h.*) Chimney.
(*i.*) Damper, chain, and lever.

Antimony, Trisulphide of (artificially prepared). Saturate an aqueous solution of tartar emetic with hydrosulphuric acid; an orange precipitate will be thrown down. This precipitate, when collected on a filter, washed, and dried, is the pure trisulphide.

Prop, &c. Native, is anhydrous, inodorous, insipid, opaque, brittle, easily pulverisable, and of a dark leaden-grey or steel colour; it has a striated crystalline texture, and breaks with a rough spicular fracture; is insoluble in both water and alcohol; soluble, with decomposition, in hot strong acids and alkaline solutions; melts at a red heat, and is partly dissipated in white fumes, leaving an impure grey-coloured oxide mixed with some undecomposed tersulphide (ANTIMONY-ASH). Its powder is black, of peculiar richness, and stains the fingers. Sp. gr. 4·6 to 4·62. The pure precipitated (amorphous) tersulphide is of orange colour; is darkened by a gentle heat, with loss of water; and at a higher temperature passes from the amorphous to the crystalline condition, at the same time that it assumes the colour and appearance of the native sulphide. It dissolves in hot hydrochloric acid, evolving hydrosulphuric acid, and producing a solution of trichloride of antimony.

Impur. The crude commercial sulphide frequently contains lead, iron, copper, and arsenic, and sometimes manganese. Its goodness is commonly estimated by its compactness and weight, the largeness and distinctness of the striæ, and the volatility of its sulphide.

Uses, &c. Chiefly as a source of metallic antimony, and of the oxide in the preparation of other antimonials. Exhibited alone, it possesses little activity unless it meets with acid in the primæ viæ, when it occasionally acts with considerable violence both as an emetic and cathartic.—*Dose.* 10 to 30 grs., in powder; as an alterative and diaphoretic, in rheumatism, gout, scrofula and glandular affections, and in lepra, scabies, and some other skin diseases. It is a favourite alterative in *veterinary medicine,* particularly in skin diseases. Farriers

and grooms frequently mix a little of it with the food of horses to improve their coat and promote their 'condition.'—*Dose*, for a *horse*, 1 to 4 *drs.*, in fine powder, often combined with nitre and sulphur; for CATTLE, ½ to 1 *oz.* or even 1½ *oz.*; DOGS, 5 or 6 to 20 or 30 grs.; HOGS, 20 to 30 grs., twice or thrice daily. According to Dr. Paris, it is one of the ingredients in *Spilsbury's Drops*. It is also an ingredient in *Tisane de Feltz*.

Antimony, Tartarated. $KSbOC_4H_4O_6$. Aq. *Syn.* TARTARIZED ANTIMONY, TARTAR EMETIC, EMETIC TARTAR, POTASSIO-TARTRATE OF ANTIMONY, Eng.; ANTIMONIUM TARTARATUM, B.P. *Prep.* Various methods have been devised for the preparation of this compound, but the following, which is taken from the 'British Pharmacopœia,' is to be preferred:—

Take of *oxide of antimony* 5 *oz.*, *acid tartrate of potash*, in fine powder, 6 *oz.*, *distilled water*, 2 pints. Mix the oxide of antimony and acid tartrate of potash with sufficient distilled water to form a paste, and set aside for 24 hours. Then add the remainder of the water, and boil for a quarter of an hour, stirring frequently. Filter, and set aside the clear filtrate to crystallise. Pour off the mother-liquor, evaporate to one third, and set aside, that more crystals may form. Dry the crystals on filtering paper at the temperature of the air.

Char. and Tests. In colourless transparent crystals exhibiting triangular facets, soluble in water, and less so in proof spirit. It decrepitates and blackens upon the application of heat. Its solution in water gives with hydrochloric acid a white precipitate, soluble in excess, and which is not formed if tartaric acid be previously added. Twenty grains dissolve without residue in a fluid ounce of distilled water at 60°, and the solution gives with sulphuretted hydrogen an orange precipitate which, when washed and dried at 212°, weighs 9·91 grains.

Phys. eff., Doses, &c. Externally, tartar emetic acts as a powerful local irritant, causing a pustular eruption, which permanently marks the skin; for this purpose it is used in the form of solution, ointment, or plaster. *Internally*, in small doses (1/16 to ⅛, or even ¼ gr.), it acts as a diaphoretic and expectorant; in somewhat larger doses (⅛ to ½ gr.), it excites nausea, and sometimes vomiting, occasioning depression and relaxation, especially of the muscular fibre; in larger doses (1 to 2 or 3 grs.), it acts as an emetic and sudorific (and often as a purge), depressing the nervous functions, and producing a feeling of feebleness, exhaustion, and relaxation, greater than that caused by other emetics; in certain doses (½ to 3, or even 4 grs.), it is used as a sedative and antiphlogistic, to reduce the force of the circulation, &c.; in excessive doses, it acts as an irritant poison, and has in some instances caused death; and even small doses frequently administered, and long continued, have brought on a state of weakness, prostration, and distaste for food, which has led to a fatal termination. It is usually exhibited dissolved in distilled water, either with or without the addition of a little simple syrup. In acute rheumatism, inflammation of the lungs or pleura, chorea, hydrocephalus, and apoplexy, it is *said* to have been given in doses of 2 to 4, or even 6 grs., with advantage, by Laennec, Rasori, and others; but these extreme doses are not always safe, and cannot be commendable when smaller ones (¼ to ½ gr., repeated every two hours) appear equally beneficial, and distress the patient less.[1] In doses of ½ gr. to ¾ gr. each, combined with calomel, it is a powerful and excellent alterative in acute rheumatism and many skin diseases. Of all our sudorifics it is, perhaps, the most valuable, and the one most generally available. Triturated with 16 to 20 times its weight of *sulphate of potassa*, it forms an excellent SUBSTITUTE for *antimonial powder* and *James's powder*, as a diaphoretic, in doses of 2 to 4 grs.

Whenever much gastric or intestinal irritation is present, *tartar emetic* should be avoided, or very *cautiously* administered, and then combined with an opiate, or some other sedative. It should also be given with caution to children; as, according to Messrs. Goodlad and Noble, even in small doses it sometimes acts as a poison on them.

In *veterinary medicine*, it is employed to promote diaphoresis and expectoration, and to reduce arterial action, particularly in fevers, and catarrhal affections, the *dose* for HORSES being 20 grs. to 1 dr., or even occasionally, 1½ dr., in gruel, thrice daily; also sometimes as a diuretic and vermifuge, in *doses* of 1 to 2 drs., combined with tin-filings, for 2 or 3 successive days, followed by a purge of aloes. The usual *dose* for CATTLE is 20 grs. to 1 dr.; SHEEP, 5 or 6 to 20 grs.; SWINE (chiefly as an *emetic*), 2 to 5 or 6 grs.; DOGS (chiefly as an *emetic*), 1 to 3 grs. It is sometimes, though seldom, used *externally*, as a counter-irritant, in chest affections, &c.; but its employment thus requires caution.

Pois., &c. That from large doses has been already noticed under ANTIMONY (which *see*). In *poisoning*, the *treatment* is the entire disuse of all antimonials, followed by tonics, a light nutritious diet, the use of lemon-juice or ripe fruit, a little wine, warm baths, and mild restoratives generally.

Antimony, Tar'tarised. See ANTIMONY, TARTARATED.

Antimony, Vit'rified. See GLASS OF ANTIMONY.

ANTIPHLOGIS'TIC (-flo-jis'-). *Syn.* ANTIPHLOGIS'TICUS, L.; ANTIPHLOGISTIQUE, Fr.;

[1] "In consequence of the violent vomiting" (and it might be added—prostration) "which (even) 1 gr. has sometimes produced, I have found patients *positively refuse* to *continue* the use of the medicine." Pereira, "*Th. & M. M.*," 4th ed., i, 752.

ANTIPHLOGISTISCH, Ger. In *medicine*, the common epithet of remedies, agents, and treatment, (ANTIPHLOGIS'TICS; ANTIPHLOGIS'TICA, L.,) which lessen inflammatory action, or allay the excited state of the system which accompanies it. Of these the principal are bleeding, purging, a low diet, cooling beverages (as water and acidulous drinks), and sedatives generally.

ANTISCORBU'TIC (-skor-bū'-). *Syn.* ANTISCORBU'TICUS, L.; ANTISCORBUTIQUE, Fr.; ANTISCORBUTISCH, GUT WIDER DEN SCHARBOCK, Ger. Good against scurvy. In *medicine*, an epithet of remedies, agents, &c., (ANTISCORBU'TICS; ANTISCORBU'TICA, L.,) used in scurvy. *Lemon-juice, ripe fruit, milk, salts of potassa, green vegetables, potatoes, meal-bread, fresh meat,* and *raw* or *lightly boiled eggs*, belong to this class.

ANTISEP'TIC. *Syn.* ANTISEP'TICUS, L.; ANTISEPTIQUE, Fr.; ANTISEPTISCH, FÄULNISSWIDRIG, Ger. An epithet of substances, agents, &c., (ANTISEP'TICS; ANTISEP'TICA, L.,) that impede, arrest, or prevent putrefaction. The principal antiseptics in common use are *culinary salt, saltpetre, spices, sugar, vinegar, carbolic acid, creasote, and alcohol;* to which may be added *intense cold, desiccation,* and the *exclusion* of *air*. Among ANTISEPTIC MEDICINES, *bark, dilute acids, quinine, wine, spirits, camphor, charcoal,* and *yeast*, take the first rank. See PUTREFACTION, SOLUTIONS (Antiseptic), &c.

ANTISPASMOD'IC (-spăz-). *Syn.* ANTISPAS'TIC; ANTISPASMOD'ICUS, L.; ANTISPASMODIQUE, Fr.; KRAMPFSTILLEND, Ger. In *medicine*, an epithet of substances and agents (ANTISPASMOD'ICS; ANTISPASMOD'ICA, L.) which allay spasms and convulsions. It is frequently incorrectly applied to anodynes and narcotics, which soothe pain, but do not repress muscular spasm. *Ammonia, assafœtida, bark, camphor, castor, chalybeates, chloral hydrate, chloroform, ether, Indian hemp* and *cannabine, musk, opium, saffron,* and *valerian*, with many other similar substances, are regarded as antispasmodics.

ANTS (ănts). See ANT, FORMIC ACID, GARDENING, INSECTS, &c.

AORT'A. [L., Ger.] *Syn.* AORTE, Fr. In *anatomy*, the main trunk of the arterial system, arising immediately from the left ventricle of the heart, and giving origin to all the other arteries of the body, except the pulmonary artery and its ramifications, which permeate the air-vesicles of the lungs.

AP'ATITE (-tīte). In *mineralogy*, native tricalcium phosphate (phosphate of lime). It is found in Devonshire and Cornwall, and abundantly in Spain, whence it is imported for use as manure, and recently particularly for the manufacture of ARTIFICIAL GUANO. Its powder phosphoresces on burning coals. It differs from *phosphorite* in not containing fluorine.

Apatite (phosphate of lime of similar constitution to bone-earth, $Ca_3(PO_4)_2$,) is found in every fertile soil, and of which it is an essential ingredient.

APE"RIENT (ă-pēre'-ĕ-ĕnt; -pĕr'-, as marked by Mayne and Smart, though etym. correct, is less usual). *Syn.* APER'ITIVE (-tĭv); APER'IENS, L.; APÉRITIF, Fr.; ABFÜHREND, ÖFFNEND, Ger. In *medicine*, opening, laxative, gently purgative; usually applied as an epithet to substances and agents (APE'RIENTS; APERIEN'TIA, APERITI'VA, L.) which, in *moderate* doses, and under *ordinary* circumstances, gently, but completely, open the bowels; and in this respect rank between the simple laxatives on the one hand, and the stronger purgatives and cathartics on the other. Among these may be named as examples—*Aloes* (when combined with soap or aromatics), *Castile soap, castor oil, compound extract of colocynth* (in small doses), *compound rhubarb pill, confection of senna, cream of tartar, Epsom salts, Glauber's salt, phosphate of soda* (tasteless purging salt), *pil. rufi, seidlitz powders, cold-water compress* over the abdomen, &c. Several of these, in *larger* doses, become active purgatives or cathartics. See PURGATIVES, also DRAUGHTS, MIXTURES, PILLS, &c.

A'PIOLE (-pe-ōle; *or* -ōl). *Prep.* The *soft alcoholic extract* of *parsley-seed* is either digested or agitated for some time with *ether;* after sufficient repose in a cool place, the ethereal solution is decanted, and the ether removed by distillation; the residuum is purified by solution in rectified spirit, and agitation first with a little litharge, and next with animal charcoal; after which the spirit is removed by distillation from the filtered solution.

Prop., &c. A yellow, oily, non-volatile liquid, having a peculiar smell, and a highly disagreeable taste; soluble in alcohol, ether, and chloroform; insoluble in water; and coloured red by strong sulphuric acid. Sp. gr. 1·078. In small doses it excites the pulse and nervous system; and in larger ones it causes headache, giddiness, vertigo, &c. It is said to be powerfully febrifuge, and has been highly extolled by MM. Joret and Homalle as a substitute for quinine in intermittents.[1] It has also been found useful in intermittent neuralgias and the nocturnal sweats of phthisis.—*Dose.* 5 to 15 drops in capsules.

A'PIS. [L.] The bee. In *entomology*, a genus of hymenopterous insects of the family *anthophila* or *mellifera*, section *apiaria*. (Latreille.) The *mouth* has two jaws, and a proboscis infolded in a double sheath; the *wings* are four; the two foremost covering the hinder ones when at rest. The *sexes* are three—*prolific females* or *queens, unprolific females* or *workers* (commonly termed *neuters*), and *males* or *drones*. The females and work-

[1] According to Drs. G. O. Rees and A. S. Taylor, 66 out of 116 cases were cured by it in their practice; but according to the French Commission, the cures are only 42%, and in many of these *only temporary*.

condition, constitute DEFECTIVE *or* DISEASED APPETITE.

Deficiency or *loss of appetite* (AN'OREXY); ANOREX'IA, L.) generally arises from disordered stomach; but is also frequently symptomatic of other affections, particularly dyspepsia, biliousness, feverishness, and organic diseases of the lungs, stomach, and primæ viæ, It is a common consequence of sedentary life, and of extreme mental anxiety, excitement, or exhaustion. The *treatment* will necessarily vary with the cause. In simple spontaneous cases, the appetite may generally be improved by out-door exercise, and the occasional use of mild aperients, especially salines and aloetics. When the affection arises from the stomach being loaded with bile and crudities, an emetic in the evening, followed by a stomachic purgative the next morning, with an occasional aperient afterwards, will seldom fail to effect a cure. With heavy drinkers, a gradual reduction of the quantity of the strong liquors usually consumed, is generally followed by a restoration of the appetite and digestive powers. The change thus gradually effected in the course of 8 or 10 days is often almost magical. The excessive use of liquors—especially of spirits, wine, or beer, or even of warm weak ones, as tea, coffee, soup, &c.—is always prejudicial. Hence drunkards are particularly subject to defective appetite; and teetotallers and water-drinkers to a heartiness often almost approaching voracity. See BILIOUSNESS, DYSPEPSIA, &c.

Depraved appetite (PI'CA, L.), or a desire for unnatural food, as chalk, cinders, dirt, soap, tallow, &c., when an idiopathic affection or depending on vicious tastes or habits (as is often the case in childhood), may be treated by admixing very small doses of tartar emetic or ipecacuanha with the objectionable food or articles. When symptomatic of pregnancy, a plentiful and nutritious diet, including the red meats, with a little good malt liquor or wine, may be adopted with advantage. When symptomatic of chlorosis, to this diet may be added, the use of chalybeate tonics, and sea or tepid bathing; when of dyspepsia, a light diet, bitter tonics, free exercise, fresh air, and cold bathing, will generally effect a cure.

Insatiable appetite (CANINE APPETITE, VORACITY; BULIM'IA, L.) is generally symptomatic of pregnancy, or worms, or diseases of the stomach or the viscera immediately connected with it; but sometimes exists as a separate disease, and is even said to be occasionally hereditary. When it occurs in *childhood*, worms may be suspected, and vermifuges administered. In *adults*, a common cause is imperfect digestion, arising from stomach complaints or gluttony, when the languor and gnawing pains of disease are mistaken for hunger. In this case, the diet should be regulated and the bowels kept gently relaxed with mild aperients, and tonics (as bark and steel), or bitters (as orange-peel and gentian), may be administered. When *pregnancy* or *vicious habits* are the cause, the treatment indicated under DEPRAVED APPETITE may be adopted. When the affection is occasioned by *acidity* in the *stomach*, an emetic, followed by the moderate use of absorbents or antacids, will generally effect a cure. In those cases depending on a *highly increased power* of the *stomach* in effecting rapid and complete digestion, its contractile force and morbid activity may be often allayed by the copious use of salad oil, fat meat, &c., by the cautious use of opiates, or by the use or, freer use, of tobacco (either smoked or chewed, or both). A cathartic daily, with a dose of blue-pill, or mercurial powder, every second or third day, is also often advantageous. 25 or 30 drops of solution of potassa, in broth, twice or thrice daily, has also been recommended. See BILIOUSNESS, DYSPEPSIA, WORMS, &c.

APP'LE (ăp'l). *Syn.* MA'LUM, PO'MUM, L.; POMME, Fr.; APFEL, Ger.; APPEL, Dut.; APLE, Swed. This well-known fruit is the product of the cultivated varieties of *py'rus ma'lus* (Linn.), or the *crab-apple* of our hedges; a tree of the *nat. ord.* Rosaceæ. The date of its amelioration from the wild state is probably very remote, as several kinds are noticed by Pliny in a manner that would lead to the inference of a high antiquity. Pippins, or 'seedling improved apples,' are said to have been introduced into this country from the South of Europe towards the end of the 16th century. Don enumerated 1400 varieties of the cultivated apple; there are now probably above 1650. *Rennet apples* (PO'MA RENET'TIA) are those ordered in the P. Cod. to be used in pharmacy. In *botany* and *composition*, the term *apple* (POMUM) is used to designate any large, round, fleshy fruit, consisting of a 'pericarp,' enclosing a tough 'capsule' containing several seeds; as *love-apple*, *pine-apple*, &c.

The *wood* of the apple-tree is much used in turnery; that of the crab-tree is generally preferred by mill-wrights for the teeth of mortise-wheels.

The *expressed juice* of 1 *cwt.* of ripe apples, after the free acid has been saturated with chalk, yields from 11 to 13 *lbs.* of a very sweet, but uncrystallisable sugar.

Love'-apple‡. The tomato.

Mad'-apple‡. The larger *Mecca* or *Bussorah gall*. They are also called DEAD-SEA APPLES, A. OF SODOM, &c. See GALLS.

Acid of Apples. Malic acid.

A'PRICOT. *Syn.* A'PRICOCK†; ARMENI'ACUM MA'LUM, PRÆCO'TIUM, L.; ABRICOT, Fr.; APRIKOSE, Ger. The fruit of *armeni'aca vulga'ris* (Lamb.; *pru'nus armeniaca*, Linn.), a rosaceous tree indigenous in Armenia, Cachmere, &c., and now cultivated in every temperate region of the world. Under the name of *præcox*, it was known in Italy in the time of Dioscorides; but it was not introduced into England until the reign of Henry VIII (A.D. 1540). Its cultivation has since been zealously attended

to by our gardeners, and it is now one of the choicest and most esteemed of our wall-fruits, and is particularly valued for desserts. It is reputed to be nutritious, easy of digestion, laxative, and stomachic. The *seeds* are bitter and saponaceous.

Apricots are principally eaten as gathered; but are also *dried*, *candied*, and made into *jam*. In *confectionery*, the Brussels and Breda varieties are preferred to the larger and sweeter kinds. See FRUIT, PRESERVES, &c.

Briançon' Apricots. The fruit of *armeni'aca brigantiaca* (Pers.). Acidulous; *seeds* or *kernels*, by expression, yield HUILE DE MARMOTE.

A'QUA (-kwă). [L.] Water.—AQUA DESTILLA'TA *or* A. DISTILLA'TA, is distilled water; A. FLUVIA'LIS *or* A. EX FLU'MINE (-ĭn-e), river-water; A. FONTA'NA, spring-water; A. MARI'NA *or* A. MA''RIS, sea-water; A. MINERA'LIS, mineral water; A. NIVA'LIS *or* D. EX NI'VE, snow-water; A. PLUVIA'LIS, A. PLU''VIA, *or* A. IM'BRIUM, rain-water, soft water; A. PUTEA'NA *or* A. EX PU'TEO, well, pump, or hard water.

Aqua. In *chemistry* and *pharmacy*, this word was formerly applied to numerous preparations and articles now included under other heads. See EAUX, ESPRITS, HAIR-DYES, LIQUORS, SOLUTIONS, WATERS, &c.

Aquafor'tis. [L.] *Literally*, 'strong water;' the name given by the alchemists to the acid obtained by distilling a mixture of nitre and sulphate of iron. The word is still commonly employed by mechanics and artists to designate the impure *fuming nitric acid* of commerce, and is thus also retained in trade. By these parties, concentrated nitric acid is called '*spirit of nitre*.' '*Double aquafortis*' merely differs from the other in strength. See NITRIC ACID.

Aqua Græ'ca, A. Orienta'lis. See HAIR-DYES and PATENT MEDICINES.

Aqua Mari'na. [L.] The beryl†.

Aqua Mirab'ilis†. [L.] *Literally*, 'wonderful water;' a cordial and carminative spirit distilled from aromatics, and formerly reputed to possess many virtues.

Aqua Re'gia. [L.] Nitrohydrochloric acid, originally so called, by the alchemists, from its power of dissolving gold.

Aqua Toffa'nia. [L.] See AQUETTA.

Aqua Vi'tæ†. [L.] *Literally*, 'water of life;' a name familiarly applied to the leading native distilled spirit. Thus, it is *whiskey* in Scotland, *usquebaugh* in Ireland, *geneva* in Holland, and *eau de vie* or *brandy* in France. When the term is employed in England, French brandy is understood to be referred to. See ALCOHOL, &c.

AQUATINT'A. [L., Fr.] *Syn.* A'QUATINT, Eng.; ACQUATINTA, It. A species of etching on copper, producing an effect resembling a drawing in Indian ink.

A'QUEOUS (-kwe-). *Syn.* AQUOSE'*; A'QUEUS, AQUO'SUS, L.; AQUEUX, Fr.; WÄSSERIG, WÄSSERHALTIG, Ger. Watery; made with, containing, or resembling water. In *chemistry* and *pharmacy*, applied to solutions, extracts, &c., prepared with water.

AQUET'TA. [It., *little water*.] *Syn.* A'QUA TOFFA'NA, A. TOFFA'NIA, L.; AQUETTA DI NAPOLI, ACQUA DELLA TOFFANA, It. A celebrated poison prepared by an Italian woman named Toffano or Tophano, and employed by the Romans about the middle of the 17th century. The composition of this poison has been a matter of frequent controversy. Pope Alexander VII, in his proclamation, described it as "aquafortis distilled into arsenic." This would produce a concentrated solution of arsenic acid. The emperor Charles VI, who was governor of Naples during Toffano's trial, declared to his physician Garelli, that it was *arsenic* (arsenious acid) dissolved in *aqua cymbalaria*. According to Gerarde, this cymbalaria was an aquatic species of pennywort, highly poisonous. The only objection to the latter statement is the smallness of the dose, regard being had to the comparative insolubility of arsenious acid; but if the woman Toffana prepared two poisons, as is probable from history—one, a single dose of which was fatal; and another, of which the dose required repetition, and which was more gradual in its action,—the discrepance will be at once removed.

AR'ABESQUE (-bĕsk). [Fr.] In the Arabian manner; more particularly applied to a species of capricious, fantastic, and imaginative ornamentation, consisting of foliage, stalks, plants, &c., to the entire exclusion of the figures of animals. The designs of this class, now so much employed in cloth and leather binding, are produced by the pressure of hot plates or rollers having the pattern engraved on them. See MORESQUE.

AR'ABIN (-bĭn). $C_{12}H_{22}O_{11}$. [Eng., Fr.] *Syn.* SOLUBLE GUM; ARABI'NA, L. The pure soluble principle of gum acacia.

Prep. Dissolve *white gum arabic* in *pure water*, filter the solution, and add *alcohol* as long as it produces curdiness; collect the precipitated matter, and dry it by a gentle heat.

Prop., &c. Very soluble in water; basic acetate of lead, alcohol, and ether, precipitate it from its solutions. It is isomeric with crystallised cane sugar. It possesses no practical superiority over the best gum arabic, except its paler colour.

AR'ABLE (-ăbl). *Syn.* ARAB'ILIS, L.; ARABILE, LABOURABLE, Fr.; PFLÜGBAR, Ger. In *agriculture*, fit for or under tillage or aration; ploughed.

Arable Land. In *agriculture*, land which is chiefly or wholly cultivated by the plough, as distinguished from *grass-land*, *wood-land*, *common pasture*, and *waste*. See LAND, SOILS, &c.

ARACHIS HYPOGÆA. *Syn.* GROUND NUT PLANT. *Hab.* Cultivated throughout the tropics of the Old and New World. *Officinal part.* The oil of the seeds (*Oleum Arachis, Ground Nut Oil*). Obtained by expression. Limpid, clear,

light yellow, almost inodorous, or with a faint smell, and bland taste. Sp. gr. 0·916.—*Prop. and Uses.* This oil affords a cheap and excellent substitute for olive oil for pharmaceutical and other purposes.

ARA'TION*. In *agriculture*, ploughing; culture by ploughing; tillage. Lands in a 'state of aration' are those under tillage.

AR'BOR. [L.] A tree. The *seventh* family of vegetables in Linnæus's system. In *anatomy* and *chemistry*, a term formerly applied to membranes and substances having some real or fancied resemblance to a tree or vegetation. An *ar'boret* is a little tree; an *arborist*, or *ar'borātor*†, is one who studies or cultivates trees.

ARCA'NUM. [L.] *Syn.* ARCANE, Fr.; GEHEIMNIS, Ger. A secret. In *alchemy*, a term applied to various preparations without any precise meaning. "Arcanum is a thing secret, incorporeal, and immortal, which can only be known to man by experience; for it is the *virtue* of each thing, which operates a thousand times more than the thing itself." (Ruland.) in *ancient medicine* and *pharmacy*, a nostrum. The word is still occasionally used in the plural (ARCA'NA, secrets, mysteries,) in the titles of books; as '*Arcana of Chemistry*,' a book professing to contain a full exposition of the mysteries of that art.

Among the *old chemists*, ARCANUM AL'BUM was 'pulvis Viennensis albus virgineus' (see POWDERS); A. BEC'CHICUM, a sweetened aqueous solution of liver of sulphur; A. CORALLI'NUM, *nitric-oxide of mercury* that had been digested in a *solution of potash*, washed with *water*, and then had *spirit of wine* burnt on it (once a favourite mercurial and escharotic); A. DUPLICA'TUM, sulphate of potash; A. D. CATHOLI'CUM, roots of *colchicum* and *plantain* (worn as an amulet against fevers and pestilential diseases; A. LUDEMAN'NI, oxide of zinc; A. TAR'TARI, acetate of potassa; A. VI'TÆ, elixir vitæ; &c.

ARCHE'US (-kē'-ŭs; ăr'*—Mayne). [L.] *Syn.* ARCHÆ'US, L. A term invented by Paracelsus, and employed by the alchemists and elder physicians, to imply the occult cause of phenomena, as well as the sub-causes or agents by which the effects were accomplished. Van Helmont and Stahl ascribe certain vital functions to the influence and superintendence of a '*spiritus archæus*' or intelligent vital principle. According to others, the powers of '*Archæus*' were indefinitely extended. He or it was an occult power of nature, the artificer of all things, physician-general to the universe, &c. &c., to the utmost bounds of absurdity and confusion.

From this word comes the *adj.* ARCHE'AL or ARCHÆ'AL, hidden, operative.

ARCH'IL (artsh'-il). *Syn.* ARCH'EL*, OR'CHIL; ARCHIL'LA, ORCHIL'LA (*ch* as *k*), L.; ORSEILLE, Fr., Ger.; ORICELLO, It. A violet-red, purple, or blue colouring matter or dye-stuff, obtained from several species of lichens, but of the finest quality from *roccella tinctoria* (DC.), and next from *r. fuciformis* (DC.).

The *archil* of *commerce* is met with as a *liquid paste*, or as a thin *liquid dye* or *stain* of more or less intensity. The ordinary *archil* or *orchil* of the shops (ORCHIL-LIQUOR) is under the last form; and is known as either BLUE OR RED ARCHIL—distinctions which arise as follows:—

Prep. 1. BLUE ARCHIL:—The *bruised* or *coarsely ground lichen* is steeped for some time in a mixture of *stale urine*, or *bone-spirit*, and *lime* or *milk of lime*, or in any similar *ammoniacal solution*, contained in *covered wooden vessels* in the *cold*; the process being repeated until all the colour is extracted.

2. RED *or* CRIMSON ARCHIL:—The materials are the same as for the last variety, but rather less *milk of lime* is used, and the 'steep' is generally made in earthen jars placed in a room heated by steam, technically called a *stove*. The two kinds merely differ in the degree of their red or violet tint—the addition of a small quantity of lime or alkali to the one, or of an acid to the other, immediately bringing them both to the same shade of colour.

Prop. Archil has a disagreeable putrid ammoniacal odour. Its colouring matter is soluble in water, alcohol, urine, ammoniacal and alkaline lyes, and weak acid liquors; alkalies turn it *blue*, acids *red*; alum gives with it a brownish-red precipitate, and solution of tin a red one; the alcoholic solution gradually loses its colour when excluded from the air. Its colouring matter consists chiefly of *orcein*.

Pur. Archil is frequently adulterated with *extract* of *logwood*, or of *Lima* or *Sapan-wood*. It may be tested as follows:—1. A solution of 50 or 60 drops of *pure archil* in about 3 fl. oz. of water slightly acidulated with acetic acid, almost entirely loses its colour, or presents only a yellowish tinge, when heated to ebullition in a flask along with 50 drops of a fresh solution of protochloride of tin made with 1 part of the salt to 2 parts of water:—2. A drop of fluid extract of logwood treated in the same way, gives a distinct violet tint, which resists several hours' boiling; but when only 3 or 4 per cent. of logwood is present, the boiled liquid has a permanent grey tint:—3. If the boiled liquid retains its red hue, extract of Sapan-wood is present:—4. The boiled liquor, when the archil is pure, re-acquires its colour by exposure to the air, and the addition of an alkali, particularly ammonia; whilst the colour produced by logwood is destroyed only by an alkaline solution of tin, and is restored by acids.

Uses, &c. It is employed to tinge the spirit used to fill the tubes of thermometers, and to stain paper, wood, &c. The aqueous solution stains MARBLE, in the cold, of a beautiful violet colour, of considerable permanence when not exposed to a vivid light. "Marble thus tinged

preserves its colour unchanged at the end of two years." (Dufay.) Its principal use is, however, in dyeing. By proper management it may be made to produce every shade of pink and crimson to blue and purple. Unfortunately, although the hues it imparts to silk and wool possess an exquisite bloom or lustre, they are far from permanent, and unless well managed, soon decay. It is hence generally employed in combination with other dye-stuffs, or as a finishing bath to impart a bloom to silk or woollens already dyed of permanent colours. In using it as a dye, it is added to hot water in the required quantity, and the bath being raised to nearly the boiling-point, the materials are put in and passed through it, until the desired shade is produced. A mordant of alum and tartar is sometimes used, but does not add to the permanence of the colour. Solution of tin, added to the bath, increases the durability, but turns the colour more on the scarlet. (Hellot.) Milk of lime or salt of tartar is added to darken it; acids or solution of tin to redden it. A beautiful crimson-red is obtained by first passing the stuff through a mordant of tin and tartar, and then through a bath of archil mixed with a very little solution of tin. By the proper management of this dye, lilacs, violets, mallows, rosemary-flower, soupes au vin, agates, and many other shades, may be produced on silk or cloth, either alone or in conjunction with other dyes to modify it. ½ *lb.* of solid archil, or its equivalent in a liquid form, will dye 1 to 2 *lbs.* of cloth. HERB-ARCHIL, it is asserted, will bear boiling, and gives a more durable tint than the other lichens, especially with solution of tin. (Hellot.) Recently Mr. Lightfoot has patented a process for dyeing with archil with the aid of oil, after the manner followed for producing Turkey-red on cottons.

Archil, Facti″tious:—1. From a mixture of *onions* (in a state of incipient putrefaction) with about 1-10th to 1-12th their weight of *carbonate of potash* and some *ammonia*, fermented together; and adding, after some days, 1-7th to 1-8th of the weight of the *potash* used in a *salt of lead*. The details of the process essential to success are, however, now unknown, the secret having died with a relative of the writer of this article.

2. *Extract of logwood* dissolved in *juice of elderberries* and *putrid urine*, with the addition of a little *pearlash* for the BLUE, and a very little *oxalic acid* or *oil of vitriol*, for the RED variety. Used to stain wood.

Arch′il, Herb. Roccella tinctoria. See ARCHIL (*above*), LICHENS, & MOSSES.

ARE′CA. [L.] In *botany*, a genus of East Indian trees, of the *nat. ord.* Palmæ (DC.).

Areca Cat′echu. [L.; Linn.] *Syn.* ARE′CA, A. IN′DICA, A. FAUFEL, BE′TEL-NUT TREE. *Hab.* East Indies. *Fruit* (BETEL-NUT), astringent and narcotic; *husk of fruit* (PENANG or PINANG), sialagogue and stomachic; both are used as masticatories; *wood* and *nut* yield an inferior or bastard sort of catechu; *charcoal* of the *nut* highly esteemed as tooth-powder.

Areca Globulif′era. [L.] Properties similar to the last.

Areca Olera′cea. [L.; Willd.] Cabbage-palm.

ARENA′CEOUS (ăr-e-). *Syn.* ARENA′CEUS, L.; ARÉNACÉ, SABLONNEUX, Fr.; SANDIG, SANDARTIG, Ger. In *agriculture, mineralogy*, &c., sandy; resembling sand; friable.

ARENA″RIOUS (-nare′-). *Syn.* ARENA″RIUS, L.; ARÉNAIRE, Fr. Sandy, arenaceous. In *agriculture* and *botany*, applied to soils (ARENARIOUS SOILS) in which sand is the prevailing and characteristic ingredient; also to plants that grow in sandy or arid soils.

ARENA′TION. *Syn.* SABULA′TION; ARENA′TIO, L.; ARÉNATION, Fr.; SANDBAD, Ger. In *medicine*, sand-bathing; a practice formerly prevalent, in dropsy, of applying hot sand, either by immersion or otherwise, to the feet, legs, or even the whole body.

ARENOSE′ (ăr-e-nōse′). *Syn.* AR′ENOUS*; ARENO′SUS, L.; ARÉNEUX, Fr. Sandy; arenaceous (which *see*).

AREOM′ETER (ă-re- *or* ăr-re-; ārę-e—Smart). *Syn.* AREOM′ETRUM, L.; ARÉOMÈTRE, Fr. *Literally*, a 'measure of lightness' or 'rarity,' originally applied to any instrument for determining the *specific gravity* of alcoholic and ethereal liquids; but since applied, like the word 'hydrometer,' to instruments adjusted to the densities of all liquids. In this country, the term is principally confined to the *aréomètres* of Baumé, on account of their general use by Continental chemists. The relations and equivalents of Baumé's scales, as now adopted in France, are shown in the first two of the following *Tables*:—

I.—Corresponding DEGREES of BAUMÉ'S AREOMETERS and REAL SPECIFIC GRAVITIES :—

1. *Areometer for liquids* LIGHTER *than* WATER, or *Pèse-esprit*.[1]

Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.
10	1·0000	21	0·9200	32	0·8690	42	0·8202	52	0·7766
11	0·9932	22	0·9241	33	0·8639	43	0·8156	53	0·7725
12	0·9865	23	0·9183	34	0·8588	44	0·8111	54	0·7684
13	0·9799	24	0·9125	35	0·8538	45	0·8066	55	0·7643
14	0·9733	25	0·9068	36	0·8488	46	0·8022	56	0·7604
15	0·9669	26	0·9012	37	0·8439	47	0·7978	57	0·7556
16	0·9605	27	0·8957	38	0·8391	48	0·7935	58	0·7526
17	0·9542	28	0·8902	39	0·8343	49	0·7892	59	0·7487
18	0·9480	29	0·8848	40	0·8295	50	0·7849	60	0·7449
19	0·9420	30	0·8795	41	0·8249	51	0·7807	61	0·7411
20	0·9359	31	0·8742						

2. *Areometer for liquids* HEAVIER *than* WATER; *Pèse-acide*, or *Pèse-sirop*.[1]

Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.
0	1·0000	16	1·1176	32	1·2667	47	1·4476	62	1·6889
1	1·0066	17	1·1259	33	1·2773	48	1·4615	63	1·7079
2	1·0133	18	1·1343	34	1·2881	49	1·4758	64	1·7273
3	1·0201	19	1·1428	35	1·2992	50	1·4902	65	1·7471
4	1·0270	20	1·1515	36	1·3103	51	1·5051	66	1·7674
5	1·0340	21	1·1603	37	1·3217	52	1·5200	67	1·7882
6	1·0411	22	1·1692	38	1·3333	53	1·5353	68	1·8095
7	1·0483	23	1·1783	39	1·3451	54	1·5510	69	1·8313
8	1·0556	24	1·1875	40	1·3571	55	1·5671	70	1·8537
9	1·0630	25	1·1968	41	1·3694	56	1·5833	71	1·8765
10	1·0704	26	1·2063	42	1·3818	57	1·6000	72	1·9000
11	1·0780	27	1·2160	43	1·3945	58	1·6170	73	1·9241
12	1·0857	28	1·2258	44	1·4074	59	1·6344	74	1·9487
13	1·0935	29	1·2358	45	1·4206	60	1·6522	75	1·9740
14	1·1014	30	1·2459	46	1·4339	61	1·6705	76	2·0000
15	1·1095	31	1·2562						

[1] These instruments were originally adjusted at the temperature of 12½° Cent., or 54½° Fahr. Those now made France are adjusted at 15° C., or 59° F.; and those made in England, at either 59° or (more usually) 60° Fahr. T standard temperature of the instrument must be known for its correct application.

II.—*Corresponding* SPECIFIC GRAVITIES *and* DEGREES *of* BEAUMÉ'S AREOMETER *for heav liquids*.[1] From the Batavian Pharmacopœia.

Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.	Degrees Baumé.	Specific Gravity.
0	1000	16	1125	32	1286	47	1485	62	1758
1	1007	17	1134	33	1298	48	1501	63	1779
2	1014	18	1143	34	1309	49	1516	64	1801
3	1022	19	1152	35	1321	50	1532	65	1823
4	1029	20	1161	36	1334	51	1549	66	1847
5	1036	21	1171	37	1346	52	1566	67	1872
6	1044	22	1180	38	1359	53	1583	68	1897
7	1052	23	1190	39	1372	54	1601	69	1921
8	1060	24	1199	40	1384	55	1618	70	1946
9	1067	25	1210	41	1398	56	1637	71	1974
10	1075	26	1221	42	1412	57	1656	72	2000
11	1083	27	1231	43	1426	58	1676	73	2031
12	1091	28	1242	44	1440	59	1695	74	2059
13	1100	29	1252	45	1454	60	1715	75	2087
14	1108	30	1261	46	1470	61	1736	76	2116
15	1116	31	1275						

AREOM'ETRY. *Syn.* AREOME'TRIA, L.; ARÉOMÉTRIE, Fr. The art or operation of ascertaining the *specific gravity* of liquids, and hence also their strength or commercial value; hydrometry. See AREOMETER (*above*), HYDROMETRY, SPECIFIC GRAVITY, &c.

ARE (ăr; ãre—Eng.). [Fr.] See MEASURES.

ARGENT'INE (-ĭn). *Syn.* ARGENTI'NUS, L.; ARGENTIN, Fr.; SILBERFARBEN, &c., Ger. Silver-like; pertaining to, resembling, or sounding like silver; argental.

Ar'gentine (-tĭn). [Eng., Fr.] German silver*. In *mineralogy*, nacreous carbonate of lime, from its whiteness and silvery lustre.

ARGENT'UM. [L.] Silver. In *old chemistry* and *pharmacy*, ARGENTUM FUGITI''VUM†, A. MO'BILE† (-ĭl-e), was quicksilver; A. MOR'TUUM†, dead silver, grain-s.; A. MUSI'VUM†, mosaic s., silver-bronze; A. NITRA'TUM†, lunar caustic; A. VI'VUM†, quicksilver; A. ZOÖTIN'ICUM†, cyanide of silver; &c.

AR'GIL† (jĭl). *Syn.* ARGIL'LA, L.; ARGILE, Fr. Clay or potter's earth.

ARGILLA'CEOUS (-jĭl-). *Syn.* ARGILLA'CEUS, L.; ARGILLEUX, Fr.; THONIG, THONARTIG, Ger. Clayey; pertaining to, containing, or of the nature of clay or argil. In *agriculture*, an epithet of soils (ARGILLACEOUS SOILS) of which clay is the principal or characteristic ingredient.

Argil'lo-arena'ceous (-jĭl-). In *agr.*, consisting chiefly of clay and sand.

Argillo-calca'reous. In *agr.*, consisting chiefly of clay and chalk.

AR'GOL. *Syn.* ARGAL*; TAR'TARUS CRU'DUS, L.; TARTRE BRUT, Fr.; WEINSTEIN, Ger. Crude bitartrate of potash, as deposited by wine. That from red wine is RED ARGOL; that from white wine, WHITE ARGOL. See TARTAR.

ARM'ATURE (-ă-tūre). *Syn.* ARMATU''RA, L. In *magnetism*, a piece of soft iron used to connect the poles of a horseshoe magnet, for the purpose of preventing loss of power.

AR'NICA. [L., Fr., Eng.] *Syn.* ARNIQUE, Fr.; ARNIKA, WOLVERLEI, Ger. In *botany*, a genus of plants, of the *nat. ord.* Compositæ (DC.). In the Ph. U. S., arnica montana (see *below*).

Arnica Monta'na. [L.; Linn.] *Syn.* ARNICA, MOUN'TAIN A., M. TOBAC'CO, GERMAN LEOPARD'S BANE; PANACE'A LAPSO''RUM*, L. ARNIQUE, A. DES MONTAGNES, TABAC DES SAVOYARDS et DES VOSGES, Fr.; ARNIKA, FALKRAUT, &c., Ger. *Hab.* Meadows of the cooler parts of Europe, North America, and Siberia. It is now cultivated in our gardens. *Flowers* (ARNICA, Ph. U.S., Castr. Ruth., and Bor.) and *leaves*, diaphoretic, diuretic, stimulant, and narcotic; in large doses, emetic and purgative; *root*, discutient; whole *herb*, diaphoretic, stimulant, and nervine.

Prop., &c. Arnica acts as an energetic stimulant on the cerebro-spinal system, and as an irritant on the stomach and bowels. It is much employed on the Continent, and is given in a great variety of diseases—amaurosis, chlorosis, convulsions, diarrhœa, dysentery, gout, paralysis, rheumatism, &c. It is much used in Germany, instead of bark, in intermittents, putrid fevers, and gangrene. In France it is commonly employed as an excito-tonic in paralysis. It has been greatly extolled as a restorative, and in bruises and injuries from falls. The Savoyards and inhabitants of the Vosges both smoke and 'snuff' the leaves. In England it is little used except by homœopaths. It is said that no animal but the goat will eat this plant. (Thomson.) Its noxious properties chiefly depend on the presence of cytisine.—*Dose.* Flowers, 5 to 10 grs., in powder, with syrup or honey; root, 10 to 20 grs. It is most conveniently administered under the form of infusion or tincture. Severe abdominal pains and vertigo, and even tetanus and death, have followed excessive doses.

Obs. According to Dupuytren, the emetic action of *infusion of arnica* depends on minute particles of the down of the plant which remain suspended in it, and which may be removed by filtration. See INFUSIONS, TINCTURES, &c.

AR'NICINE (seen). This name has been applied to two substances—the one discovered by Pfaff; the other, by Bastick:—

Arnicine (of Pfaff). The resinous matter extracted by *alcohol* from the *roots* and *flowers* of *mountain arnica*, and in which their acridity appears to reside.

Arnicine (of Bastick). *Syn.* ARNICI'NA, ARNICI''A (-nĭsh'-y'ă), L. *Prep.* 1. (Bastick.) From the *flowers*, by a similar process to that by which he obtains lobelina.—2. From the *flowers* (or *root*), as directed under ARICINA.

Prop., &c. Bitter; acrid; crystallisable; scarcely soluble in water; soluble in alcohol and ether; forms salts with the acids, the hydrochlorate, and one or two others, being crystallisable. Its physiological properties and dose have not as yet been accurately determined.

ARNATT'O, Arnotto. See ANNOTTA.

ARO'MA. [L.] *Syn.* AROME, Fr.; AROMA, GERUCHSTOFF, Ger. The characteristic odour of substances, particularly the peculiar quality of plants, and of substances derived from them, which constitutes their fragrance.

AROMA'TA. [L.] See AROMATIC.

AROMAT'IC. *Syn.* AROMAT'ICUS, L.; AROMATIQUE, Fr.; GEWÜRZHAFT, Ger. Fragrant; odoriferous; spicy; applied chiefly to plants and their products (AROMATICS, A. PLANTS; AROMAT'A, AROMAT'ICA, L.; AROMATIQUES, ÉPICES, Fr.; GEWURZ, Ger.) characterised by their spicy odour or aroma, and warm pungent flavour, and of which *allspice, cinnamon, cloves, lavender, pepper, rosemary, sage*, &c., are well-known examples. They are all stimulant, carminative, and antiseptic; and from remote antiquity have been regarded as prophylactic and disinfectant.

[1] The standard temperature of the instrument is here 12½° Cent., or 54½° Fahr.

Aromatic. In *medicine, pharmacy, perfumery*, &c., applied to substances, simple or compound, characterised by an agreeable odour or carminative properties, or both; as *aromatic confection, a. pastilles, a. vinegar, a. bark* (CORTEX AROMATICUS, white canella), &c.

ARQUEBUSADE' (ar-ke-bŭŭ-zade'). [Fr.] *Primarily*, the shot of an arquebuse; but afterwards applied to an aromatic spirit (EAU D'ARQUEBUSADE, Fr.), originally employed as an application to gunshot (arquebuse) wounds.

AR'RACK (*arrack'*—Brande). [Ind.] *Syn.* ARAC, ARACK, RACK‡§; PALM-SPIRIT; ARRAC'CA, SPIR'ITUS PAL'MÆ, S. SUC'CI P., S. OBY'ZÆ*, L.; ARACK, Fr.; ARAK, Ger. A spirituous liquor imported from the East Indies. The finer qualities are distilled from the fermented juice (*toddy, palm-wine*) of the cocoa-nut tree, palmyra tree, and other palms; and the other kinds, from the infusion of unhusked rice (*rice-beer*), fermented with cocoa-nut or palm-juice, either with or without the addition of coarse sugar or jaggery.

Prop., &c. It is colourless or nearly so, but like other spirit, when long kept in wood gradually acquires a slight tinge, similar to that of ~~old~~ Hollands. The best kinds, when of sufficient age, are pleasant flavoured, and are probably as wholesome as the other spirits of commerce; but common arrack has a strong and somewhat nauseous flavour and odour, depending on the presence of volatile oil derived from the rice, and corresponding to that of corn-spirit. The inferior qualities are hence more heating and apt to disagree with the stomach than the other commercial spirits. In this country it is chiefly used to make punch. When sliced pine-apples are put into good arrack, and the spirit kept for some time, it mellows down and acquires a most delicious flavour, and is thought by many to be then unrivalled for making 'nectarial punch' or 'rack-punch.'

Obs. Batavian arrack is most esteemed; then that of *Madras*; and next that of *China*. Others are regarded as inferior. The common *pur'iah-arrack* is generally narcotic, very intoxicating, and unwholesome; being commonly prepared from coarse *jaggery, spoilt toddy, refuse rice*, &c., and rendered more intoxicating by the addition of *hemp-leaves, poppy-heads, juice of stramonium*, and other deleterious substances.

Arrack, Factitious. *Syn.* MOCK AR'RACK, BRIT'ISH A.; VAUXHALL' NEC'TAR; &c. *Prep.* Good *old Jamaica rum* (uncoloured), *rectified spirit* (54 to 56 *o. p.*; clean flavoured), and *water*, of each, 1 quart; *flowers of benzoin*, 1 dr.; *sliced pine-apple*, ½ oz. (or *essence of pine-apple*, ½ teaspoonful); digest, with occasional agitation, for a fortnight; then add of *skimmed milk*, 1 wine-glassful; agitate well for 15 minutes, and in a few days decant the clear portion.

AR'ROW-ROOT. The common name of *maran'ta arundina'cea* (Linn.; *m. Indi'ca*—Tuss.); a plant of the *nat. ord.* Marantaceæ (Lindl.; Cannaceæ—Endl.). It was originally brought from the island of Dominica to Barbadoes, by Col. James Walker. It has since been extensively cultivated in the West Indies.

Tubers, yield true ARROW-ROOT; when fresh and good they contain about 26% of starch, of which 23% may be obtained as arrow-root, and the rest by boiling.

Arrow-root. *Syn.* MARAN'TA, AM'YLUM MARAN'TÆ, FÆC'ULA M., L.; RACINE FLÉCHIÈRE, PIVOT, Fr.; PFEILWURZ, P.-SATZMEHL, Ger. The starch or fecula obtained from the rhizoma or tubers of *maran'ta arundina'cea* (Linn.; see *above*), and which forms the true 'arrow-root' of commerce.

Prep. The fecula is extracted from the tubers when they are about 10 or 12 months old, by a process similar to that by which the farina is obtained from potatoes. In Bermuda the tubers, after being washed, are deprived of their paper-like scales and every discoloured and defective part by hand; they are then again washed and drained, and next subjected to the action of a wheel-rasp, the starch being washed from the comminuted tubers with rain-water; the milky liquid is passed through a hair sieve, or a coarse cloth, and allowed to deposit its fecula. This is then allowed to drain, after which it is again carefully washed with clean water, again drained, and, after being thoroughly dried in the air or sun, is at once packed for market. (Cogswell.) In St. Vincent (on the Hopewell estate), a cylindrical crushing-mill, tinned-copper washing machines, and German-silver palettes and shovels, are employed; whilst the drying is effected in extensive sheds, under white gauze, to exclude insects. In Jamaica, the washed tubes are generally pulped in deep wooden mortars; machinery being seldom employed in any part of the process.

Prop., &c. A light, dull, dead-white, tasteless, inodorous powder or small pulverulent masses, feeling firm to the fingers, and crackling when pressed or rubbed; viewed by a pocket lens it appears to consist of glistening particles, which are shown by a microscope to be convex, irregular, ovoid or truncated granules, most of them, according to Mr. Jackson, being ·0010 of an inch in length, and ·0008 of an inch in breadth; mixed with others varying from about double to only half that size. In its action with boiling water, and its general properties, it resembles the other starches; than which, however, it is freer from any peculiar taste and flavour; and thus agrees better with the delicate stomachs of invalids and infants than the ordinary farinas.

Comp. Similar to that of the other starches.

Pur. A large portion of the arrow-root of the shops consists either wholly or in part of the fecula or farina of potatoes, or is more or less mixed with sago-meal or rice-meal: such materials can be readily detected by the microscope. Potato starch is known in commerce as

'FARINA' or 'BRITISH ARROW-ROOT,' or simply '*arrow-root*;' whereas, genuine arrow-root is always described as '*Bermuda*,' '*St. Vincent*,' '*St. Kitts*,' or, at least, as '*West Indian arrow-root*.' The substitution of the inferior farinas for genuine arrow-root is not only fraudulent on account of their inferior value, but is reprehensible in a hygienic point of view; as some of them are offensive to a delicate stomach, and exert of themselves, and still more when carelessly manufactured, a laxative action on the bowels; whereas the effect of true arrow-root is that of a slight and soothing tonic.

Uses, &c. As an agreeable, non-irritable article of diet for invalids and children, in the form of cakes, biscuits or puddings, or boiled with milk or water and flavoured with sugar, spices, lemon-juice, or wine, at pleasure. For young children a little caraway or cinnamon water is to be preferred. It is especially useful in irritation or debility of the stomach, bowels, or urinary organs, and in all cases in which a demulcent or emollient is indicated. It must not, however, be employed to the entire exclusion of other food, as, being destitute of the nitrogenous elements of nutrition, it is incapable alone of supporting life. *Arrow-root jelly* is prepared by first rubbing the powder up with a very small quantity of cold water, and then gradually adding the remainder boiling, stirring well all the time. Beef tea, veal broth, or milk, may be used instead of water. Some persons boil it for a few minutes. This jelly, flavoured with a little genuine port wine and nutmeg, is almost a specific in cases of simple diarrhœa arising from habit or debility.

Obs. Arrow-root is imported in tins, barrels, and boxes, from all the West-India Islands; and from Calcutta and Sierra Leone. The best quality was, until recently, solely obtained from Bermuda; but of late equally fine samples have been produced on the Hopewell Estate, St. Vincent, and, according to Dr. Ure, with the advantage of being prepared with the purest spring water, in profusion, instead of rain water.

In commerce, the word arrow-root is now often loosely used as a generic term to indicate any white, tasteless, and edible starch or fecula.

Arrow-root, Brazil'ian. Cassava-starch or tapioca-meal.

Arrow-root, East In'dian. Curcuma starch; from the tubers of the *curcuma angustifolia*, or narrow-leaved turmeric. The *maranta arundinacea* is now also extensively cultivated in India under the name of *maranta Indica*, and the fecula therefrom extensively exported, which might, with equal propriety, be called East Indian arrow-root; but this is not the case in commerce, the whole passing as W. I. arrow-root irrespective of the place of its production.

Arrow-root, Eng'lish. Potato-starch.

Arrow-root, Port'land. From the underground tubers of *arum maculatum* (Linn.) or *wake-robin*.

Arrow-root, Tahi'ti. Tacca starch or Otahite salep; from the tubers of *tacca oceanica*.

ARSE"NIATE. *Syn.* AR'SENATE; ARSE"NIAS, AR'SENAS, L.; ARSÉNIATE, Fr.; ARSENIKSAURE, SALZE, Ger. A salt consisting of AsO_4 and a metal or other basic radical; *e.g.*, ammonio-magnesium arseniate, $NH_4M_9AsO_4$.

AR'SENIC (-se-nĭk). *As. Syn.* ARSENIUM; ARSEN'ICUM, ARSE'NIUM, L.; ARSENIK, A.-METALL, Ger. ARSENICO, Sp., It. The brittle, grey-coloured metal, or metalloid, which forms the base of the white arsenic and orpiment of commerce. Discovered by Geber in the eighth century, but first accurately described by Brandt (A.D. 1773). The poisonous properties of arsenious acid were not generally known for some centuries after its discovery. As a medicine it was first employed in intermittents in Hungary.

Sources. Arsenic is peculiar to the mineral kingdom. The metallic arsenic of commerce is obtained by roasting arsenical pyrites (MISPICKEL), in earthen tubes, or in tubular earthen retorts; the arsenic sublimes, and sulphuret of iron remains behind. On the small scale it is prepared by sublimation from a mixture of arsenious acid and charcoal or black flux. Combined with oxygen it frequently exists in mineral waters; and, in a larger quantity, in certain rivulets and streams.

Prep. A mixture of arsenious acid, 1 part; and black flux, 2 or 3 parts; is exposed to a low red heat in a Hessian crucible over which is luted a deep empty crucible, or an earthen tube, to receive the metal; the latter being kept as cool as possible. Charcoal or even oil may be substituted for black flux, and a retort of hard glass may be used, with the same result. Or the following method may be used:—White oxide of arsenic, of commerce, 2 drs.; is placed at the sealed end of a hard German-glass tube ($\frac{1}{2} \times 18$ inches), and covered with about 8 inches of dry and coarsely powdered charcoal; the portion of the tube containing the latter is then raised to a red heat, whilst a few ignited coals are placed beneath the oxide to effect its slow sublimation. The sublimed metal gradually attaches itself to the inside of the tube at its cool extremity. A small charcoal furnace similar to that used for organic analysis should be employed, and the process conducted under a flue to carry off any fumes that may escape. The open end of the tube should be loosely closed with a cork.

Prop. Very brittle, so much so that it may be easily powdered in a mortar; lustre, highly metallic; colour, steel-grey or bluish-white; texture, crystalline; crystals, rhombohedrons; sublimes, without fusion, at 356 to 360° Fahr., (and slowly at lower temperatures), in close vessels unaltered, but when exposed to the air with conversion into arsenious acid; at a higher temperature, in open vessels, it burns with a

pale-blue flame. Its vapour or fumes have a characteristic alliaceous odour; it is slowly oxidised and dissolved by boiling water; but may be preserved unchanged in pure cold water; it rapidly tarnishes in the air, particularly when moist, a black film, consisting of metallic arsenic and arsenious acid forming on its surface; with chlorine, iodine, sulphur, and hydrogen, it unites to form definite compounds. With oxygen it forms acids, but no basic oxide. It combines with the metals in a similar manner to sulphur and phosphorus, the latter of which it resembles in many respects. These compounds are termed AR'SENIDES. Sp. gr. 5·7 to 5·9; sp. gr. of *vapour*, 1·0362.

Uses, &c. With copper it forms a white alloy (PACKFONG); and it is added to some other alloys to increase their whiteness, hardness, and fusibility. In *medicine*, it is only used in combination. In the metallic state it is inert; but, from its great affinity for oxygen, it rapidly becomes oxidised and poisonous; and hence acts as a powerful *poison* when swallowed, or when rubbed on the skin. Its fumes are also highly poisonous. See ARSENIOUS ACID (afid *below*).

Arsenic, Tribro'mide of. $AsBr_3$. *Syn.* TERBRO'MIDE OF ARSENIC, SESQUIBRO'MIDE OF A.; ARSEN'ICI BROMI'DUM, L. *Prep.* Add metallic arsenic, in powder, cautiously and in a very small quantity at a time, to pure bromine, contained in a vessel set in ice or a freezing mixture, until light ceases to be emitted; then cautiously distil into a well-cooled receiver.

Prop., &c. Solid below 68° Fahr.; above it, a yellowish fuming liquid, which boils at 428° Fahr.

Arsenic, Trichlo''ride of. $AsCl_3$. *Syn.* CHLO''RIDE OF A., ARSEN'ICI TERCHLORI'DUM, &c., L. *Prep.* 1. From a mixture of arsenic, 1 part; and bichloride of mercury, 6 parts; both in powder, carefully distilled into a well-cooled receiver.

2. Gently boil powdered arsenic for some time in hydrochloric acid to which a little nitric acid has been added; then concentrate cautiously by evaporation, and distil as before. It is also produced with the disengagement of heat and light, when powdered metallic arsenic is thrown into gaseous chlorine.

Prop., &c. A colourless, volatile, highly poisonous liquid, decomposed by water into arsenious acid and hydrochloric acid. It has been employed as a caustic in cancer and venereal warts; but its use requires the greatest caution.

Arsenic, Flu'oride of. AsF_3. *Syn.* ARSENIC TRIFLUORIDE, TERFLU'ORIDE OF ARSENIC. A fuming volatile liquid, prepared as the bromide.

Arsenic, Trii'odide of. AsI_3. *Syn.* TERIODI'DE OF ARSENIC, IODIDE OF ARSENIC; ARSEN'ICI IODI'DUM, A. TERIODI'DUM, L.; ARSENIC IODURE, &c., Fr. *Prep.* 1. From finely-pulverised metallic arsenic, 2 parts; iodine, 11 parts; mixed and gently heated in a bent glass tube, or a suitable retort, until combination is complete; the heat being then raised, and the sublimed iodide collected, and at once put into a well-stopped phial.

2. Arsenic, in fine powder, 1 part; iodine, 5 parts; triturate them together, place the mixture in a small flask or retort just large enough to contain it, and apply a gentle heat until liquefaction is complete, avoiding the formation of iodine vapour; when the odour of iodine is no longer perceptible, and the mass assumes a reddish-yellow colour and crystallises on the sides of the vessel, the operation is complete, without having recourse to sublimation. A very easy and excellent process.

Prop., &c. A deep orange-red, crystallisable solid; soluble in water, and highly volatile and poisonous. Its aqueous solution yields the iodine unchanged by rapid evaporation, but when slowly concentrated and set aside, white pearly plates are obtained, consisting of arsenious acid and the teriodide. As a *medicine*, it combines the properties of both arsenious acid and iodine, but its use requires great caution. It has been successfully employed by Dr. A. T. Thomson, Biett, and others, in obstinate skin diseases (*lepra, impetigo, herpes, lupus, psoriasis*, &c.), and in real or stimulated cancer.—*Dose.* $\frac{1}{16}$ to $\frac{1}{12}$ gr. (in pills or solution), gradually increased to $\frac{1}{4}$ or even $\frac{1}{3}$ gr. (A. T. Thomson.) *Externally*, 2½ grs., to lard 1 oz.; of which 1 dr. may be used at a time. (Biett.)

Arsenic, Disulphide of. As_2S_2. *Syn.* ARSENIC BISULPHIDE, BISUL'PHIDE OF A., RED SUL'PHIDE OF A., &c., REALGAR; RÉALGAL, ARSENIC ROUGE SULFURE, ORPIN ROUGE, &c., Fr.; ROTHES SCHWEFELARSENIK, &c., Ger. This substance is found native at Solfaterra, near Naples, and in several other volcanic districts; but that of commerce is often prepared by distilling arsenical pyrites, or a mixture of sulphur and white arsenic, &c., in the proper proportions, as noticed under REALGAR and RED PIGMENTS.

Prop., &c. A fusible, volatile substance; scarlet or ruby-red in mass, but orange-red in powder, by which it is distinguished from cinnabar; crystals, oblique rhombic prisms. Sp. gr. 3·3 to 3·6. Its chief use is as a pigment, and in pyrotechny to make white fire. The factitious sulphide has not the rich colour of the native mineral, whilst it is much more poisonous. It is improved by resublimation.

Arsenic, Trisul'phide of. As_2S_3. *Syn.* TERSUL'PHIDE OF ARSENIC, YELLOW SUL'PHIDE OF A., SESQUISUL'PHIDE OF A., OR'PIMENT; A. SESQUISULPHURE'TUM, ORPIMEN'TUM, L.; ORPIMENT, SULFURE JAUNE D'ARSENIC, &c., Fr.; AURIPIGMENT, OPERMENT, RAUSCHGELB, Ger. This sulphide, like the last, is found ready formed in nature; and is prepared artificially, by sublimation, from a mixture of arsenious acid and sulphur, as noticed under

ORPIMENT and YELLOW PIGMENTS. It also falls as a precipitate when a stream of sulphuretted hydrogen gas is passed through an acid solution of arsenious acid or of an arsenite.

Prop., &c. Golden-yellow crystalline lumps, or a fine golden-yellow powder; crystals, right rhombic prisms; volatile; fusible; very soluble in pure alkalies, by which it is distinguished from sulphide of cadmium; and from trisulphide of antimony by being insoluble in hydrochloric acid. The factitious sulphide (KING'S YELLOW) of the shops often contains 80 to 90% of white arsenic; and is, therefore, much more poisonous than the native trisulphide. Sp. gr. (native) 3·44 to 3·60.

Use, &c. As a dye, as a pigment, and as an ingredient in fireworks, and in some depilatories. Silk, woollen, or cotton goods soaked in a solution of pure orpiment in ammonia, and then suspended in a warm apartment or stove-room, rapidly lose their ammonia, and become permanently dyed of a superb yellow colour. The native sulphides (both red and yellow) are much less soluble, and hence, less poisonous, than those prepared artificially. They also possess the richest colour; and are, therefore, preferred by artists and dyers. In former times, orpiment, like realgar, was employed in medicine. See ARSENIC.

Arsenic, Pentasul'phide of. As_2S_5. *Syn.* SULPHARSEN'IC ACID, &c.; ARSEN'ICI PENTASULPHURE'TUM, &c., L. When a stream of sulphuretted hydrogen is transmitted for some time through a solution of arsenic acid, a precipitate of the PENTASULPHIDE is deposited after some hours' repose. Its formation is accelerated by boiling the liquid.

Prop., &c. It greatly resembles the tersulphide in its appearance and general properties.

Arsenic, White‡. See ARSENIOUS ANHYDRIDE.

Arsenic, Yell'ow. Trisulphide of arsenic.

ARSEN'IC ACID. H_3AsO_4. *Syn.* ACIDUM ARSEN'ICUM, L.; ACIDE ARSÉNIQUE, Fr.; ARSENIKSÄURE, Ger.

Prep. 1. Arsenious acid, in fine powder, 2 parts; concentrated nitric acid, 6 parts; hydrochloric acid, 1 part; mix in a flask or tubulated retort, and digest, with heat, until solution is complete; after repose, decant the clear portion, and evaporate, to the consistence of a thick syrup.

2. Dissolve arsenious acid in hot hydrochloric acid, and when the solution is cold, add concentrated nitric acid, in small quantities at a time, until red vapours cease to be evolved, then proceed as before.

Prop. Sour, thick syrup, occasionally forming clear transparent crystals, very deliquescent, and converted by heat into the anhydrous acid. Extremely poisonous and soluble.

Arseniates. *Prep.* Most of the metallic arseniates may be formed by adding a solution of a soluble salt of the metal to another of an alkaline arseniate, as long as a precipitate falls; which must be collected, washed, and dried. The alkaline arseniates may be prepared by adding the base or its carbonate to a solution of the acid, to alkaline reaction, and then evaporating and crystallising the liquid.

Prop., &c. The arseniates of the alkalies are soluble in water; those of the earths and metals insoluble, except in acids. They are isomorphous with the corresponding phosphates.

Tests. Nitrate of silver added to the solution of an arseniate gives a highly characteristic reddish-brown precipitate, which distinguishes it from arsenious acid. Nitrate of lead gives a white precipitate, and the salts of copper greenish-blue ones. Pure lump-sugar dissolved in an aqueous solution of this acid becomes, in a few hours, of a reddish colour, and afterwards of a magnificent purple. Heated with charcoal it evolves a garlic-like odour, and is reduced to the metallic state. The suspected liquid being treated with sulphurous acid and boiled for a short time, the arsenic acid loses oxygen and is converted into arsenious acid, which may be tested for as such. Sulphuretted hydrogen does not precipitate a solution of arsenic acid, or an acidified arseniate, until after the lapse of several hours; and alkaline and neutral solutions, not at all.

ARSENIC ANHYDRIDE. As_2O_5. *Syn.* ANHYDROUS ARSENIC ACID, ARSENIC ACID; ACIDUM ARSENICUM, L.; ACIDE ARSÉNIQUE, Fr.; ARSENIKSÄURE, Ger. Best prepared by igniting the arsenic acid, in a platinum crucible, at a low red heat, as long as water is given off.

Prop. White deliquescent substance, and violent poison, readily soluble in water to the acid.

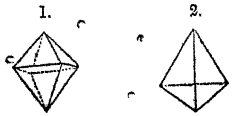
ARSENIOUS ACID. See ARSENIOUS ANHYDRIDE.

ARSE''NIOUS ANHYDRIDE. As_2O_3. *Syn.* AR'SENIOUS ACID, AR'SENIC, WHITE A.; ACIDE ARSÉNIEUX, ARSENIC BLANC, OXYDE, Fr.; ARSENIGSÄURE, ARSENICHSTE S., Ger.; ARSENICO BIANCO, It.; A. BLANCO, Sp. The arsenic, or white arsenic, of the shops.

Sources. The white arsenic of commerce is principally imported from Germany, where it is obtained in the process of roasting arseniuretted cobalt ores, in making zaffre. At Altenburgh it is procured from arsenical iron pyrites (mispickel); and at Reichenstein from native arsenide of iron. About 900 to 1000 tons are also annually collected at Cornwall, being principally a secondary product of the process of roasting grey copper ore and white mundic. The British arsenic works in that county, are perhaps the finest in the world. The usual plan is to roast the powdered ore in muffle-furnaces; by which its arsenic is converted into arsenious anhydrid, which escapes as vapour (smelting-house smoke), and passing into the condensing-chambers, is deposited in a pulverulent state, forming the flowers of arsenic, or rough white arsenic, of the smelters.

(the giftmehl or poison-flour of the Germans). The crude article obtained in this way is purified by re-sublimation in suitable iron pots or other iron vessels, before it is fit for sale. It then forms a semi-transparent vitreous cake, which gradually becomes opaque, and of snowy whiteness, by exposure to the air, and at length acquires a more or less pulverulent state on the surface.

Prop. Crystals (obtained by careful sublimation, or by cooling a boiling aqueous solution), usually transparent, regular octahedrons (see *fig.* 1), but sometimes, though rarely,



assume the form of tetrahedrons (see *fig.* 2). When prepared on the large scale, it forms large, glassy, colourless or yellowish-white, transparent or semi-transparent cakes or porcelain-like masses (vitreous arsenious acid, glacial a. a.), which soon become opaque on their exterior, and often friable and pulverulent; odourless; volatilises at 380° Fahr.; fumes, odourless, unless carbonaceous organic matter be present, when they smell strongly of garlic; heated under pressure it liquefies and forms a transparent glass; taste, faintly sweetish, with a slight acidity and astringency, not perceived until some minutes after being swallowed. The opaque variety is soluble in 80 parts of water at 59° Fahr., and 7·72 parts of boiling water; but on cooling to 60°, only about ⅓rd of this quantity continues in solution. The transparent variety is soluble in 103 parts of water at 59°, and 9·3 parts of boiling water. Both soluble in alcohol, syrups, oils, and spirits, and freely so in alkaline lyes and hydrochloric acid; organic matter generally impedes its solution; solutions redden litmus; heated with organic matter it is reduced to the metallic state. Sp. gr. 3·5 (lowest opaque var.) to 3·8 (highest transp. var.).

Arsenites. True arsenious acid ($HAsO_2$) has never been obtained in a satisfactory condition, but its salts are readily obtained by dissolving arsenious anhydride in a solution of the base, or by double decomposition. They are generally white; nearly all insoluble, except those of the alkalies, and all soluble in acids.

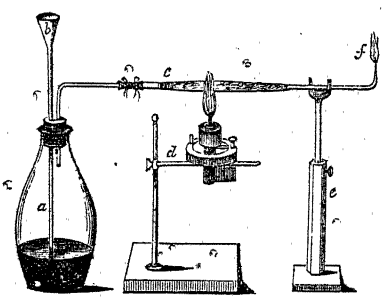
Tests, Detec., &c. Owing to the importance of the subject, and for convenience and facility of reference, the leading tests for the arsenites and arsenious anhydride are noticed alphabetically below; to which a few general remarks on their application, under the various circumstances that occur to the chemist and toxicologist, are appended. When not otherwise stated, it is to be understood that they are to be applied to pure, or nearly pure and colourless solutions of arsenious acid or the arsenites.

Ammonio-nitrate of silver gives a well-marked yellow precipitate of arsenite of silver in an agneous of arsenious anhydride solution which is soluble in ammonia and in dilute nitric acid.

Crystallisation Test.—A very minute quantity of arsenious acid placed in a small tube (arsenic-tube), and heated in the flame of a spirit lamp, gives a crystalline sublimate, which collects on the cooler portion of the tube, and which, when examined by a pocket lens, is found to consist of sparkling octahedral crystals (see *engr.*).

(Magnified.)

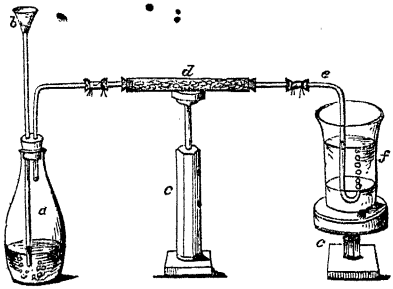
Ellis's Test.—This is a modification of the 'nascent hydrogen test,' in which the suspected gas is passed through a tube containing slips of copper leaf or riband, or still better pure oxide of copper, gently heated; the end of the tube communicating with the atmosphere being drawn to a capillary size, at which the gas may be enflamed and tested, as in 'Marsh's Apparatus.' (See *engr.*) If arsenic be abundant in the gas, the copper will be almost instantly frosted over with a coating of metallic arsenic; and after continuing the heat for a few minutes it will present a beautiful silvery surface, and may then be submitted to further examination.



(*a.*) Flask containing the suspected fluid, dilute sulphuric acid, and zinc.
(*b.*) Funnel.
(*c.*) Tube containing the copper-leaf or c.-riband, and heated by the lamp (*d*).
(*e.*) Support.
(*f.*) Capillary end of tube (*c*), with the gas inflamed.

Lassaigne's Test. (Adopted by the French Academy.) This consists in passing the gas generated in the suspected liquid, through a solution of nitrate of silver. (See *engr.*) When arsenic is present black flocculi of metallic silver are deposited, and arsenious acid remains in solution mixed with nitric acid and some arsenide of silver. The filtered liquor, treated with ammonia, will now give a

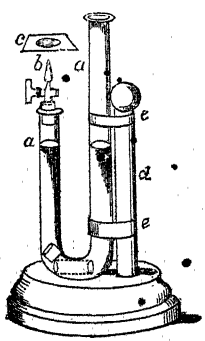
characteristic yellow precipitate of arsenite of silver; or a little dilute hydrochloric acid may be cautiously added to precipitate any remaining nitrate of silver, and the liquid, after filtration, tested for arsenic either in a Marsh's



(*a.*) Bottle containing dilute sulphuric acid, zinc, and suspected fluid.
(*b.*) Funnel for supplying the bottle with acid.
(*c, c.*) Supports.
(*d.*) Tube filled with asbestos.
(*e.*) Bent tube to convey the liberated gas.
(*f.*) Glass vessel containing a solution of nitrate of silver.

apparatus, or with any of the liquid tests; or it may be evaporated to dryness, when its arsenious acid will be converted into arsenic acid by the nitric acid present, and will then be found to give the usual brick-red precipitate of arseniate of silver with a solution of the nitrate of that metal. See MARSH'S TEST.

Marsh's Test. Some of the suspected liquid is mixed with dilute sulphuric acid until strongly acid, and is then poured upon some pure granulated zinc, or clippings or other small pieces of zinc, previously placed in the apparatus; hydrogen gas is immediately evolved, and, if arsenic be present, unites with it, forming arseniuretted hydrogen gas, which escapes by the aperture *b* (see *engr.*), and may be recognised as follows:—



(*a, a.*) Bent glass tube, containing dilute sulphuric acid, zinc, and suspected liquid.
(*b.*) Stop-cock and jet.
(*c.*) Plate of glass to receive the stain.
(*d.*) Support.
(*e, e.*) Bands to keep the tube upright.

It possesses a garlic-like odour.

It burns with a bluish-white flame and emits a whitish smoke.

If a piece of window-glass, or a white porcelain plate or saucer, be held a short distance above the flame, a fine pulverulent film of arsenious acid is deposited on it. See (*fig.*) *above.*

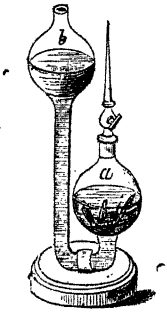
If the cold plate be held in the flame, so as to slightly impede the combustion of the gas, a blackish-brown deposit of metallic arsenic is obtained, more or less deep, brilliant, and glistening. Both these deposits may be obtained simultaneously by holding nearly vertically over the flame a glass tube about 8 or 10 inches long, and $\frac{3}{16}$ths of an inch in diameter. See (*fig.*) *above.*

A solution of arsenious acid may be obtained by letting the flame play upon 3 or 4 drops of water placed on the under side of the piece of glass or china, to which the 'liquid tests' may be then applied. Another plan is to apply drops of the liquid tests to the plate as above, and to let the flame play on them successively.

The true arsenical spot or film is of a blackish-brown colour, and generally of a very deep hair-brown, usually surrounded at the circumference, with a white film of arsenious acid; whilst that of antimony, which in some points is similar, is of a deep black colour, and but feebly lustrous, and, when viewed by transmitted light, appears smoky-black; whereas an arsenical spot viewed in the same way, appears brown. It is further distinguished from others by—Treated with concentrated nitric acid, it instantly disappears, leaving upon the surface of the liquid traces of the metal, which only dissolve on the application of heat. This solution, gently and carefully heated, leaves a white residuum, which, when cold, gives with a concentrated solution of nitrate of silver, a dull-red precipitate of arseniate of silver.—The nitric solution treated with a few drops of sulphurous acid, and subsequently with sulphuretted hydrogen, gives a canary-yellow precipitate of trisulphide of arsenic, which readily redissolves, forming a colourless solution with ammonia.—The arsenical spot, when heated, is turned bright yellow by sulphuretted hydrogen, and is then readily dissolved, as before, by ammonia, and by its bicarbonate; whereas one of antimony is turned of a deep orange-red, or reddish-brown, by sulphuretted hydrogen, is not readily dissolved by ammonia, and is scarcely or not at all affected by bicarbonate of ammonia.—It is freely soluble in and removed by hypochlorite of soda; a reagent which does not affect antimonial spots. Heated by a flame of pure hydrogen an arsenical stain rapidly disappears. A mixed stain of antimony and arsenic does not disappear by the action of the last two reagents, and is shown to contain arsenic by the two first tests above. When hydrochloric acid is present zinc stains are sometimes formed, but they do not re-

semble those from arsenic. The flame which produces it is very pale blue or bluish-white; whereas antimoniuretted hydrogen burns with a pale green or greenish-yellow flame, and a white smoke, both of which are characteristic.

Obs. Marsh's test is admirable for its simplicity, delicacy, and trustworthiness, as well as for the ease of its application. It is adapted to all liquids, whether colourless or coloured, which are not so glutinous as to inconveniently froth during the extrication of the hydrogen.[1] Various modifications of the original apparatus have been proposed to obviate this difficulty; among which the one chiefly deserving notice is figured in the margin. It consists of a bent tube having two large bulbs blown in it, and fitted with a stop-cock and jet in the usual manner. In this case the grains or fragments of zinc are put into the lower bulb (*a*).

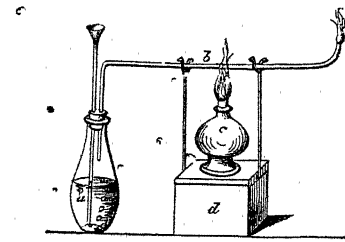


It is, however, worthy of remark, that, with ordinary care and skill, a simple wide-mouthed bottle, furnished with a tube and cock, will often be found to answer quite as well as more costly apparatus; as the fluid is less liable to froth than in a narrow tube. Even a common quinine-phial, or a 4-*oz.* or 6-*oz.* medicine phial, fitted with a piece of glass tube of very small bore, or even with a piece of a common tobacco-pipe, for a burner (see *engr.*), may be used when no more convenient instrument is at hand.

A film of oil placed on the surface of the liquid tends considerably to lessen the frothing.

Objec., precau., &c. Objections have been raised to this mode of testing, from the great frothing which often occurs with organic mixtures, and from antimony and imperfectly charred organic matter also forming crusts somewhat resembling, to the inexperienced eye, those produced by arsenic. But these objections are invalid, because there are easy means of purifying the liquid before testing it, and of discriminating between true arsenical spots or deposits, and false ones. Another objection is, that both zinc and sulphuric acid sometimes contain arsenic; but to obviate this difficulty, we have only to use them when perfectly pure; and to test them by means of the apparatus before pouring the suspected liquid into it. Indeed, these objections apply with equal force to all those tests which depend on the production of nascent hydrogen. The precaution necessary to success, and to reliable results, is to set the apparatus with simple zinc, acid, and water, and after it has worked a short time to test the evolved gas for arsenic (as above); when, if no trace of that substance is detected, the suspected fluid, in which the organic matter (if necessary) has been destroyed by any one of the methods hereinafter pointed out, may be added, and the operation continued. Care should also be taken not to light the jet of gas before all the atmospheric air is expelled from the apparatus, as without this precaution an explosion may take place.

Nascent Hydrogen Test. The apparatus used may be similar to that figured in the *engr.* The plan followed in the laboratory of Giessen, is to heat the long tube through which the gas passes to redness in several parts, to produce distinct metallic mirrors; and then to remove the tube from the hydrogen apparatus and transmit a very feeble stream of dry sulphuretted hydrogen through it, the metallic mirrors being at the same time heated by means of a common spirit lamp from the outer towards the inner border or extremity. If arsenic alone is present, yellow trisulphide of arsenic is formed within the tube; if antimony alone is present, an orange-red or black trisulphide of antimony is produced; and if



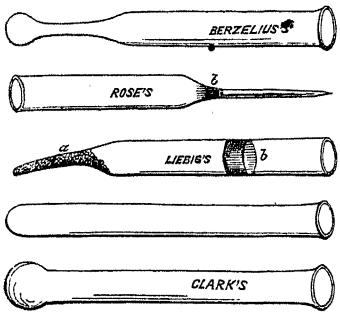
(*a*). Flask containing the suspected fluid, dilute sulphuric acid, and zinc.
(*b*.) Small tube, at the one end having an almost capillary orifice, where the gas is inflamed.
(*c*.) Spirit-lamp.
(*d*.) Support.

the mirror consists of both metals, the two sulphides appear side by side, the sulphide of arsenic, as the more volatile, lying invariably before the sulphide of antimony. If dry

[1] Animal tissues and liquids containing organic matter are best prepared for testing for arsenic by Marsh's test, in the following manner proposed by Odling:—The tissue, or the residue obtained by the evaporation of a liquid over a water-bath, is to be *thoroughly* dried at a temperature of about 212° F., then ground to powder or cut up into small pieces, next drenched with the strongest hydrochloric acid and allowed to stand twenty-four hours in a warm place, and finally distilled. The distillate will contain arsenic (if it existed in the material under examination) comparatively free from organic matter, and is, therefore, in a fit state to be introduced into Marsh's apparatus, as the organic matter, which is the cause of frothing, has been removed.

hydrochloric acid gas be now transmitted through the tube, without application of heat, no alteration will take place if sulphide of arsenic alone is present, even though the gas be transmitted through the tube for a considerable time. If sulphide of antimony alone is present, this will entirely disappear; and if both sulphides are present, the sulphide of antimony will immediately volatilise, whilst the yellow sulphide of arsenic will remain. If a small quantity of ammonia be now introduced into the tube, the sulphide of arsenic is dissolved, and may thus be readily distinguished from sulphur which perhaps may have separated.

Reduction Test. A small quantity of the suspected sample, in the state of powder, is mixed with twice its weight, or more, of some reducing agent or flux, and the mixture is placed at the bottom of a very small glass tube,



(*a.*) The arsenical mixture.
(*b.*) Arsenical ring.

and heated in the flame of a small spirit lamp for some time, when the arsenic gradually sublimes, and condenses in the cooler portion of the tube, under the form of a metallic crust, mirror, or ring. A common test-tube, if of very small diameter, may be employed; but those known as the reduction tubes of Liebig, Rose, or Berzelius, are undoubtedly the most convenient and efficient. (See *engr.*)

Liebig's method is by using a mixture of equal parts of dry carbonate of sodium and cyanide of potassium. The suspected substance, perfectly dry and in powder, being first introduced into a Berzelius' tube, is then covered with 6 times the quantity of this mixture, and so that the whole will not more than half fill the bulb. A very gentle heat is next applied, to expel any adhering moisture from the powder and the tube, after which a strong heat is applied to the bulb, and continued for some time, to effect the entire reduction and sublimation of the arsenical compound.

The best fluxes to use are ferrocyanide of potassium dried at 212° F., calcined bitartrate of potassium, cyanide of potassium, and powdered charcoal.

The metallic ring is proved to be arsenical by the properties and tests previously noticed. Should it be imperfectly formed, or marked by decomposed organic matter, the portion of the tube which contains it may be cut off with a file, next coarsely powdered, then re-introduced into another arsenic-tube, and the exposure to heat repeated.

The characteristics most simple and well-marked are—

The volatility of the deposit when heated, shown by its escaping from the hotter portion of the tube and condensing on the cooler part higher up or further on.

Its conversion into minute octahedral crystals of arsenious anhydride, when repeatedly chased up and down the tube by the cautious application of the flame of a spirit lamp first to one part, and then to another. The character of these crystals with respect to volatility, lustre, transparency, and form, is so exceedingly well marked, that a practised eye may safely identify them, though their weight should not exceed the $\frac{1}{100}$th, or even the $\frac{1}{250}$th part of a grain. A pocket lens is here serviceable. The form of the crystals is very evident with a microscope of 4 powers. Oxide of antimony never forms octahedrons, but only prisms.

In employing this test, particular care must be taken to avoid soiling the sides of the tube in inserting the mixture, and that the substances operated on are perfectly dry; as, unless this is attended to, the experiment does not succeed. The common plan is to introduce the mixture through a small paper funnel or tube extemporised for the purpose. The heat at first should be gentle, and merely sufficient to expel any adhering moisture from the mixture and the inner surface of the tube; after which (except where otherwise ordered) the upper portion of the mixture should be strongly heated, and then the bulb or bottom of the tube exposed to the full flame. After the operation is complete the bulb or lower portion of the tube is usually removed by a file, and the portion containing the deposit hermetically sealed, when it may be preserved, unaltered, for any length of time, ready to be produced as evidence, if required.

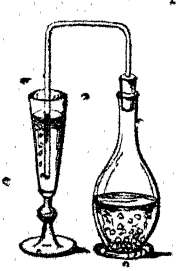
This test is usually regarded as decisive; as we here actually obtain the arsenic in a solid form, recognisable by the most unequivocal characters.

Reinsch's Test; Cupro-arsenical Test. The suspected solution is strongly acidulated with hydrochloric acid (1 to 6 *or* 8), and after being raised to ebullition in a porcelain or glass vessel, some bright and clean metallic copper in the form of gauze, foil, clippings, or wire, but preferably the first, is added, and the whole boiled together. The time required for the ebullition varies according to the strength of the solution; when weak it should be continued for at least a quarter of an hour. When the quantity of arsenic in the suspected liquid is very small, at least ½ an hour should elapse before the removal of the copper. In solutions containing a notable quantity of arsenic, a few

seconds is often sufficient to obtain a coating; but which, for safety sake, may be extended to 2 or 3 minutes, or even longer. Liquids rich in organic matter also require longer boiling than those nearly free from it. The coated copper, which has now acquired a characteristic iron-grey colour, is then taken from the liquid, carefully washed in distilled water, in alcohol, and (if greasy) in ether, next dried on blotting paper, and then either cut into small pieces or rolled into a small coil or cylinder. It is then heated in a reduction-tube over a spirit lamp, when the metallic arsenic forming the coating is volatilised, and yields a sublimate of minute octahedral crystals of arsenious anhydride; or, if the tube be very small, or any reducing agent be added, a bright metallic ring. When the coating on the copper is sufficiently thick, it may be scraped off with a knife, and heated separately in an arsenic-tube.

This test is invaluable as affording a certain and ready means of abstracting arsenic from its solution, whether pure or mixed with organic matter. The contents of the stomach or other viscera may thus be at once examined, without any tedious preliminary operations. In this way Dr. Christison discovered the presence of arsenic upwards of 4 months after interment; and we have ourselves found it 2 years and 8 months after interment. The coated copper may be preserved unharmed for years. Dr. Taylor found that the 1-8th of an inch of one of these deposits that had been kept in paper nearly fourteen years, gave a well-marked ring of octahedral crystals, when heated.

Sulphuretted Hydrogen Test; Sulphur Test. This produces a bright yellow precipitate of trisulphide of arsenic (orpiment) in solutions containing a free acid; but acts slowly and imperfectly on pure and neutral solutions, and does not disturb those that possess an alkaline reaction. The suspected liquid should therefore be slightly acidulated with hydrochloric or acetic acid before applying this test, unless it be already acid, when it is better first to neutralise it with an alkali, and then to add the acid. The transmission of the gas through the liquid (see *engr.*) should be continued for at least half an hour; when the end of the conducting tube, after being well rinsed in the liquid, is removed, and the glass, lightly covered with a piece of porous paper, set aside in a temperature of about 100° Fahr., until the odour of sulphuretted hydrogen is completely lost. The precipitate is now collected on a small filter, washed with pure water, and dried by a gentle heat. It is then placed in a watch-glass or small capsule, and redissolved in a little liquor of ammonia, which is then again expelled by heat; or it may be at once submitted to confirmatory tests. It is shown to contain arsenic by its ready and perfect solubility in ammonia, and in solutions of the fixed alkalies, their carbonates and bicarbonates, and in alkaline sulphides; by being nearly insoluable in hydrochloric acid, even when concentrated and boiling; and by yielding a metallic mirror when mixed with a flux and submitted to the reduction-test (which *see*).

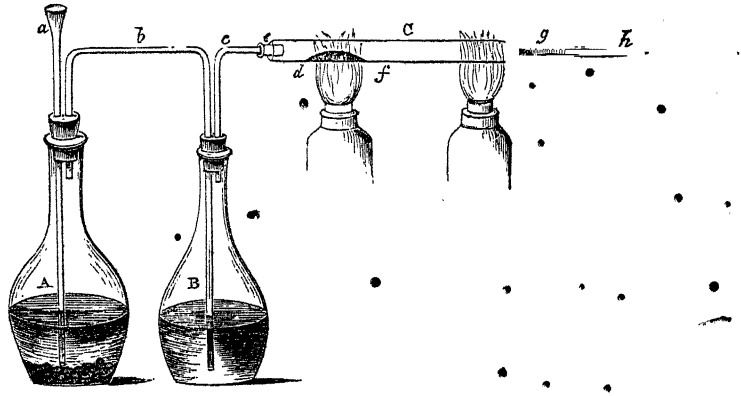


Sulphuretted-hydrogen water and sulphydrate of ammonium act in a similar way to gaseous sulphuretted hydrogen; but much less effectively.

For accuracy, the sulphuretted hydrogen should be washed by passing it through a small bottle containing a little pure water, or sulphuric acid, before allowing it to enter the arsenical liquor. The reduction of the newly precipitated sulphide is generally regarded as the most important part of the investigation, and requires great care and attention. An extremely elegant and sensitive method of effecting this, is by heating the mixture in a stream of dry carbonic acid gas. This method has been followed by Drs. Babo and Fresenius with the most satisfactory results, and is thus performed:—(*A*) is a capacious flask for the evolution of carbonic acid, half filled with rather large pieces of solid limestone or marble (not chalk). To one aperture of the doubly perforated cork, a funnel-tube (*a*) is adapted, which nearly reaches to the bottom of the vessel; to the other aperture a tube (*b*), by means of which the gas evolved is conducted into a flask of smaller size (*B*), in which it is washed and dried by concentrated sulphuric acid. The tube (*c*) conducts the carbonic acid into the reduction-tube (*C*), which is shortened in the *engr.*, and must be made of difficultly fusible glass. When the apparatus is prepared, the sulphide of arsenic intended for reduction is rubbed in a small basin, previously heated in a water bath, with about twelve parts of a well-dried mixture consisting of 3 parts of dry carbonate of sodium, and 1 part of cyanide of potassium (prepared by Liebig's method). The mixed powder is then placed on a small strip of card-paper beat into the shape of a gutter, which is next pushed into the reduction-tube up to the point (*f*), and the tube is turned half round. In this manner the mixture is deposited without soiling any other part of the tube; after which, the strip of card-paper is cautiously withdrawn. The reduction-tube is then, by means of the cork (*e*), fixed in its place; a moderate stream of carbonic acid gas is evolved by pouring hydrochloric acid into the funnel-tube (*a*), and the 'mixture' carefully dried, by very moderately heating the tube along its whole length, by means of a small spirit lamp. When the gas-stream has become so slow that the bubbles pass through the sulphuric acid at inter-

vals of about a second, the spot (*k*) is heated to redness by means of a spirit lamp. When this point is attained, another strong spirit-flame is applied to the mixture, progressing from (*d*) to (*f*), until all the arsenic is reduced and volatilised (the first flame at the same time continuing in action at *k*).

The reduced arsenic recondenses at the spot (*g*), forming a mirror, whilst an exceedingly small portion escapes at the capillary orifice (*h*), and fills the air with its garlic-like odour. The second spirit lamp is at last slowly advanced towards the other lamp, or the spot (*k*), so as to drive towards (*g*) all the arsenic which has adhered to the walls of the wider part of the tube. Both lamps are then removed, the tube closed at the point (*h*) by fusion, and heat applied, progressing from the point (*h*) towards (*g*), to contract the mirror on that side also, which increases its beauty and distinctness. The tube is then cut off at (*f*), and hermetically closed and sealed. In this state



it becomes a permanent evidence which may be referred to in any future proceedings. Neither sulphide of antimony nor any other compound of antimony yields a metallic mirror or ring, when treated in this way. Less than $\frac{1}{200}$ gr. of trisulphide of arsenic thus gives a very distinct and beautiful mirror; and even $\frac{1}{500}$ gr., a clearly perceptible one.

Voltaic Test. The wires from the opposite poles of a voltaic battery are immersed or brought in contact with a little of the arsenious solution placed in a capsule or on a piece of window-glass. If arsenic be present it is developed at the negative pole; and if this be formed of copper wire, it becomes whitened and assumes the appearance of polished steel or silver, in consequence of the formation of arsenide of copper.

Detection of Arsenic in *Organic Mixtures.* Of the tests, those which act by producing *coloured* precipitates are only applicable, with any degree of certainty, to perfectly limpid and colourless liquors. Those depending on the extrication of arseniuretted hydrogen are partially free from this inconvenience; but even here, if the suspected liquid be more than slightly charged with organic matter, so much frothing ensues, as to render the process nearly unmanageable. In this respect *Reinsch's Test* possesses advantages over all others; as it may be applied even to coloured liquids containing a considerable quantity of organic matter, without these being subjected to any preliminary process, and without danger of failure. In some cases also, as with liquids possessing only a slight degree of consistency or colour, the arsenic may be separated, after simple filtration and acidulation with hydrochloric acid, by a stream of sulphuretted hydrogen, in the usual manner. The reduction-test is only applicable to solid arsenious acid, or to compounds of arsenic obtained by means of other tests or processes. In toxicological examinations the poison is almost always to be sought for in mixtures loaded with organic matter, and under other conditions even more embarrassing. Soon after arsenic is swallowed, it enters the circulation, contaminates the various tissues, localises itself in certain viscera, and is eliminated in the excretions. Hence it becomes necessary not only to examine the solids and liquids in which it is suspected the poison has been administered, the vomited matter, and the contents of the stomach and primæ viæ; but also, in fatal cases, the stomach itself, the liver, muscles, blood, and, more especially, the urine.[1] In such cases the stomach is the part first laid open, and a careful examination is made of its contents and coats in order to detect any undissolved particles of the poison; a pocket lens being employed, if necessary, in the search. If any particles, however minute, are found, they are carefully collected and submitted to the reduction-test. If the reverse be the case, the

[1] Absorbed arsenic more particularly localises itself in the liver, in which it may generally be found in from 12 to 15 hours after administration. The liver also generally retains traces of arsenic long after it has been eliminated from the other viscera and the muscular tissues.

stomach (cut into small pieces), together with its contents, is submitted to some further process, to obtain a solution suitable for the application of the usual tests. The liver, also some muscle, and any other portion of the body that may be selected, are likewise separately treated in the same manner. We have here, both solid and liquid organic matter to operate on, and the problem for solution is, the abstraction of their arsenic in the simplest and most certain manner, and in a form in which its presence may be demonstrated by tests. This subject has long engaged the attention of the most eminent chemists and toxicologists, and various plans have been proposed for the purpose; among which the following appear to be the most valuable, and that usually adopted:—

(Reinsch.) Solids (as the stomach, liver, &c.) are cut into small fragments, and boiled in a glass vessel with water acidulated with about 1-4th of its volume of hydrochloric acid, until the tissues or fragments are entirely broken down into flakes or grains, when the whole, after filtration, is again heated to the boiling-point, and tested as described under Reinsch's test (see ANTIMONY). Liquids do not require this preparation.

Estim. This may be effected in various ways:—

1. GRAVIMETRICALLY:—Arsenic is usually WEIGHED under the form of arsenate of lead, arsenate of sesquioxide of iron, tersulphuret of arsenic, (metallic) arsenic, or (directly) as arsenious anhydride. The last three only, as the more simple and convenient, will be noticed here:—

As Trisulphide:—The whole of the arsenic being precipitated by a stream of sulphuretted hydrogen, with the necessary precautions, in the manner already noticed, the precipitate, after being carefully collected, washed, and dried, is purified by redissolving it in pure ammonia water, and evaporating the resulting solution in a weighed watch-glass or capsule, by the heat of a water bath. It is then dried at a temperature not above 212° Fahr., and finally weighed. Each grain of the tersulphide so found corresponds to ·80487 gr. of arsenious acid, or ·61 gr. of metallic arsenic.

As (metallic) Arsenic:—Obtained by one of the processes already given. Each gr. represents 1·32 gr. of arsenious acid.

As Arsenious anhydride:—Obtained in a weighed capsule or tube, either by the crystallisation or sublimation test. The weight is the answer sought for arsenious anhydride. Each gr. of this is equiv. to ·75758 gr. of metallic arsenic.

VOLUMETRICALLY. (Method of F. Mohr.) This depends on the fact, that an aqueous solution of arsenious acid, or of an alkaline arsenite, when mixed with an excess of saturated solution of pure bicarbonate of soda, and a little starch-paste, has its arsenious acid converted into arsenic acid, by a solution of iodine. A standard solution of iodine is, therefore, an appropriate arsenimeter for the above mixture. The solution of iodine is added until the blue starch-reaction just begins to appear; the arsenious solution having been previously exactly neutralised with pure carbonate of soda, if acid; or with pure hydrochloric acid, if alkaline. The results are accurate when no substance capable of oxidising or decomposing iodine is present in the liquid tested.

Phys. eff., &c. Arsenious anhydride or white arsenic is alike destructive to vegetable and animal life. Seeds soaked in any but a very weak solution of it, lose their power of germination; and buds plunged in it become incapable of expanding into flowers. When applied to the leaves, roots, or stems, absorption takes place, and the plant soon perishes. On combustion it evolves the characteristic garlic-like odour of arsenic, and arsenic may be discovered in its substance by chemical tests. According to Jäger, Gilgenkrantz, and Pereira, a few of the lower order of the algæ are occasionally developed in solutions of arsenious acid. To all animals, from the infusoria up to man, arsenic proves deleterious, although in different degrees; the highest susceptibility of its effects existing in man, on account of the superiority of his development. In all of them death is preceded by inordinate actions and increased evacuations, especially from the mucous surfaces. Difficult respiration, thirst, vomiting, and convulsions, are the leading symptoms which gradually develope themselves as we approach the higher grades of the system. (Jäger.) In very small or therapeutical doses, properly administered, it is a valuable medicine, and acts as a tonic, alterative, and antispasmodic attenuant; and externally, as an escharotic. In slightly increased medicinal doses, or long-continued small doses, nausea, vomiting, purging, griping, debility, emaciation, and all the effects of slow-poisoning, occur in succession—a gradual sinking of the powers of life, without any violent symptom; a nameless feeling of illness, failure of the strength, an aversion to food and drink, and to all the enjoyments of life. Redness of the conjunctiva and eyelids, headache and giddiness, spasms, eczematous eruptions, numbness and paralysis of the limbs, and pytalism, are also frequent and well-marked symptoms of slow poisoning by arsenic. In an excessive or poisonous dose, the symptoms are rapid and violent; usually indicating extreme gastro-intestinal inflammation and disorder of the cerebro-spinal system, and often occasioning death in from 1 to 3 days. The smallest fatal dose found recorded by Christison is 4½ grs., taken in solution. The subject was a child 4 years old, and death occurred in six hours. 2½ grs. destroyed a robust girl in 36 hours. (Letheby.) 2 grs., in solution, are suspected to have caused the death of a full-grown woman. 2 or 3 grs. may be a fatal dose. (Dr. A. Taylor.) Notwithstanding these facts much larger quanti-

tions by weight represented by the numbers attached to them in the following table, or in multiples of these proportions. Dalton accounted for this law by supposing that the constituent particles of matter are indivisible, and believed that, if it were possible to place such particles in the balance, their relative weights would be found to correspond with the numbers given in the table.[1] In other words, the term *atom*, which is derived from the Greek ἄτομος, indivisible, is applied in modern chemistry to the smallest quantity by weight of an element which is capable of existing in a *chemical compound*, hydrogen being taken as unity.

ATOMIC VOLUME. The volume or space occupied by the atomic weights of gases at a temperature of 60° F., and under a pressure of 30 inches of the barometer, compared with that occupied by one part by weight of hydrogen under the same conditions.

In the following table □ represents one volume:—

Name.	Symbol.	Atomic weight.	Atomic volume.	Name.	Symbol.	Atomic weight.	Atomic volume.
ALUMINUM ...	Al	27·5		Molybdenum ...	Mo	92	
ANTIMONY	Sb	122		NICKEL	Ni	58·8	
ARSENIC	As	75	¼	Niobium.....	Nb	97·6	
BARIUM.....	Ba	137		**NITROGEN** ...	N	14	□
BISMUTH	Bi	208		Osmium.....	Os	199	
BORON	B	11		**OXYGEN**	O	16	□
BROMINE.....	Br	80	□	PALLADIUM ...	Pd	106·5	
Cadmium	Cd	112	□□	**PHOSPHORUS**.	P	31	¼
Cæsium	Cs	133		PLATINUM.....	Pt	197·4	
CALCIUM	Ca	40		**POTASSIUM**...	K	39	
CARBON	C	12		RHODIUM	Rh	104	
Cerium	Ce	92		Rubidium	Rb	85·5	
CHLORINE ...	Cl	35·5	□	Ruthenium ...	Ru	104	
CHROMIUM ..	Cr	52·5		Selenium	Se	79	□
COBALT	Co	58·8		**SILICON**	Si	28·5	
COPPER.....	Cu	63·5		**SILVER**.....	Ag	108	
Didymium.....	D	96		**SODIUM**	Na	23	
FLUORINE ...	F	19	□	STRONTIUM ...	Sr	87·5	
Glucinum	G	14		**SULPHUR**.....	S	32	□
GOLD	Au	196·7		Tantalum	Ta	137·5	
HYDROGEN ...	H	1	□	Tellurium	Te	128	
Indium	In	74		Thallium	Tl	204	
IODINE.....	I	127	□	Thorium.....	Th	231·5	
IRIDIUM.....	Ir	198		TIN.....	Sn	118	
IRON	Fe	56		TITANIUM	Ti	50	
Lanthanum ...	L	92		TUNGSTEN.....	W	184	
LEAD.....	Pb	207		URANIUM	U	120	
Lithium.....	Li	7		Vanadium	V	51·2	
MAGNESIUM ...	Mg	24		Yttrium	Y	68	
MANGANESE .	Mn	55		**ZINC**	Zn	65	□□
MERCURY	Hg	200	□□	Zirconium.....	Zr	90	

In the foregoing table the most important elements are distinguished by the largest type, those next in importance by medium type, and those of rare occurrence, or of which we know but little, by the smallest type.

ATOM'IC WEIGHTS. See ATOM.

ATON'IC. *Syn.* ATON'ICUS, L.; ATONIQUE, Fr.; ATONISCH, SCHLAFF, Ger. Weak; debilitated: deficient in tone or strength. In *pathology*, applied to diseases or conditions of the body (ATONIC DISEASES; ATONY) in which debility is the leading feature. In *pharmacology*, ATONICS are agents which relax or lower the tone of the system.

AT'ONY. *Syn.* ATO'NIA, L.; ATONIE, &c., Fr., Ger. In *pathology*, loss of tone, relaxation, morbid diminution of vital energy or power; commonly applied to debility of any kind.

AT'ROPHY (-fe). *Syn.* ATRO'PHIA, L.; ATROPHIE, &c., Fr.; ATROPHIE, Ger. In *pathology*, wasting or emaciation, with loss of strength, and unaccompanied by fever or other sensible cause; defective nutrition; decline.

Classif., Causes, &c. It is either *local*, as in the case of a limb which is small, imperfectly developed, or withered; or *general*, affecting

[1] Strictly speaking, Dalton, the inventor of the Atomic Theory, did not adopt the precise numbers given in the table, but others, which, however, bear a very simple relation to them.

the whole body. GEN'ERAL ATROPHY appears to depend on deficient nutrition, arising from a want of due balance between the functions of assimilation and absorption, or from profuse evacuations draining off the materials necessary for the support of the body. In the former case only may it be regarded as an independent disease. LO'CAL ATROPHY, commonly arises from some cause which lessens the normal circulation of blood in the part; or from a diminution of the nervous influence, as in paralysis. *General atrophy* is most frequent in infancy, childhood, and old age. In the *first two* it may be often traced to bad nursing, worms, or a scrofulous taint; and not unfrequently, to continually inhaling impure or damp air. In *adults*, the causes are impaired digestion and imperfect action of the chyliferous organs, and sometimes diseased action of the liver. In many cases it results from the use of tobacco.

Treatm. This consists in a close attention to diet (which should be liberal and nutritious), exercise, clothing, ventilation, warmth, &c., with gentle stimulants, and chalybeate tonics where not contra-indicated, and, in the case of adults, the moderate use of pure generous wine or malt-liquor. Among special remedies, both in this disease and *anæmia*, may be mentioned pure sweet *cod-liver oil*, which seldom fails to arrest or greatly retard the progress of the disease, and in very many cases effect an entire cure. When this affection is symptomatic of any other disease, as worms, stomach or liver complaints, &c., the removal of the latter must of course be first attempted. See ANÆMIA, CHLOROSIS, TABES, &c.

ATRO"PIA (trōpe'y'ă). $C_{34}H_{23}NO_6$. [L.; B. P.] *Syn.* AT'ROPINE (-pin; sometimes *atro'pine*‡), Eng., Fr.; ATROPI'NA, ÁTRO"PIUM*, L. An alkaloid discovered by Brandes in *at'ropa belladon'na* or deadly nightshade.

Prep. 1. (B. P. Process.) Take of *belladona root*, recently dried, and in coarse powder, 2 *lbs.*; *rectified spirit*, 10 *pints*; *slaked lime*, 1 *oz.*; *diluted sulphuric acid*, *carbonate of potash*, of each, a sufficiency; *chloroform*, 3 *fl. oz.*; *purified animal charcoal*, a sufficiency; *distilled water*, 10 *fl. oz.* Macerate the root in 4 pints of the spirit, for 24 hours, with frequent stirring. Transfer to a displacement apparatus, and exhaust the root with the remainder of the spirit by slow percolation. Add the lime to the tincture placed in a bottle, and shake them occasionally several times. Filter, add the diluted sulphuric acid in very feeble excess to the filtrate and filter again. Distil off three fourths of the spirit, add to the residue the distilled water, evaporate at a gentle heat, but as rapidly as possible, until the liquor is reduced to one third of its volume and no longer smells of alcohol; then let it cool. Add very cautiously, with constant stirring, a solution of carbonate of potash so as nearly to neutralise the acid, care, however, being taken that an excess is not used. Set to rest for six hours, then filter, and add carbonate of potash in such quantity that the liquid shall acquire a decided alkaline reaction. Place in a bottle with the chloroform; mix well by frequently repeated brisk agitation, and pour the mixed liquids into a funnel furnished with a glass stop-cock. When the chloroform has subsided, draw it off by the stop-cock, and distil it on a water bath from a retort connected with a condenser. Dissolve the residue in warm rectified spirit; digest the solution with a little animal charcoal; filter, evaporate, and cool until colourless crystals are obtained.

2. *Expressed juice of belladonna* is evaporated over a water bath to the consistence of an extract, and then triturated in a marble or porcelain mortar with a strong solution of caustic potassa; the resulting mass is digested and well agitated for some time, at the temperature of 75° to 80° Fahr., with benzole, q. s.; and, after repose, the benzole-solution is carefully separated, and its volatile hydrocarbon is distilled off by the heat of a water bath; the residuum in the retort is now exhausted with water acidulated with sulphuric acid, and the resulting 'acid-solution,' after filtration, precipitated with *carbonate of soda*; the precipitate is crude ATROPIA, which is collected on a filter, pressed between folds of bibulous paper, and dried; after which it is purified by one or more re-solutions in alcohol, and crystallisations, which may or may not be modified in the manner noticed. The proportion of potassa should be about 1 dr. to every quart of the expressed juice. An excellent and economical process. The product is 0·3 to 0·4 of the weight of the plant from which the juice has been obtained.

3. (Mein and Liebig,) *Belladonna-root* (fresh-dried and coarsely powdered), is exhausted by *alcohol* (sp. gr. 0·822); *slaked lime* (1 part for every 24 of the dried root employed) is then added to the tincture, and the whole digested, with agitation, for 24 hours; *sulphuric acid* is next added, drop by drop, to slight excess, and, after filtration, rather more than one half the spirit is removed by distillation; a little water is now added to the residue, and the remainder of the alcohol evaporated as quickly as possible by a gentle heat; after again filtering, the liquid is reduced by further evaporation to the $\frac{1}{12}$th part of the weight of the root employed, and a concentrated solution of potassa dropped into the cold liquid (to throw down a dark greyish-brown matter), carefully avoiding excess or rendering the liquid in the slightest degree alkaline; in a few hours the liquid is again filtered, and carbonate of potassa added as long as a precipitate (ATROPIA) falls after a further interval of from 12 to 24 hours, this precipitate is collected and drained in a filter, and after pressure between folds of blotting paper, dried by a very gentle heat. It is purified by making it into a paste with water, again squeezing it between the folds of blotting paper, drying it, re-dissolv-

ties have been taken, under peculiar circumstances, with comparative impunity; and cases are not wanting in which even enormous quantities have produced very trifling effects. Under all circumstances arsenious anhydride is, undoubtedly, one of the most powerful of the mineral poisons; and in whatever form or way it is introduced into the system, it exerts the same deleterious influence. In all cases, in sufficient doses, its action is to increase the secretions, diminish the contractility of the voluntary muscles, and to produce convulsions, prostration and death.

Arsenic is a non-accumulative, irritant poison, and exerts no decided chemical or corrosive action on the tissues. (Taylor.)

Pois., &c.—Symp. These sometimes begin to appear within half an hour after the poison has been taken, or even sooner; but much more generally, not until after the lapse of some hours. They usually commence with nausea and distress at the stomach, followed by thirst, often intense, and a sense of burning heat in the bowels; then come on constriction of the œsophagus, violent vomiting, severe colic pains, tenesmus, and excessive and painful purging, the stools being occasionally bloody; but pain, vomiting, &c., do not invariably occur. The pulse is generally quick, small, feeble, and irregular — sometimes scarcely perceptible, and the heart's action is irregular and tumultuous. The tongue is dry and furred; the respiration difficult and panting; the urino-genital apparatus is often affected; there is pain and difficult micturition, and sometimes entire suppression of urine; faintings, coldness of the limbs, and cold sweats, with other signs of debility, intervene. Itching and eczematous eruptions of the skin, trembling, painful cramps and contractions of the extremities, and violent convulsions, often follow; and after these, a greater or less prostration of strength, which induces a deceitful calm. At length the heart's action abates, the skin becomes suffused with a cold clammy sweat, and the sufferer dies from exhaustion. The progress, succession, and precise character of the symptoms are modified by the idiosyncrasy of the individual, the quantity of the poison, and the manner in which it has been taken; and are seldom all present in the same person.

Treatm. If vomiting has commenced it should be promoted by tickling the throat, and administering a large quantity of gelatinous hydrated peroxide of iron, or other appropriate antidote, in divided doses, mixed with a large quantity of warm or tepid water, strongly sweetened with sugar. If vomiting has not commenced, which is rare, it must be excited by administering 15 to 20 grs. of sulphate of zinc, or ipecacuanha (or in the absence of these, a teaspoonful of flower of mustard) in a tumbler of tepid water, and tickling the throat as before. If these means fail in rapidly inducing copious vomiting, the dose must be repeated, or the stomach-pump had recourse to. Altogether as much as 16 to 18 *oz.* of the hydrated peroxide of iron, may be administered. If the poison has been swallowed several hours previously, and hence may have passed the pylorus, a strong dose of castor oil, or a purgative clyster may be administered, and, after its action, another clyster containing the antidote. As soon as the stomach and bowels are cleared, diuretics and sudorifics should be given in abundance. Lastly, any remaining irritation must be relieved by demulcent and soothing remedies; or if urgent, by slight general or local bleeding, which cannot be earlier practised without danger; and opium, camphor, and ether, followed by tonics, may be had recourse to, to recruit the system.

Lesions. Redness and inflammation of the whole primæ viæ; and sometimes, of the mouth, fauces, and œsophagus, but more usually, the contrary. Sometimes also, though seldom, there is no marked appearance of inflammation in the stomach and intestines. The stomach is usually highly injected, and frequently marked with extravasations; lungs, gorged with blood; mucous lining of trachea reddened; heart generally flabby, and exhibiting deep red or blackish stains, and the right cavities more or less loaded with blood; the conjunctiva is sometimes very vascular; and redness, extravasation of blood, and effusion of serum, is occasionally seen in the brain. The blood is frequently, though not invariably, fluid after death, and dark-coloured. Under certain circumstances, the mucous membrane of the stomach and intestines is lined with a multitude of brilliant points or grains, which have been mistaken for arsenious anhydride; but which, according to Orfila, are composed of fat and albumen. Placed on burning coals, they decrepitate on drying, and produce a species of explosion or detonation. These grains are also met with in the stomach of persons who have not been poisoned. Digested in water, the liquid obtained from them does *not* show the presence of arsenic when submitted to reagents.

Ant. In the order of their assumed efficiency:—Hydrated or gelatinous sesquioxide or peroxide of iron (for an adult—a tablespoonful, in water, every 8 or 10 minutes, until 12 or 16 oz., or more, have been taken). Hydrated sulphide of iron (as 10 last). Gelatinous hydrate of magnesia (as the last). Calcined magnesia (taken as the first). Salad or olive oil, or almond oil, and oil or fats generally (ad libitum), are all highly effective in lessening, if not destroying the action of arsenious anhydride).[1] Albumen (white of egg),

[1] Dr. Blondlot, in a paper communicated to the Paris Academy of Sciences, has come to the conclusion that the slightest quantity of greasy matter in contact with arsenious anhydride reduces its solubility to about 1-20th of what it was before. This explains at once why, in certain judicial investigations, arsenic has been sought for in vain in the liquid contents of the stomach, when the food consisted

or liquids containing it (in cold water, ad libitum). Milk, wheat-flour, oatmeal gruel, (with water, ad libitum). Lime water, with milk (as the last). Chalk, with milk and water (as the last). Infusion or decoction of bark, or better, of nut-galls (as the last). Sugar or syrup (ad libitum). See *Treatm.* (above); also the above substances under their respective heads.

Uses, &c. Arsenious anhydride and its compounds are extensively employed in the arts and medicine. It is used by the dyer, it furnishes the artist with several of his most beautiful pigments, and the glass-maker and enameller with a flux or material to whiten and decolour their wares. In *agriculture*, it is used (in solution) as an anti-smut for seed-wheat; and as an anti-vermin lotion or dipping for sheep and cattle. In small (therapeutical) *doses* it is a valuable remedy in intermittent fevers, chronic skin diseases (especially lepra and psoriasis), and in several nervous affections (as neuralgia, epilepsy, chorea, tetanus, &c.). It is the active ingredient of the tasteless ague-drop; and in the Tanjore pills, long celebrated in India for the cure of the bite of the cobra di capello and other venomous serpents, as well as of hydrophobia. It has been given in syphilis, chronic rheumatism, typhus, and several other diseases, with more or less advantage. Cautiously administered in phthisis, it frequently restores the appetite and strength, and greatly retards, and in some cases, arrests the progress of the disease. It has been recently used to relieve toothache arising from caries. *Externally*, it is employed in the form of powder, lotion, and ointment, for the cure of cancer. Plunkett's Ointment, Pâte arsénicale, Davidson's Remedy for Cancer, and several other like preparations, owe their activity to arsenious anhydride. Water in which white arsenic has been steeped has become a favorite cosmetic wash with many ladies, since its assumed property of softening the skin was announced in a certain popular periodical. Its use, whether internal or external, is, however, attended with considerable danger in unskilful hands, and should, therefore, never be adopted but under proper advice.—*Dose.* $\frac{1}{20}$ to $\frac{1}{8}$ gr., made into pills with crumb of bread and lump sugar; or in solution, 3 to 5 *or* 6 drops, twice or thrice daily, gradually and cautiously increased to 12, or even 15 drops. As a *rule*, arsenical preparations should be taken soon after a meal, and by no means on an empty stomach. (Dr. A. T. Thomson.) The dose should be suspended, or greatly reduced, as soon as the conjunctiva is affected (Hunt); or if dryness of the mouth or throat, or irritation of the stomach or bowels, ensues. Mr. Maculloch found the pills more efficacious than the solution; they act differently, and cannot be substituted for one another.

Arsenic is a favorite tonic and alterative with farriers; who often administer it very carelessly to horses, to the serious injury of these animals. It is also a favorite with grooms, who have imbibed the notion that small doses of it contribute to improve the condition of the skin. The best-informed veterinarians, however, either wholly avoid it, or use it with very great caution.[1]—*Dose* (for a HORSE), 2 to 5 *or* 6 grs., twice or thrice daily; in farcy or glanders, 10 to 12 grs. In solution it is often employed as a wash or dipping to destroy vermin in cattle and sheep; but its use is not free from danger, particularly to the shepherds or dippers.

Gen. commentary. The necessary length of the preceding article, owing to the great importance of the subject in its relations to toxicology and medical jurisprudence, has left us little space for further remark here. In addition to what has been said on arsenical testing, it may be useful to caution the reader, of the absolute necessity of only employing tests and reagents which are themselves absolutely pure; and in which the operator has, by personal examination, failed to detect the slightest trace of arsenic. Commercial sulphuric, nitric, and hydrochloric acids, potash, soda, nitre, iron, and zinc, frequently contain arsenic; from which, however, they may be freed by chemical processes, or they may be purchased in the pure state from respectable dealers in chemicals. But no assurance of the vendor should be regarded as a proof of their purity. In all judicial investigations the absence of arsenic in the several tests and reagents, and the apparatus employed, must be demonstrated and sworn to. We may further add, that the results afforded by no single test can be depended on. In matters of such vast importance, the most ample confirmatory evidence must be sought.

Marsh's, Reinsch's, Lassaigne's, the *Sulphur*, and the *Reduction Tests*, and their modifica-

partly of fatty substances, such as broth, milk, &c. It likewise explains how arsenious anhydride, taken in powder, may sometimes remain a long time in the stomach before it produces any deleterious effect; since, in such cases, its action is hindered by the presence of fatty matter. Jugglers often swallow arsenic with impunity, because, according to Dr. Blondlot, they previously take the precaution to drink milk and eat fat bacon. Hence, in cases of poisoning by arsenic, oils and fatty substances may be administered as real antidotes, capable of suspending the action of the poison for a considerable time, until more radical means of effecting a cure can be applied. The people engaged in some of the arsenic-works regard salad oil as almost a certain antidote to this poison.

[1] "As a therapeutic agent for horses, arsenious acid can be well dispensed with. It is, however, employed by some as a tonic, in doses of from 10 to 20 grs. daily; and by others as a vermifuge. When injudiciously administered death has been the result. By those of the old school it is extolled as a caustic, and a very powerful one doubtlessly it is; but there is this disadvantage attending its use—we cannot control its action, and, oftentimes, a most extensive and painful wound is caused by it. Occasionally it is resorted to for the eradication of warts; although a better plan is to extirpate them at once with the knife. When, however, this is inadmissible, 1 part of arsenious acid, in very fine powder, may be mixed with 4 parts of lard, and a (small) portion of the compound applied, with friction, over and around the excrescence every other day, for three or four times. This will excite such a powerful sloughing action, that in about 10 days the warts will be thrown off." (Prof. Morton.)

tions, are those now generally preferred by toxicological chemists; each of which, with its confirmatory tests, are amply sufficient for the indisputable identification of arsenic.

Modern toxicologists have abandoned most of the old processes for the detection of arsenic, and have adopted one of two, which have been found more expeditious, as well as more certain. These are the *Tests* of Marsh and Reinsch, preferably the latter.

HERAPATH'S METHOD is to obtain deposits by Reinsch's Test on 4 or 5 pieces of No. 13 copper wire; each piece being about 2½ inches long, and previously flattened and planished with a polished hammer for about one half its length. The deposit, with some of the adhering copper, scraped from one of these coated pieces, is sealed up hermetically in a tube for future production. The 'scrapings' from three pieces of wire are separately submitted to the sublimation test in tubes bent in the form of an obtuse V, capillary at one end, and about $\frac{3}{10}$ths of an inch in diameter at the other; the capillary leg being about three times as long as the larger one. The 'scrapings' are placed in the bent part of the tube; and the flame of a small spirit lamp is so applied as to slowly drive the sublimate into the narrower portion of the tube, which is held rather higher than the other. If the deposit so obtained be mercury, it condenses in white shining globules;—if lead or bismuth, it does not rise but melts into a yellowish glass, which adheres to the copper;—if tellurium, it falls as a white amorphous powder;—if antimony, it does not rise at that low temperature; but —if it be arsenic, it sublimes as arsenious anhydride, which condenses as minute octahedral crystals, looking, with the microscope, like very transparent grains of sand. One of these tubes containing the sublimed arsenious anhydride is then sealed up, like the first one, for future production. The capillary part of another tube, containing the sublimate, is then cut off, and carefully boiled in a few drops (10 to 15) of distilled water; and, when cold, 3 or 4 drops of the resulting solution is poured on a plate of white porcelain, and to this, by means of a glass rod, one drop of solution of ammoniacal sulphate of copper is added. The mixture is then carefully conducted on to a piece of white filtering-paper set on the surface of a smooth, clean, and dry chalk-stone, by which the moisture is absorbed, and the smallest portion of Scheele's green produced by the test rendered more conspicuous. The ammonio-nitrate of silver test is then applied, in a similar manner, to 3 or 4 drops of the remaining solution; after which, the pieces of paper with the spots are dried, and sealed up in separate tubes, as before, observing to exclude the light from that containing the yellow precipitate of arsenite of silver. A stream of sulphuretted hydrogen is then passed through the remaining tube containing the arsenical sublimate, by which the latter is converted into the yellow tersulphide—this too is sealed up. Here are now five tests—the metal, the acid, arsenite of copper, arsenite of silver, and yellow tersulphide of arsenic.

It is now well known that certain soils contain arsenic, either as arsenite of lime or sulphide of arsenic; and which, under favorable circumstances, may permeate or be absorbed by a body, after interment. In judicial investigations following disinterment it is, therefore, necessary to examine portions of the cemetery-earth taken from the grave, as well as from parts more or less distant from it. For this purpose the earth should be *thoroughly* dried in a water bath, drenched with pure and concentrated hydrochloric acid, and allowed to stand for twenty-four hours. The mixture is then distilled, and the distillate tested for arsenic by Reinsch's or Marsh's test. Should the product of one distillation yield no evidence of arsenic, it should be returned to the retort, if necessary, a second or even a third time, and the distillation repeated.

The practice of employing a solution of white arsenic as an anti-smut steep for wheat, has lately arrested the attention of chemists. M. Audouard states that he has detected traces of arsenic in the crops raised from seed-wheat thus treated. But that which appears to be likely to prove much more dangerous, is the introduction of arsenic into crops by the employment of crude superphosphate of lime as manure—a substance often rich in this poison. Dr. Edmund Davy positively states that arsenic, as it exists in artificial manures, is taken up by plants growing where those manures have been applied! He found cabbages and turnips taken from fields manured with superphosphate give unmistakable evidence of being 'arseniated.' These facts have some important bearings; for though the quantity of arsenic which occurs in such manures is not large when compared with their other constituents, and the proportion of that substance which is thus added to the soil must be necessarily small, still plants during their growth, as in the case of the alkaline and earthy salts, take up a considerable quantity of this substance. Further, as arsenic is well known to accumulate in soils, though not an accumulative poison in the animal system, the effects, after some time, will probably be, that vegetables raised on those continuously so manured, will ultimately be found to contain such a proportion of arsenic, as will exercise an injurious effect on the health of men and animals. The statement of M. Audouard has been disputed by M. Girardin, because he failed to detect arsenic in corn under the circumstances; and it is also denied by Dr. A. S. Taylor, and others; but our own experiments, very carefully performed, confirm the assertions of both Audouard and Davy. The ultimate consequences of pouring into the Thames such enormous quantities of disinfectants contaminated with ar-

senic, as has been done during the last 3 or 4 years, is another matter deserving consideration, and one which has been ably pointed out by Dr. Letheby, in his reports, as Officer of Health to the City of London,

Dr. Lois has found arsenic, often in large quantities, in ordinary brass, and brass utensils; and we have ourselves repeatedly found arsenic in the Britannia-metal, German-silver, and other cheap white alloys at present in such general use.

The preceding facts are recommended to the careful attention of medical jurists.

By Act of Parliament[1] it is provided—1. That every vender of arsenic shall, before the delivery of the same to the customer, enter in a book or books kept for the purpose, the date of sale, name, and residence of the purchaser, in full, his or her condition or occupation, the quantity so sold, and the purpose or purposes for which it is required, in a form set forth in the schedule to the Act; which form or schedule shall be signed by the vender, and by the said purchaser, unless he be unable to write, when such fact shall be recorded in the said schedule by the vender; and this schedule, when a witness is required to the sale, shall also bear his signature, together with his place of abode:—2. *Arsenic* is *not* to be *sold* to a *stranger*, unless in the presence of a witness acquainted with both vender and purchaser:—3. *No person to sell arsenic* unless it be previously mixed with *at least* 1 *oz.* of *soot* or ½ *oz.* of *indigo* to the pound; unless such admixture would be injurious to the object for which it is intended, when not less than 10 *lbs.* is to be sold at any one time:—4. *Penalty* for *evading* the *Act*, either as vender, purchaser, or witness, £20:—5. Act *not* to *extend* to *arsenic* used in compounding *prescriptions*, nor to the *wholesale trade*:—6. The word '*arsenic*' to include 'arsenious anhydride, and the arsenites, arsenic acid, and the arseniates, and *all* other colourless poisonous preparations of arsenic.' See ARSENIC, ARSENIC ACID, LOTIONS, PILLS, SHEEP-DIPPING, SOAPS, SOLUTIONS, TOOTH-CEMENTS, WHEAT-STEEPS, IRON, POTASSA, SODA, and other *Bases*, &c. &c. (also *below*).

Self-detect'ing Arsenious Anhydride. *Prep.* (Dr. Cattelf.)—1. Ordinary *white arsenic* to which is added a small quantity of a mixture of *dry calomel* and *quick-lime*; or of *dried sulphate of iron* and powdered *gall-nuts*. The *product* is *white*, but immediately turns BLACK when mixed with liquids:—2. As the last, but adding a mixture of *thoroughly dried sulphate of iron* and *ferrocyanide of potassium*. Strikes a BLUE:—3. As last, but using *dried phosphate of sodium* and *dried sulphate of iron*. Strikes a GREEN. Proposed as a method of preventing arsenic being used as a poison.

ARSENIDE. *Syn.* ARSEN'IURET; ARSENIURE'TUM (-i-ū-), L.; ARSÉNIURE, Fr. A combination of arsenium with a metal (including hydrogen), in definite proportion.

[1] 14 Vict., c. xiii, 1851.

AR'SENITE (-nīte). *Syn.* AR'SENIS, L.; ARSÉNITE, Fr.; ARSENIGSÄURE SALZ, Ger. A salt of arsenious acid.

ART. [Eng., Fr.] *Syn.* ARS (*gen.*, ar'tis; *pl.*, ar'tes), L.; τέχνη (*tech'ne*), Gr.; KUNST, Ger. *Primarily*, strength, power, and hence also mental strength, skill; the application of knowledge or power to effect a desired purpose; the power or ability of doing something not taught by nature or instinct; practical skill guided by rules. SCIENCE is *knowledge*—ART, *practical skill* in applying this knowledge. ART is *applied science*; whilst SCIENCE is *knowledge* obtained by *observation*, *experience*, and *ratiocination*. This distinction is nowhere more fully seen than within the domain of *chemistry*, where knowledge, deduction, great power of generalisation, and great expertness, are necessary elements of success. *Art* has filled the world with luxuries, conveniences, and comforts; and *art*—the ARTS—*useful* or *fine*—are the safest and surest civilisers of our race. See SCIENCE.

ARTE'SIAN (-tē'-zhăn; *or* -tēze'-yăn). [From *Artois*, a province of France, in which such wells were first formed.] *Syn.* ARTÉSIEN, Fr. In *physics* and *civil engineering*, applied to very deep borings into the ground from which water flows. See FOUNTAINS, WATER, WELLS, &c.

ARTHANI'TINE (-tĭn). [Eng., Fr.] *Syn.* ARTANI'TINE; ARTHANITI'NA, L. A peculiar substance first obtained by M. Saladin, by the action of *alcohol* on the tuberous stems of the herb *arthrani'ta* or *sow-bread*. It is acrid, colourless, and crystalline, and imparts its acridity to the plant.

AR'TICHOKE. *Syn.* CIN'ARA, CYN'ARA, SCOL'YMUS, L.; ARTICHAUT, Fr.; ARTISCHOCKE, Ger. The *cyn'ara scol'ymus* (Linn.), a thistle-like perennial plant of the *nat. ord.* Compositæ (DC.). *Hab.* Southern Europe; but now extensively cultivated in our gardens, for its 'bottom,' or the sweet fleshy receptacle of its flowers, which is eaten as a potherb. These are cooked by brisk boiling in water, stalk-ends uppermost, until tender; and take ½ to 1 hour, according to their age. Sometimes they are *preserved* in brine (PICKLED ARTICHOKES); and also after depriving them of the 'choke' and spiny hairs and blanching them by immersion in boiling water, by drying in the sun (DRIED ARTICHOKES; CULS D'ARTICHAUT, Fr.), by which they retain their flavour for some time. *Infusion of the flowers*, used with rennet.

As an esculent the artichoke resembles asparagus in its general properties; but it is said to be more nutritious, and even more diuretic.

Jeru'salem Artichoke. The *helian'thus tubero'sus* (Linn.), a perennial plant of the sunflower family, and quite distinct from the preceding. *Hab.* The Brazils. It is cultivated in England for culinary purposes. *Roots* (tubers), resemble the artichoke in flavour; but are considered far from wholesome, being apt

to produce flatulence and dyspepsia. They are diuretic, and impart the odour of turpentine to the urine. They are cooked by boiling (15 to 25 minutes, according to size), or frying; in the former case, served with melted butter. They are also served mashed, like turnips. The flowers yield a volatile oil resembling that of turpentine.

ASARABAC'CA (ăs-ă-). *Syn.* AS'ARUM, A. EUROPÆ'UM (Linn.), NAR'DUS MONTA'NA*, &c., L.; ASARET, A. D'EUROPE, CABARET, AZARUM C., NARD SAUVAGE, OREILLE D'HOMME, &c., Fr.; HAZELWURTZEL, Ger. The ἄσαρον of Dioscorides, a small, round, hard, stemless, hardy herbaceous plant, bearing chocolate-coloured flowers; and of the *nat. ord.* Aristolochieæ (DC.). It grows freely in central France, and is found in woods and shady places in Lancashire, Westmoreland, and other parts of England. *Hab.* Europe, between 37° and 60° latitude.—*Root & rhizome* (AS'ARI RA'DIX), has a pepper-like odour and an acrid taste:—*Leaves* (A. FO'LIA), less odorous, though bitter-tasted, acrid, and aromatic; formerly officinal in the pharmacopœias:—*Whole plant* (ASARABACCA, of the shops), nauseant, emetic, and purgative. Before the introduction of ipecacuanha it was the common emetic (6 to 9 of the green leaves in whey); but, owing to the violence of its action, it has long fallen into disuse. Its common name in France (CABARET, or *public-house plant*), is said to have arisen from its frequent employment to relieve the stomach of those who had drunk too hard. It is now almost solely used as a sternutatory or errhine, and is probably one of the best.

According to Gräger,[1] asarabacca contains three volatile, oily principles, which may be obtained by distillation with water:—VOLATILE OIL (*o'leum as'ari*):—AS'ARITE, an odourless, tasteless, and crystalline solid; fusible and volatilisable, yielding white and very irritating fumes:—AS'ARUM-CAM'PHOR, differing chiefly from the last in being precipitated, by water, from its alcoholic solution in cubes or six-sided prisms, instead of delicate flexible needles. Also a brownish, bitter, crystallisable principle (AS'ARINE, AS'ARUM-BIT'TER), which is soluble in alcohol.

Uses, Dose, &c. Dried leaves, 20 to 30 grs., or root, 10 to 12 grs.; as a purge or emetic. As an *errhine*—leaves, 3 to 5 grs.; root, 1 to 3 grs.; in powder, snuffed up the nose every day, or every other day, at bed-time. It excites irritation and a copious watery discharge, more or less muculent, which frequently continues to flow for several days, and occasionally proves highly useful in certain affections of the brain, eyes, mouth, nose, ear, and throat, on the principle of counter-irritation. It has been found "particularly serviceable in *cephalalgia* (headache), *obstinate headache, chronic ophthalmia* (inflammation of the eyes), and some other lethargic affections." (Dr. A. T. Thomson.) In dimness of sight (especially that arising from fatigue or congestion), deafness, and slight paralytic affections of the mouth, tongue, lips, or eyelids, not of a serious organic character, and particularly, in chronic earache, it also sometimes affords relief after other remedies have failed. It constitutes the basis of several CEPHALIC SNUFFS, ASARABACCA-SNUFF, BARON MCKINSEY'S MEDICINAL POWDER (*or* SNUFF), and several other like nostrums, which are much extolled by their venders, and sold at marvellously high prices. See PATENT MEDICINES, POWDERS, SNUFFS, &c. (also *below*).

[1] Gobel and Kemze, "*Pharm. Waarenk.*" 1830-1.

AS'ARIN (-rĭn). $C_{20}H_{36}O_5$. *Syn.* ASARONE. A species of stearopten, discovered by Görtz, in asarabacca. It has an aromatic taste and an odour resembling camphor, and is said to be emetic. It is probably a mixture of asarum-camphor and some partially oxidised volatile oil. (See *above*.)

As'arine (of Gräger). *Syn.* ASARI'NA, L. The crystallisable bitter principle of asarabacca, noticed above. It is said to greatly resemble *cytisine*.

AS'ARITE (-rīte). See ASARABACCA.

ASBES'TOS. *Syn.* ASBES'TUS (ασβεστος, *incombustible, unconsumable.* Gr.), AMIANTH'US, LA'PIS A., &c., L.; ASBESTE, AMIANTE, Fr.; ASBEST, STEINFLACHS, Ger. In *mineralogy*, a soft, fibrous substance, composed of flexible or elastic filaments which, in their most highly developed form, greatly resemble those of flax or silk, and which bear exposure to a very considerable degree of heat without suffering decomposition. It has been proposed to clothe our firemen in dresses of asbestos; but without freedom of respiration could be insured in a heated and poisonous atmosphere, this envelope would be of little service. Gloves are sometimes made of it, for holding red-hot crucibles. It is also used as a filtering medium for corrosive liquids.

Var. Of these there are several; as AM'IANTH or ELAS'TIC ASBESTOS, LIG'NIFORM A., MOUNTAIN-CORK, M.-LEATHER, M.-WOOD, &c.; varying from a grey, brown, or green colour, to pure white, and from extreme flexibility and softness, to rigidity and hardness, as indicated by the respective names. In common language, however, the term '*asbestos*' is usually restricted to the softer fibrous varieties.

ASH. *Syn.* FRAX'INUS, L.; FRÊNE, Fr.; ESCHE, Ger. The popular name of several species of valuable hardy trees bearing apetalous flowers (except in the 'flowering ash'), belonging to the *nat. ord.* Oleaceæ (DC.), and *gen.* Fraxinus; but appropriately, the—

Ash. *Syn.* COMM'ON ASH; FRAX'INUS, F. EXCEL'SIOR (Linn.), F. APET'ALA (Lamb.), F. OR'NUS (Scop.), L.; FRÊNE, F. COMMUN, Fr.; GEMEINE ESCHE, Ger. A large tree common to our woods and hedges; *timber* (ASH *or* ASH-WOOD), used by carpenters, cabinet-makers, and machinists, and much esteemed for its great toughness and elasticity; *bark*, febrifuge, diuretic, resolvent, and tonic; has been success-

fully exhibited in agues; *seeds*, acrid, bitter, and diuretic; *leaves*, purgative, diuretic, and febrifuge; sometimes used instead of senna. In southern Europe it exudes an inferior kind of MANNA, and its medicinal properties are much greater than in our climate.—*Dose.* (Leaves) ½ *oz.* to 1½ *oz.* (made into an infusion), as a purge; *seeds*, 1 dr., as a diuretic, &c.

Flow'ering Ash. *Syn.* MAN'NA-ASH; FRAX'INUS OR'NUS (Linn.), L. A small tree of southern Europe. Yields MANNA. The '*round'-leaved flowering-ash*' (CALA'BRIAN-ASH; FRAX'INUS ROTUNDIFO''LIA, Lamarck) is a smaller variety of the preceding, and a native of Calabria and the Levant. Said to yield the best MANNA. The '*small'-leaved flowering-ash*' (FRAX'INUS PARVIFO''LIA, Lam.), is another manna-yielding species, indigenous to Asia Minor.

ASH. Ashes (which *see*).

ASH-BALLS. The ashes of land-plants, especially ferns, damped and made into balls. *Used* as a substitute for soap in washing, and in cleaning paint.

ASH'ERY. [Amer.] A place where potash or pearlash is made or kept.

ASH'ES. (-ĭz). [Eng. pl.] *Syn.* ASH; CI'NIS, L.; CENDRES (*pl.*) Fr.; ASCHE, Ger. The remains of anything burned. In *antiquity*, the remains of a body consumed on the funeral pyre; and hence, figuratively, the remains of the dead. The word, in English, has properly no singular; although '*ash*' is very commonly heard; and is now almost exclusively used in composition, as in *pearlash, potash, soda-ash*, &c.

Ashes. In *commerce*, the residuum of the combustion of vegetable substances containing either *carbonate of potassium* ('land-plants'), or *carbonate of sodium* ('marine plants'), and from which the commercial alkalies are obtained. Their *value* depends upon their richness in 'alkali,' which is determined in the manner explained under ALKALIMETRY. The word is also commonly employed as a general term for the crude carbonates of potash of commerce (which *see*).

Ashes of Plants. See MANURES, PLANTS, VEGETATION, &c.

ASPAR'AGIN (ăs-păr-jĭn). $C_4H_8N_2O_3$. [Eng., Fr.] *Syn.* ALTHE'INE, ASPAR'AMIDE, MAL'AMIDE*; ASPARAGI'NA, ASPARAGI'NUM, L.; AGÉDOÏTE, Fr.; SPARGELSTOFF, Ger. A peculiar azotised principle discovered by Vauquelin and Robiquet in asparagus, and since found in the potato, marsh-mallow, liquorice, climbing vetch, and several other plants. Many plants which do not naturally contain it may be made to yield it by growing them in dark damp cellars; whilst many which only normally contain it in very small quantities, are found to yield much more when allowed to vegetate in the same manner.

Prep. 1. From ASPARAGUS-SPROUTS:—The expressed juice, after being heated to the boiling-point (to coagulate albumen) and carefully skimmed and filtered, is evaporated, at a gentle heat, to a syrupy consistence, and then abandoned to spontaneous evaporation in a warm dry atmosphere for several days; the resulting crystals being purified by cautious washing with very cold water or very strong alcohol, re-solution, and re-crystallisation.

The following are cheaper and more convenient processes:—

2. From MARSHMALLOW-ROOT:—*a.* The *root* (chopped small, or grated) is macerated for several days in milk of lime, in the cold, the filtered liquid precipitated with carbonate of ammonium, and the clear solution evaporated in a water bath, and otherwise treated as before.

b. From the expressed juice, 2 parts; milk of lime, 1 part; agitated well together; the liquid portion, after some hours, being decanted, filtered, and evaporated, &c., as before.

3. From the ETIOLATED SHOOTS OF VETCHES:—The expressed juice of the young shoots when from 2 or 3 to even 12 or 15 inches long, is gently simmered for 8 or 10 minutes, to coagulate the albumen, and, after straining or clarification, the clear liquid is gently evaporated to the consistence of a thin syrup, and set aside to crystallise, as before. The resulting brown crystals are purified by washing with very cold water, re-solution in boiling water, and re-crystallisation, as in No. 1; or, and what is better, the hot liquid, before evaporation to a syrup, is digested for a short time with a little pure animal charcoal in coarse powder, and then filtered, when large and beautifully white crystals are obtained by the first operation.[1] An excellent and very economical process.

Prop., &c. Crystals brilliant, transparent, colourless, right rhombic prisms; neutral to test-paper; non-basic; having a faint, cooling, and scarcely nauseous taste; scarcely soluble in cold water; freely soluble in hot water; insoluble in strong alcohol and ether; solution unaffected by alkaline sulphurets, oxalate of ammonia, acetate of lead, or infusion of galls; triturated with quick-lime, ammonia is evolved; heated to 212° Fahr. the crystals lose 2 equiv. or 12% of water; heated with water under pressure in a closed vessel, or boiled along with an acid or an alkali, or dissolved in a saccharine liquid and then submitted to fermentation, it is converted into ammonium and ASPAR'TIC ACID; aqueous solutions of asparagin and aspartic acid treated with a current of nitrous acid evolve pure NITROGEN, with the formation of MALIC ACID which remains in solution. It was called *asparamide* under the impression that it is *aspartite of ammonia*

[1] This use of *animal charcoal* may also be advantageously extended to the other Formulæ. Mr. C. G. Williams, in Ure's "*Dict. of Arts, M., & M.*," 4th ed., directs the shoots to be used when of "a length of 2 inches;" but some authorities recommend them to be of 9, 12, or even 15 inches. The selection must, however, in many cases, depend upon circumstances and convenience.

minus 1 atom of water; and *malamide*, for similar theoretical reasons.

Uses. It is sedative and diuretic.—*Dose.* 1 to 6 grs.; in dropsies, heart-affections, &c.

ASPAR'AGUS. [L., Eng.] In *botany*, a genus of low, spiny plants, with scale-like leaves, many of which are shrubs and climbers, of the *nat. ord.* Asparageæ (DC.; Liliaceæ—Lindl.). The following species, which is that best known in England, is, however, an exception to this description, as it is neither climbing nor spinose.

Asparagus Officina'lis. [Linn.; L.] *Syn.* ASPAR'AGUS, COMM'ON A., GARD'EN A.; SPAR'AGUS§, SPAR'ROW-GRASS§, SPER'AGE†§; ASPERGE, Fr.; SPARGEL, Ger. A well-known perennial plant, and one of the oldest and most delicate of our culinary vegetables.—Young shoots, from the underground eyes (TURIO'NES ASPAR'AGI, L.); the *asparagus* of our tables; diuretic; communicate a peculiar fœtid odour to the urine, and, when eaten in excess, occasion bloody urine and accelerate fits of gout; formerly esteemed emmenagogue and aphrodisiac.—*Root* (RA'DIX ASPAR'AGI, L.), properties resemble those of the young shoots, but stronger; one of the '*five greater aperient roots*' (RAD'ICES APERIEN'TES QUIN''QUE MAJO''RES, L.) of old pharmacy. The tops and roots, though no longer officinal in the British Pharmacopœias, are both occasionally employed as popular remedies in dropsy and stone—the first being eaten in the usual way at table; and the second, made into an infusion or decoction (½ *oz.* to the pint), taken ad libitum.

As an article of food, asparagus, in moderation, is both wholesome and nutritious. It is cooked by simply boiling it rather quickly until tender, like the other soft green vegetables; and is either served up plain, or on toast with melted butter or *sauce Hollandaise* in a boat. (Soyer; Rundell.) When very small and green, it is frequently dressed and served like green-peas, the tender portion of each shoot being cut into bits of equal size, and about 1-3rd of an inch long. (Miss Acton.)

Choice, &c. "The large grass is generally preferred; although the smaller has the fullest flavour for a dish." (Soyer.") Unlike other plants, the *asparagus officinalis* has not produced a single well-marked permanent variety by cultivation.[1]

Asparagus Petræ'a. [L.] *Syn.* ROCK'-ASPAR'AGUS; CORRUDA; ASPAR'AGUS ACUTIFO''LIA, L.; CORRUDE, Fr. Resembles the last in its general qualities; but is said to contain more *asparagin*.

ASPAR'AMIDE (-mĭd). See ASPARAGINE.

ASPAR'TIC ACID. $HC_4H_6NO_4$. *Syn.* MALAM'IC ACID; ACIDUM ASPAR'TICUM, L.; ACIDE ASPARTIQUE, Fr. An acid first obtained, by Plisson, from *asparagin*, by boiling it along with hydrate of lead or of magnesia. Its *salts* are called ASPAR'TATES (Eng., Fr.; ASPAR'TAS, L. sing.). See ASPARAGIN.

AS'PEN (-pĕn). *Syn.* ASP*, TREM'BLING POP'LAR‡; POP'ULUS TREM'ULA (Linn.), L.; TREMBLE, Fr.; AESPE (äspe), &c., Ger. A large tree, of the *nat. ord.* Amentaceæ (DC.), not uncommon in the moist woodlands of England, and found native on many of the Scottish mountains. It derives its name from the trembling motion of its leaves, which, owing to the peculiar flattening of the leaf-stalks, are agitated by the slightest impulse of the air. Bark and leaves contain POP'ULIN associated with SAL'ICIN. Both bark and leaves have been used with advantage in strangury and intermittents.

ASPHALT' (-fălt'). Asphaltum.

ASPHALT'UM. [L., prim. Gr.] *Syn.* ASPHALT', COMPACT BITUMEN, MINERAL PITCH, JEW'S PITCH, FOSS'IL BITU'MEN, VIT'REUS B., &c.; ASPHAL'TUS, BITU'MEN FOS'SILE (-e-le), B. JUDA'ICUM, B. SOL'IDUM, B. VIT'REUM, MU'MIA†, M. MINERA'LIS*, &c., L.; ASPHALTE, BITUME MASSIF, B. SOLIDE, POIX JUIVE, &c., Fr.; ASPHALT, ERDPECH, JUDENPECH, &c., Ger. A black, hard, brittle, and glossy variety of bitumen found on the shores of the Dead Sea (hence called *La'cus Asphalti'tes*), on and near the shores of the Great Pitch Lake, of Trinidad, and as a mineral product in various other parts of the world.

Prop., &c. Melts without decomposition, and, when pure, burns without residue. It is distinguished from other varieties of bitumen by its more difficult fusibility, and by its fracture being clean, conchoidal, and vitreous. Distilled by itself it yields about 36% of a peculiar bituminous oil (crude PETROLENE), together with combustible gases, traces of ammonia, and water. To anhydrous alcohol it yields 5% of a YELLOW RESIN soluble in rectified spirit and ether; by digesting the residuum in ether, a further 70% of a BROWNISH-BLACK RESIN is obtained, which is freely soluble in the volatile oils and in about 5 times its weight of mineral naphtha. The portion (25%) left undissolved by ether, is very soluble in the oils of turpentine and petroleum. These three resinous principles dissolve altogether, when digested, in the oils of anise, rosemary, and turpentine, and in the fixed oils. (John.) According to others, asphaltum consists almost entirely of *asphaltene*. (Boussingault.) Paranaphthaline has been found in some varieties. (M. Laurent.) Average sp. gr. 1 to 1·68. By friction it affords negative electricity. It is soluble in oil of turpentine, benzole, mineral and coal-tar naphtha, the fixed oils, solutions of the caustic alkalies, and several other liquids, by the aid of heat.

Sources. That of *commerce* is chiefly obtained from the shores of the Dead Sea; but much of that of the shops is a spurious article of the most worthless character. A short time

[1] "The young shoots of *polygonatum* (Solomon's Seal), and others, have been substituted for asparagus." (Lindley's "*Veg. King.*," 3rd ed., 205.)

since some specimens of the purest and most beautiful description, from the great Bitumen Lake of Trinidad, were given us by our respected and venerable friend, the late Earl of Dundonald, who stated, that the supply of both liquid and indurated bitumens, of every grade of quality, was unlimited from that source; but that owing to injudicious importations of inferior kinds, (those most easily shipped,) a prejudice had been created against them in the London market. Our personal investigations have since confirmed the accuracy of these statements.

Uses. The finer varieties are chiefly used as a 'glazing colour' by artists, and in the manufacture of black varnishes and japans. The inferior kinds are applied to the same purposes as ordinary solid bitumen. The Egyptians used it in embalming under the name of MU'MIA; and the Babylonian builders are said to have employed it, as a cement, in lieu of mortar. It is, however, doubtful whether the hard semi-vitreous variety of bitumen, properly termed 'asphaltum,' was that which was thus employed; its present hardness being probably due to time. As a *medicine*, it is stimulant; and it was formerly used as an ingredient in certain plasters and ointments. See BITUMEN, PITCH, &c. A mixture of asphalt, chalk, sand, ground sandstone, &c., is used as a pavement for making water-tight tanks and covers, as a coating for gas and water pipes, and for various other similar purposes. Sometimes the pitchy residue obtained by distilling off the more volatile portions of gas tar is employed to replace the asphalt in the foregoing mixture; the product is called *artificial* or *gas-tar asphalt.*

Facti"tious Asphaltum (-tĭsh.'ŭs). *Syn.* ASPHAL'TUM FACTI"TIUM, L. That of the shops, when not an inferior kind of true asphaltum, is commonly made from the bottoms of *Barbadoes tar*, and other *mineral bitumens*, by heating them until quite hard. Sometimes a little *Scio turpentine, balsam of copaiba*, or even *common resin*, is added. Colour, hardness, &c., inferior to those of native asphaltum.

Liq'uid Asphaltum. *Syn.* PREPARED' ASPHALTUM; ASPHAL'TUM LIQ'UIDUM, L. *Prep.* 1. *Scio turpentine*, 2 *oz.*; melt; add *asphaltum* (in powder), 1 *oz.*; mix, cool a little, and reduce with hot *oil of turpentine.*

2. (Wilson's.) *Asphaltum*, ½ *lb.*; melt; add of hot *balsam of copaiba*, 1 *lb.*; and, when mixed, thin it with hot *oil of turpentine.* Both are used as 'black japan' or 'varnish,' and as a 'glazing colour' by artists.

ASPHYX'IA (-fĭk'-sh'ă; -fĭks'-e-ă‡). [L., Gr.] *Syn.* ASPHYX'Y‡ (-e), Eng.; ASPHYXIE, Fr.; PULSLOSIGKEIT, SCHEINTOD, Ger. *Literally*, absence of pulse; hence, a fainting fit; apparent lifelessness. Its use is now generally confined to a suspension of vitality from some cause interrupting respiration, but in which life is not actually extinct, and may, under favourable circumstances, be revived.

Asphyxia is commonly divided into *four varieties* by nosologists:—

1. ASPHYXIA AL'GIDA:—*Cause.* Exposure to intense cold.—*Symp.* Countenance pale, livid, and shrivelled; limbs rigid.

2. ASPHYXIA ELEC'TRICA:—*Cause.* Stroke of lightning or electricity.—*Symp.* Countenance pale, limbs flexible, blood incoagulable.

3. ASPHYXIA MEPHIT'ICA:—*Cause.* Inhalation of irrespirable gases or fumes.—*Symp.* Countenance pallid, lips wan, &c.

4. ASPHYXIA SUFFOCATIO'NIS:—*Cause.* Suffocation or strangulation, as from drowning, hanging, &c.—*Symp.* Countenance turgid and livid.

Treatm., &c. No general rules can be given exactly suitable to each variety. Whenever it is possible to procure medical aid, it should, of course, be immediately sought; as the delay of even a single minute may render it unavailing. In the *treatment* of suspended animation the principal object is to effect a restoration of the respiratory and circulatory functions; the former of which has been arrested by the external condition of the patient; the latter, by the contact of morbidly carbonised blood with the capillary vessels of the lungs. The *first* thing to be attempted, is the restoration of warmth by active friction with the warm hands, flannels, &c.; the *second*, the re-establishment of natural respiration by any available means, of which, perhaps, none is simpler or better than alternate pressure and its relaxation, applied to the thorax and abdomen, so as to induce expiration first, and inspiration immediately afterwards, by the natural action and elasticity of the ribs and diaphragm. Cold water may also be suddenly dashed on the face and general surface previously warmed by the frictions, in the hope of inducing a more decided inspiration. If these measures fail, *artificial respiration* should be promptly had recourse to. (Dr. Marshall Hall.) The warm bath, and slight electrical shocks, or continued streaming electricity, may also be applied.

See CHARCOAL, COLD, DROWNING, HANGING, RESPIRATION (Artificial), SEWERS-GAS, STRANGULATION, SUFFOCATION, &c.

ASPHYX'IATED. *Syn.* ASPHYXIA'TUS, L.; ASPHYXIÉ, Fr.; ASPHYKTISCH, SCHEINTODT, &c., Ger. Affected with or labouring under asphyxia. (See *above.*)

ASP'IC†. Spike lavender or French lavender; also the *male lavender, spica nardi*, or *pseudo-nardus* of old writers. See ASP.

Aspic. In *cookery*, "savory jelly extracted from the succulence of meat." (Soyer.)

Prep. (Miss Acton.) *Calf's feet*, 2 in no.; *veal*, 4 *lbs.*; *ham*, ¾ *lb.*; *onions*, 2 (large); *carrots*, 3; *water*, 1 gal.; boil 5 or 6 hours, or until reduced to less than one half, strain, and when cold, put the jelly into a stew-pan with the *whites* of 4 *eggs* well beaten, a large bunch of *savoury herbs*, 3 blades of *mace* (in shreds), a teaspoonful of *white peppercorns*, and *salt*,

q. s.; keep it well stirred until pretty hot, then let it *gently* simmer for about 15 minutes, and, after settling, pass it through a *jelly-bag* till quite clear. After cooling a little, it is fit for use; or it may be allowed to cool, and be at any time remelted. French cooks commonly flavour it with *tarragon-vinegar*, added after clarification.

Uses, &c. "Cold poultry, game, fish, plover's eggs, truffles, and various dressed vegetables, with many other things often elaborately prepared, and highly ornamental, are moulded and served in it, especially at large *déjeûners* and similar repasts. It is also much used to decorate raised pies, and hams; and for many other purposes."[1]

ASS (ăss). *Syn.* As'INUS, L.; ANE (âne), Fr.; ESEL, Ger. The *e'quus as'inus* (Linn.), a well-known animal found almost everywhere.

ASSAFŒTIDA. [L. and Eng.] *Syn.* ASSAFETIDA, DEVIL'S DUNG, Eng.; ASSAFŒTIDA GUMMI, L.; STINKASAND, STINKENDER ASAND, TEUFELS-DRECK, Ger. A gum resin exuded from the excised root of *narthex assafœtida* (B. P.); from *ferula assafœtida*, and probably from *ferula Persica*. It yields its virtues to alcohol, and forms a clear tincture, which becomes milky on the addition of water. It is imported into Europe from Persia, via Bombay, in cases, mats, and casks.

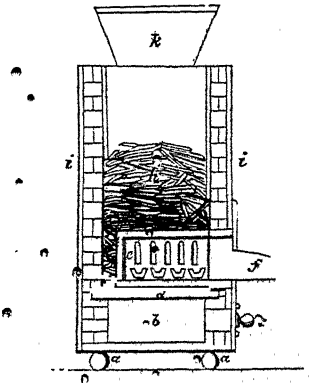
Comp. Assafœtida contains from 4 to 5% of a peculiar volatile oil, and from 50 to 60% of resin of a whitish colour, turning rose-red and reddish-brown by exposure to the air, and giving a greenish solution with concentrated sulphuric acid. Brande resolved this resin into two others—*one*, soluble in ether; the *other*, insoluble in that menstruum.

Pur. The assafœtida of the shops is generally in masses of a whitish, reddish, or violet hue, formed principally of adhering tears or grains, possesses a peculiar fœtid, alliaceous odour, and forms an emulsion with water in all proportions. Hot sulphuric acid blackens it and forms a dark blood-red liquid, sulphurous fumes being evolved. This solution diluted with water, and then saturated with potassa, has a blue colour, which is most visible by reflected light. Digested first in alcohol, and afterwards in weak spirit-and-water, the residuum should not exceed 16%. Sp. gr. 1·325 to 1·330. It is frequently adulterated with inferior gums, and with chalk, clay, sand, &c. The purest and best is that which is clear, of a more or less pale-red colour, full of white tears, and very fœtid.

Prop., Uses, &c. Assafœtida is stimulant, antispasmodic, emmenagogue, expectorant, aphrodisiac, and anthelmintic, and is the most powerful of all the fœtid gum-resins. It is administered with advantage in several uterine diseases, hysteria, chorea, flatulent colic, hooping-cough, infantile convulsions, spasmodic asthma, and some other affections of a spasmodic and convulsive character.—*Dose.* 5 or 6 to 30 grs.; in pills, or preferably made into an emulsion; as an *enema*, 2 drs., with warm water, q. s. Some oriental nations esteem it highly as a condiment. The Brahmins use it against flatulence, and to correct the coldness of their vegetable food. In Persia, the *leaves* of the plant are eaten as salad; and the *root*, after being roasted. In *cookery*, it is now frequently employed as a substitute for garlic. "I am assured by an experienced gastronome, that the *finest relish* which a *beef-steak* can possess, may be communicated by" (slightly) "rubbing the gridiron, on which the steak is to be cooked, with assafœtida."[2]

ASSAY' (-sā). *Syn.* ESSAI (*anc.*, asaie), Fr.; PRÜFUNG, &c., Ger. *Literally*, a 'trial' or examination. In *chemistry*, the determination, by *any* chemical means, of the richness of a substance in its essential material or more valuable ingredient; more particularly applied to quantitative analyses of the commercial alkalies, bleaching-powder, oxide of manganese, ores, and other like articles that are employed on the large scale. In *docimacy* and *metallurgy*, the determination of the quantity of metal in any ore, alloy, or other metallic compound, particularly in the 'dry way,' or by the process of cupellation; and more especially of the quantity of pure gold, or pure silver, contained in coin, bullion, and the commercial alloys and ores of these metals. The substance assayed*. See ASSAYING, &c.

ASSAY'ING. *Syn.* ASSAY', DOC'IMACY (dŏs'-), DOCIMAS'TIC ART; COUPELLATION, Fr.; AB-



(*a, a.*) Rollers on which the furnace rests.
(*b.*) Ash-pit.
(*c.*) One of the ash-pit dampers.
(*d.*) Grate supporting the muffle-plate.
(*e.*) Muffle containing the cupels.
(*f.*) The mouth-plate, upon which, during use, is piled ignited pieces of charcoal, by which the mouth of the furnace is closed, and heated air made to pass over the cupels.
(*k.*) Interior of furnace containing charcoal.
(*i, i.*) Walls of the furnace.
(*k.*) Moveable chimney for regulating the draught.

TREIBEN AUF DER CAPELLE, Ger. The *art of assay*, or of determining the quantity of gold

[1] Miss Acton's "*Modern Cookery*," Longmans, 1860, p. 104.

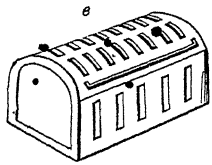
[2] Pereira, "*Mat. Med. & Therap.*," 4th ed., iii, 177.

and silver in ores and alloys of these metals in the 'dry way,' or by cupellation. It differs from chemical analysis in merely furnishing the quantity of the precious metal contained in the sample examined; instead of the nature and proportions of all, or any, of the ingredients in the compound, at the will of the operator.

Materials, Appar., &c. These are—*furnace, muffle, cupels, charcoal,* &c., all of which must be provided and properly arranged for use before an assay can be made:—

The FUR'NACE employed at the Royal Mint, and at Goldsmiths' Hall, London, is figured in section in the *engr.*, and has the following dimensions:—*Total height,* 2½ feet; from the *bottom* to the *grate,* 6 inches; *grate, muffle-plate,* and *bed of loam* that covers it, 3 inches; *space* between the grate and the bottom of the funnel or chimney, 21½ inches; *funnel,* 6 inches. A furnace of any other shape and size may be employed, provided it affords a sufficient heat, and allows of the easy introduction of the muffle.

The MUFF'LE (mŭf'l) is a vessel made of clay (see *engr.*), and furnished with an opening to admit of the introduction of the cupels, and



the complete inspection of the process. It is placed on the muffle-plate (see *above*), by which it is introduced into the furnace.

The CU'PEL (kū'-pĕl) is a small, porous, shallow crucible, usually made of bone ashes or burnt horn. The powder (slightly moistened with water), is placed in a circular steel mould, and after being pressed down tight, is finished off with a rammer having a convex face of polished steel, which is forcibly struck with a mallet, until the mass becomes sufficiently hard and adherent. The newly formed cupel is then carefully removed and exposed in the air for a fortnight, or three weeks, to dry. *Fig.* 3 represents a *cupel* in section, and *fig.* 4, the *tongs* used for charging it. The

best weight for cupels ranges between 180 and 200 grs. Those used at the Royal Mint are made of the calcined cores of ox horns.

Proc. of ass. The *muffle,* with the *cupels* properly arranged on the 'muffle-plate,' is placed in the furnace, and the charcoal added and lighted at the top, by means of a few ignited pieces thrown on last. After the cupels have been exposed for about half an hour, and have become white hot, the lead (see *below*) is put into them by means of the tongs. As soon as this becomes bright red and '*circulating,*' as it is called, the specimen for assay, wrapped in a small piece of paper or lead-foil, is added. The fire is now kept up strongly until the metal enters the lead and circulates well, when the heat, slightly diminished, is so regulated that the assay appears convex and more glowing than the cupel itself, whilst the '*undulations*' circulate in all directions, and the middle of the metal appears smooth, with a margin of litharge which is freely absorbed by the cupel. When the metal becomes bright and shining, or, in technical language, begins to '*lighten,*' and prismatic hues suddenly flash across the globules, and undulate and cross each other, followed by the metal becoming very brilliant and clear, and at length fixed and solid (called the '*brightening*'), the separation is ended and the process complete. The cupels are then drawn to the mouth of the muffle, and allowed to cool slowly. When quite cold, the resulting 'button,' if of SILVER, is removed by the pliers or tongs from the cupel, and after being flattened on a small *anvil* of *polished steel,* with a polished steel hammer, to detach adhering oxide of lead, and cleaned with a small hard brush, is *very accurately* weighed. The WEIGHT is that of the PURE SILVER; and the DIFFERENCE between the *weight of the alloy before cupellation,* and that of the *button of pure metal,* represents the proportion of *alloy* in the sample examined. (See *below.*) In the case of GOLD, the 'button' has to undergo the subsequent operations of *quartation, parting,* and *annealing,* before it is weighed; as described under that metal.

Assayer's weights, &c. The materials used in assaying are accurately weighed in a balance of the most susceptible description; and the weights are given in terms of the 'notation' employed by assayers. The '*fineness,*' '*richness,*' or 'degree of *purity*' of GOLD is expressed in *carats.* Pure gold is spoken of as 24 *carats fine;* and any other sample containing in 24 parts only 12, 18, 22, &c., parts of pure gold, is said to be of as many *carats fine.* Every *carat* is nominally divided into 4 '*assay-grains,*' each assay-grain into '*quarters,*' and each quarter into '*eighths*' (= $\frac{1}{32}$ carat), giving 768 "*reports*" for GOLD. On this system fractional alloys are commonly spoken of as of so many '*carats* and *thirty-seconds* fine.' The real quantity taken for assay, technically termed the 'ASSAY-POUND,' is, however, very small, generally either 12 grs. or 6 grs.; which makes each *assayer's eighth-grain,* or "*report,*" equal to either the $\frac{1}{24}$ or $\frac{1}{12}$ gr. Troy, as the case may be. The nominal *assayer's gold carat* is 12 grs. The "*journey-weight of gold*" is 15 lbs. Troy (= 701 sovereigns = 1402 half-sovereigns).

The '*fineness,*' '*richness,*' or '*purity*' of SILVER was formerly expressed in penny-

weights; but is now generally reckoned in 1000ths, which admits of greater accuracy. *Pure silver* was said to be "silver of 12 pennyweights." If it contained 1, 2, or 3 parts of alloy, it was termed "silver of 11, 10, or 9 pennyweights," as the case might be. Every *assayer's pennyweight* was nominally divided into 24 grs., and hence gave 288 fine grains, or '*reports*,' for SILVER. The fineness of specimens containing odd grains, was given in *pennyweights* and *fine grains*. The 'ASSAY-POUND' for *silver*, on this system, may be 24 Troy gr., when 2 real grains are equal to 1 'fine pennyweight,' and $\frac{1}{12}$ real gr. equal to 1 'fine-grain.' In the *decimal method* pure silver is = 1000. The usual weight of silver taken for the 'assay-pound,' when the fineness is reckoned in 1000ths, is 20 Troy grs., every real grain of which represents $\frac{50}{1000}$th of fineness; and so on of smaller divisions. The mint "*journeyweight of silver*," is 60 lbs. Troy (= 3920 shillings, or a like value in other denominations).

Ratio. Cupellation, which is the distinctive and most important operation in assaying gold and silver, is founded upon the feeble affinity which these metals have for oxygen, in comparison with copper, tin, and other cheaper metals; and on the tendency which these latter metals have to oxidise rapidly in contact with lead at a high temperature, and sink with it into any porous earthen vessel, in a thin, glassy or vitriform state. The conditions essential to the success of the process, and which are found in the precious metals, are —that "the metal from which we wish to part the oxides must not be volatile;" and that "it should also melt and form a button at the heat of cupellation; for otherwise it would continue disseminated, attached to the portion of oxide spread over the cupel, and incapable of being collected."[1]

Concluding remarks. The art of assaying requires very great care, skill, and experience, for its due exercise; and from the costliness of the precious metals, and their general employment for coin, jewelry, plate, &c., is of the utmost importance both to individuals and governments. Such is the extreme delicacy of the operation of cupellation, that, without the requisites alluded to, it is more likely to fail than to give reliable results. An assay is thought to be good when the 'button' or 'bead' separates readily from the cupel, has a round form, with a brilliant upper surface, and the lower one granular and of a dead metallic lustre. When the upper surface is 'dead' and 'flat,' too much heat has been employed; and in the case of silver, some of the metal may have been lost by fuming or absorption. When the bead adheres to the cupel, or is spongy, variegated, or has scales of litharge still adhering to it, either too little heat has been used, or the process has been stopped before the assay was complete. The remedy is re-exposure to heat in the cupel, adding a little powdered charcoal or a few small pieces of paper, and continuing the heat until the metal 'brightens' and 'circulates' freely. The lead employed must be absolutely pure, or that technically called '*poor lead*;' and, for this purpose, is commonly prepared by the reduction of refined litharge mixed with some carbonaceous matter, by heat; but, according to the late T. H. Henry, "lead reduced from the litharge of commerce usually contains from 10 to 15 *dwt.* of silver per ton." These remarks apply equally to gold and silver.

The process of assaying by the cupel, however skilfully conducted, gives much less accurate results, especially with silver, than the method of chemical analysis, often termed '*humid*' or '*volumetrical assay*;' whilst it is, in all cases, much more troublesome and expensive, and with compounds containing only small quantities of the precious metals, is not to be depended on. See GOLD, SILVER; also CARAT, CUPELLATION, PARTING, LIQUATION, QUARTATION, REFINING, &c. (and *below*).[2]

Assay of the Touch. The fineness of JEWELRY, and of small quantities of GOLD which it is either impossible or inconvenient to assay according to the usual method, is generally determined by means of *touch-needles* and *touch-stones*. The former are made in sets, containing gold of different degrees of fineness, and differently alloyed with copper and silver. The latter are usually of black basalt; but pieces of good black pottery answer the purpose very well. The mode of using them is to mark the stone with the sample under examination, and to compare its appearance, hardness, colour, &c., with that produced by one or more of the needles. When the two are similar, the quality or 'fineness' is considered to be the same. The marks are then further examined by heating the 'touch-stone' to redness, and moistening the strokes with *aquafortis*, when the appearances resulting from oxidation, &c., differ according to the nature and quantity of the alloy. A nearly similar method is sometimes adopted with SILVER; but the characteristics are scarcely so distinct with that metal. (See *above*.)

Hu'mid Assaying, Humid Assay. Terms applied to the estimation of the quantity of gold and silver in ores and alloys in the moist way, more especially by the method known as volumetrical analysis. See GOLD (Estim.), SILVER (Estim.), VOLUMETRICAL ANALYSIS, &c.

ASSIMILA'TION. [Eng., Fr.] *Syn.* ASSIMILA'TIO, L.; ANEIGUNG, VERÄHNLICHUNG, &c., Ger. In *physiology*, the conversion of food into nutriment, and finally into the substances which compose the bodies of animals and plants; the function of nutrition.

[1] Ure's "*Dict. of Arts, M., & M.*," 5th ed., i, 214.

[2] Those desirous of further information on the subject than that contained in this work, are referred to Mitchell's "*Manual of Assaying*," and to the various memoirs of Gay-Lussac, Chaudet, D'Arcet, Tillet, Brande, Ure, Henry, and others.

ASTHEN'IC. *Syn.* ASTHEN'ICUS, L.; ASTHÉNIQUE, DÉBILE, Fr.; SCHWACH, Ger. Weak; debilitated. In *pathology*, an epithet of diseases (ASTHEN'IC DISEASES) accompanied by great and well-marked debility.

ASTHEN'OPY. *Syn.* ASTHENO'PIA, L. In *pathology*, incapacity to keep the eyes fixed on near or small objects for any length of time without confusion of vision. The common causes are over-exertion of the eyes, particularly by artificial light, or by a very brilliant one, or during convalescence; congestion of the ocular vessels; debilitating discharges or indulgences; and general nervous debility, however produced. It "appears to consist in weakness of the apparatus by which the eye is adjusted for the vision of near objects;" and along with this "there is an irritable state of the retina, connected in some manner with a tendency to internal congestion of the eyes."[1] The *treatment* may consist of rest to the eyes, and ablution of them in cold water, with such other efforts to restore their tone and the general health as are noticed under AMAUROSIS. The prospect of complete cure, when the cause is not removable, is unfavorable; but even when confirmed the disease is not likely to end in blindness. The use of *convex spectacles* of *very low power* will generally be found serviceable. See EYE, SPECTACLES, VISION, &c.

AST'HMA (ăst'-mă[2]). [Eng., Ger., L., Gr.] *Syn.* ASTHME, Fr.; ENGBRÜSTIGKEIT, Ger. In *pathology*, a well-known disease coming on by fits, and characterised by shortness and difficulty of breathing, accompanied by a wheezing sound, cough, stricture and tightness of the chest, with other like symptoms. These gradually increase until the patient can no longer remain in a recumbent position, being, as it were, threatened with immediate suffocation; and they generally terminate, after the lapse of a few hours, in copious expectoration. The attack usually commences towards evening, and the symptoms increase in urgency during the night—often occurring suddenly after the first sleep—until at length, on the approach of morning, a remission takes place, and, in all probability, the patient, worn out and exhausted, falls into a sound sleep. On awaking in the morning he still feels the 'tightness' at the chest, breathes with some difficulty, which is increased by moving, and cannot lie in bed unless his head and shoulders are greatly raised. After a repetition of the fits for some nights, they at length moderate, and after more considerable remissions, pass off at last, leaving the patient in his usual state of health for a time, or until fresh exciting causes produce a return of the disease. For an evening or two previous to the fit, the patient generally feels drowsy, indolent, and low-spirited, and experiences a sensation of fulness about the stomach, with headache, general uneasiness, and indigestion—these are the premonitory symptoms.

Asthma is principally confined to the later periods of life, and appears in many cases to be hereditary. It is generally severest in the heat of summer, or in the foggy or damp or windy weather of winter. The fits vary in duration from two to several hours. Sometimes copious expectoration commences early, which has led to the division of asthma, by nosologists, into two kinds—*dry, nervous*, or *spasmodic asthma* (ASTHMA SIC'CUM, L.) and *humid a.* (A. HU'MIDUM, L.).

The *exciting causes* of asthma are exposure to sudden changes of temperature, particularly from heat to cold; unwholesome effluvia, hard drinking, heavy meals, indigestion, violent exercise, and cold, damp, foggy, and sometimes, windy weather.

Treatm. A dry, warm, and airy situation as a residence, should, if possible, be sought. The use of flannel next the skin, and tepid or warm bathing is also advantageous. The bowels should be kept regular by mild aperients, and the stomach preserved in order by the adoption of a light and wholesome diet; particularly avoiding excess in either eating or drinking. The severity of the paroxysm may be generally lessened by adopting the sitting posture, and inhaling the vapour of hot water or of an infusion of chamomile. Small doses of camphor, ether, and opium, frequently repeated, may also be tried. The inhalation of the vapour of a little tar liquefied by heat, is said to often produce considerable relief. The fumes arising from the slow combustion of porous paper dipped in a solution of nitre, and dried, have also been recommended. "The fumes of a piece as big as one's hand being placed on an earthenware plate, and ignited, presently become sensible throughout the room; and within a quarter of an hour their influence, in many cases, is rendered evident, in clearing the passages, and gradually opening the air-tubes." "Of calming vapours that of chloroform is, however, the one likely, in respect of its soothing power, to supersede all others. Inspired in moderate quantity, far less than is requisite to produce general insensibility, it has been found of singular efficacy in allaying, at once, the spasmodic distress of an asthma-fit. But it is a remedy too potent and subtle to be intrusted to the discretion of the patient himself" (Dr. Watson); unless, indeed, he well understands its properties and nature, and has some friend near him to restrain his using it too freely—a thing he is, unfortunately, often tempted, by the urgency of the symptoms, to do. "Bleeding is an imprudent operation in every species of asthma" (Dr. Bree); and has often proved highly injurious, especially in elderly persons. It is only in full plethoric habits, or when the paroxysms are very severe, and attended with signs of congestion of the lungs and

[1] T. W. Jones, "*Defects of Sight;*" Lond., 1856; p. 82.

[2] *Asth'ma* (with *th* fully sounded), as given by Knowles, is difficultly pronounceable, and is now obsolete.

brain, indicated by lividity of the countenance, stupor, extreme dyspnœa, &c., that blood should be taken; and then only by 'cupping' between the shoulders, or by leeches to the chest. Emetics, and active purgatives, must also be avoided during the paroxysm; at which time costiveness may be best removed by an aperient clyster containing assafœtida. At other times, emetics (of ipecacuanha) and *diaphoretics*, followed by *mild purgatives*, may be administered with advantage; indeed, an emetic, taken a few hours before an impending fit, will frequently prevent its accession. *Dyspeptic symptoms* must be treated in the usual manner. "*Chalk* and *opium* will astonish the asthmatic, by the excellence of their effects when the irritation proceeds from dyspepsia of the first passages only." (Dr. Bree.) The same authority also states that 'vinegar,' *separately* administered, counteracts the flatulence and distension of the stomach.

Various other remedies have been recommended for asthma; among which are the smoking of tobacco and stramonium. In using the latter herb, the root and lower parts of the stem are chopped up and placed in the bowl of a common tobacco-pipe, and a few whiffs are occasionally taken. Drinking at the same time should be avoided. Lately *lobelia inflata* (Indian tobacco) has been highly extolled in asthma, in *doses* of—*tincture*, 20 or 30 drops, to 2 teaspoonfuls—*powder*, 5 to 15 or 20 grs.; taken at the commencement or shortly before the accession of the fit, and repeated after the interval of an hour, if nausea or expectoration does not intervene. Sir John Floyer is said to have been cured of an asthma of 60 years' standing, at the age of 80, by the constant use of very strong coffee. Sir John Pringle adopted the same remedy with great success. He remarks, "One quality occurred to me which I have observed of that liquor (*coffee*), confirming what you have said of its sedative powers. It is the best abater of periodic asthma which I have seen. The coffee used ought to be the best *Mocha*, newly burnt, and made very strong immediately after grinding it. I commonly order an ounce for one dish, which is to be repeated with fresh coffee after the interval of a quarter or half an hour; and which I direct to be taken without milk or sugar."[1]

Very recently cigars and cigarettes of *datura tatula*, Linn.—a peculiar species of stramonium—have been prepared by Messrs. Savory and Moore; and are strongly recommended by Drs. Watson, Latham, Fergusson, and many other physicians of eminence, as the very best remedy yet introduced for asthma.

A change of diet and habits, and particularly a change of residence, will often produce a marked improvement in asthmatic patients, and even effect a cure, when medicines have failed. The use of *bark* and *bitters*, or mild *chalybeate tonics* (when not contra-indicated) tends to improve the tone of the system, and may be adopted, in nearly all cases, with perfect safety. See AIR-BATH (Compressed), CIGARS, DATURA, &c.

[1] "*Letter to Dr. Percival.*"

Grind'er's Asthma. See MELANOSIS.

ASTRIN'GENT (-trĭnje'-). [Eng., Fr.] *Syn.* ASTRIN'GENS, L.; ZUSAMMENZIEHEND, Ger. That straitens or causes wrinkling or constriction. In *pharmacology*, an epithet of substances or agents (ASTRIN'GENTS; ASTRINGEN'TIA, L.) which constrict animal fibre and coagulate albuminous fluids, and thereby obviate relaxation and check excessive secretion or discharges. In modern use, the word, both as an *adj.* and *subst.*, is chiefly applied to internal remedies; those of a like character, employed externally, being usually termed 'styptics,' 'desiccants,' &c.

The principal astringents are—*alcohol*, *alum*, *chalybeates* (generally), *sulphate of copper*, *sulphate* and *perchloride of iron*, *acetate* and *diacetate of lead*, *lime*, *bichloride of mercury*, *nitrate of silver*, *vegetable astringents* (see *below*), *acetate*, *carbonate*, *chloride*, *oxide*, and *sulphate of zinc*, &c. See DESICCANTS, STYPTICS, TONICS, &c.

Min'eral Astringents. See ASTRINGENT (*above*).

Veg'etable Astringents (vĕj'-). Of these the principal are—*alkanet*, *bistort*, *catechu*, the *cinchona barks* and their *alkaloids*, *dragon's blood*, *French* or *red rose*, *galls*, *kino*, *logwood*, *mastiche*, *oak-bark*, *red sander's wood*, *rhatany*, *tormentil*, *tannic acid*, *gallic acid*, and *areca nut*. (See *above*.)

Astringent Prin'ciple. A term formerly restricted to tannin; but now commonly applied to the astringent matter of any vegetable.

ATMOM'ETER. *Syn.* ATMIDOM'ETER; ATMOM'ETRUM, &c., L.; ATMOMÈTRE, &c., Fr. In *chemistry* and *meteorology*, an instrument for measuring the rate of evaporation from a humid surface.

AT'MOSPHERE (-fēre). *Syn.* ATMOSPHE''RA, L.; ATMOSPHÈRE, Fr.; ATMOSPHÄRE, DUNSTKREIS, Ger. *Primarily*, a 'vapour-sphere;' *appr.*, the assemblage of respirable gas and aëriform vapours which surround the earth; *fig.*, any surrounding medium or influence.

Comp., Chem. prop., Pur., Uses, &c. See AIR (Atmospheric).

Mechanical properties of the atmosphere:—

COLOUR:—The prevailing colour of the atmosphere is blue; at considerable elevations this blue tint is lost, and the sky appears deep black. The prevalence of blue is referred to the greater facility with which the blue and violet rays are reflected; whilst the glowing tints of morning and evening are conceived to arise from the red rays possessing greater momentum than the other rays of the spectrum.

DENSITY:—The density of the atmosphere diminishes with the distance from the earth's surface, and this in the duplicate ratio of the

altitude. Thus, if at a given altitude the density of the air is only one half what it is at the level of the sea, at twice that elevation it possesses only one fourth that density. On this fact depends the application of the barometer to the determination of the elevation or depression of any point above or below the level of the sea, taken as a standard.

Density of the Atmosphere at Different Elevations. By PROF. GRAHAM.

Height above the level of the Sea in miles	Volume of Air.	Height of the Barometer.
0·	1	30
2·705	2	15
5·41	4	7·5
8·115	8	3·75
10·82	16	1·875
13·525	32	·9375
16·23	64	·46875

HEIGHT, &c.:—If the density of the air were uniform throughout its whole extent, the height of the atmosphere, measured by a corresponding column of mercury, would be barely 5¼ miles. As, however, its density decreases with the distance from the earth's surface, its real height must be considerably greater. Kepler found that the reflection and refraction of the sun's rays by the atmosphere, producing twilight, ceases when that luminary descends 18 degrees below the horizon; whence it is calculated that the atmosphere cannot have a greater altitude than 45 miles. On the other hand, there is reason to believe that it cannot be much less than this sum. "With a good air-pump air may be rarefied 300 times; supposing this to be the utmost limit to which rarefaction can be carried, the atmosphere would still extend to an altitude of above 40 miles." Whether, in a state of extreme tenuity in which its grosser properties are lost, it extends indefinitely into space, was formerly a subject of controversy. That its boundaries are limited, and that it belongs exclusively to our earth, appears almost certain. "We are warranted in concluding that the atoms of air are not infinitely divisible, and consequently, that the atmosphere has a limit; and the limit must be situated at that height, above the earth, where the gravitation of the atoms is just equal to the force of their repulsion."[1] Under ordinary circumstances the mercury of the barometer falls about one inch for every 1000 feet of elevation.

PRESSURE:—The weight or pressure of the atmosphere is shown by the rise of water in the barrel of the common 'lifting' pump, and the suspension of the mercurial column in the tube of the barometer. The last affords a ready means of determining the actual pressure of the air; the column of mercury, and the column of air by which it is suspended, resembling two weights in equilibrio, at the opposite extremities of the same balance. The mean height of the barometer at the level of the sea, in England, is 28·6 inches (= about 33⅓ feet of water); and as a cubic inch of mercury weighs 3425·92 grs. or ·48956 *lb.*, it follows that the weight of a column of mercury whose base is a square inch, is 14·6 *lbs.* avoirdupois. The pressure of the atmosphere is not merely downwards, but is equally diffused in all directions, and exerts a most powerful effect in the economy of organic beings. On the surface of the body of an adult of ordinary size (say = 15 sq. feet, or 2160 inches), it amounts to the enormous weight of 31,536 *lbs.*, which is not sensible, only because it is balanced by the force of the elastic fluids in the interior of the body. Were this equilibrium to be suddenly destroyed, the consequence would be, either that the body would be instantly torn to pieces with explosive violence, or that it would be crushed under the overwhelming weight that would suddenly fall upon it. Even the comparatively slight variations of atmospheric pressure which occur with changes of wind, weather, and season, exercise a perceptible effect on the functions of life.

Mean pressure of the Atmosphere at the level of the Sea, in different latitudes, at 32° Fahr., *expressed in inches of mercury.*

Lat.	Height (inches).	Lat.	Height (inches).	Lat.	Height (inches).
0°	29·930	40°	30·019	54½°	29·926
10	29·975	45	30·000	60	29·803
20	30·064	49	29·978	64	29·606
30	30·108	51½	29·951	67	29·673

TEMPERATURE:—The *temperature* of the *atmosphere*, independently of changes arising from variations of latitude and season, diminishes, like its density, with its elevation. In general, every 100 yards of ascent causes the temperature to fall 1° Fahr. See AIR (Atmospheric), EPIDEMICS, VENTILATION, &c.

Atmosphere. In *engineering* and *pneumatics*, the pressure of a column of mercury at 0° Cent. or 32° Fahr., which is 76 centimètres or 29·9218 inches high, at the mean level of the sea in latitude 45°, taken as a standard of that exerted by other elastic fluids. In *practice* this is assumed to be 15 *lbs.* to the *square inch*, under a barometrical pressure of 30 inches. Thus, *steam* or *air* condensed so as to exert a pressure of 30 *lbs.* per sq. inch, is said to be of *two atmospheres;* at 45 *lbs.*, of *three atmospheres*, &c.

AT'OM (-ŭm). **Atomic Weight, Atomic Theory.** *Syn.* AT'OMUS, L.; ATOME, Fr.; ATOM, UNTHEILBARE THEILCHEN, Ger.

ATOMIC WEIGHT. When the elements unite chemically, they invariably do so in the propor-

[1] Brande's "*Dict. of Lit., Sci., & Art.*"

ing it in 5 times its weight of alcohol, decolouring it with pure animal charcoal, distilling off greater part of the alcohol, and evaporation and crystallisation by a very gentle heat; or only about one half the spirit is distilled off, and 3 or 4 times its volume of water gradually agitated with it, the resulting milky liquid being then heated to boiling, and allowed to cool very slowly, when nearly the whole of the ATROPIA crystallises out after a few hours. The same may be effected by at once agitating 6 or 8 volumes of water with the alcoholic solution, and setting aside the mixture for 12 to 24 hours, by which time the crystallisation will be completed. This process originated with Soubeiran, was improved by Mein, and subsequently, with slight modifications, adopted by Liebig. The product is about 0·3% of the weight of root operated on.

4. (Bouchardat and Cooper.) The filtered tincture is precipitated with iodine dissolved in an aqueous solution of iodide of potassium, the resulting ioduretted hydriodate of atropia, decomposed by zinc-and-water, the metallic oxide separated by means of carbonate of potassa, and the alkaloid thus obtained dissolved in alcohol, and crystallised.

5. (Mr. Luxton.) The dry leaves of belladonna are gently boiled, for 2 hours, in distilled water just sufficient to cover them, and the resulting decoction is strained through a coarse cloth into a large precipitating jar; this process is repeated with a second quantity of distilled water, and the two decoctions mixed; concentrated sulphuric acid is now added in the proportion of 2 drs. to every pound of leaves operated on, by which the vegetable albumen of the decoction is precipitated, and the liquid becomes clear and sherry-coloured; the clear liquor is now decanted or syphoned off, and, if necessary, filtered; the filtrate is now decomposed by either passing a stream of gaseous ammonia through it, or by suspending in it a lump of carbonate of ammonia. The effect is that the liquid turns black, and crystals of ATROPIA are slowly formed and deposited. At the expiration of a day or two, the supernatant mother-liquid is removed with a syphon, and the crystals thrown on a filter to drain and dry.[1] It may be purified by re-solution and crystallisation. 1 lb. of leaves yields 40 grs.; or at the rate of fully ·57%.

6. (Rabourdin.) To the crystallised juice of the plant (previously heated to coagulate its albumen, filtered, and allowed to cool), 1 quart; is added of caustic potassa, 1 dr.; and afterwards, of chloroform, 1 oz.; the whole is then agitated well, and after ½ an hour's repose, the supernatant liquor is poured from the discoloured chloroform, which, after being washed with distilled water as long as it gives any colour to that liquid, is placed in a small retort, and the chloroform distilled off by the heat of a water bath; the residuum is dissolved in a little water acidulated with sulphuric acid, and precipitated with carbonate of potassa, in slight excess; the precipitate is redissolved in alcohol, and the solution, by spontaneous evaporation, yields crystals of ATROPIA.

7. (Ure.) From the expressed juice of the fresh, or the watery extract of the dry plant, by treating it with caustic soda, in slight excess, and then agitating the mixture with 1½ times its volume of ether; the ATROPIA taken up by the ether is again deposited after repose for some time, and is then purified by repeating the treatment with fresh ether as often as necessary.

8. Freshly precipitated hydrate of magnesia is added to the coagulated and filtered expressed juice, and the mixture evaporated to dryness, as quickly as possible, in a water bath; the residuum is pulverised and digested in strong alcohol, and the clear liquid allowed to evaporate spontaneously. The crystals may be purified by repeated re-solutions in alcohol.

Prop., Tests, &c. The crystals obtained from hot concentrated solutions, colourless, transparent, silky prisms; from solutions in dilute spirit, silky needles, like those of disulphate of quinine. It is colourless; has a bitter, acrid, and somewhat metallic taste; dissolves in 200 parts (300 parts—Thomson) of cold and 50 to 54 parts of boiling water, in 1½ parts of cold alcohol, and in 25 parts of cold, and 6 parts of boiling ether; it has an alkaline reaction, fuses at about 194° Fahr., is slightly volatile at common temperatures, and freely rises in vapour at 212° Fahr.; at higher temperatures it volatilises with partial decomposition; with the acids it forms salts, of which several are crystallisable.

Tests.—1. Nitric acid forms with it a yellow solution:—2. With cold sulphuric acid it gives a colourless solution, which becomes *red* only when heated:—3. Aqueous solutions of atropia and its salts are—*a.*, turned *red* by tincture of iodine—*b.*, gives a citron-yellow precipitate with terchloride of gold—*c.*, a flocculent whitish precipitate with tincture of galls, and—*d.*, a yellowish-white one with bichloride of platinum:—4. Heated with caustic potassa or soda, it suffers decomposition, and ammonia is evolved:—5. A weak solution cautiously applied to the eyelid or conjunctiva, produces dilation of the pupil lasting for several hours.

Pur., &c. Alkaloid prepared from the root of *atropa belladonna*. Crystals; white, in the form of prisms; soluble in water and rectified spirit. It leaves no ash when burned with free access of air (B. P.).

Phys. eff. It is a very powerful narcotico-acrid poison.[1] Its effects are similar to those of belladonna, but considerably more powerful. "A very minute (imponderable) quantity applied to the eye is sufficient to dilate the pupil." (Pereira.) The $\frac{1}{12}$ to $\frac{1}{10}$ gr. often causes very serious effects in the human subject. The ¼th

[1] "*Pharm. Journ.*," 1854-5, p. 299.

[1] A "cerebro-spinal poison."—Taylor.

of a grain accelerates the pulse, affects the brain, causes dryness of the throat, difficulty of deglutition, dilation of the pupil, dimness of sight, giddiness, strangury, numbness of limbs, sense of formication in the arms, rigidity of thighs, depression of pulse, and sometimes feebleness or loss of voice. These symptoms continue for from 12 to 24 hours. In larger doses death ensues.

Ant., &c. These may be similar to those described under BELLADONNA and ALKALOID.

Uses. Chiefly as an external agent, as a substitute for belladonna, to cause dilation of the pupil; and as a local anæsthetic or anodyne, especially in facial neuralgia. Internally, it has been occasionally given in hooping-cough, chorea, and a few other nervous diseases.—*Dose.* $\frac{1}{30}$ gr., gradually increased to $\frac{1}{20}$, or occasionally, even $\frac{1}{10}$ gr. in solution, or made into a pill with liquorice powder and honey, or syrup, or used endermically; for a collyrium, 1 gr. to *water* 1 oz., a few drops only being applied to the eye at a time; the greatest caution in each case being observed. It is also employed to make the sulphate. In dispensing it, a single drop of acetic acid, or dilute sulphuric acid, will be found to facilitate and ensure its perfect solution. See BELLADONNA and BELLADONINE.

Atropia, Sul'phate of. *Syn.* ATRO'PIA SUL'PHAS, L. *Prep.* (B. P.) Take of *atropia*, 120 *grs.*; *distilled water*, 4 *fl. drs.*; *diluted sulphuric acid*, a sufficiency.

Mix the atropia with the water and add the acid gradually, stirring them together until the alkaloid is dissolved and the solution is neutral. Evaporate it to dryness at a temperature not exceeding 100°.

Characters and Tests.—A colourless powder, soluble in water, forming a solution which is neutral to test-paper, and when applied to the eye dilates the pupil as the solution of atropia does. It leaves no ash when burned with free access of air.

Intended for external application. It is a powerful poison.

Uses, &c. The same as those of the pure alkaloid.—*Dose.* $\frac{1}{25}$ to $\frac{1}{20}$ gr., either in solution or pills; 1 to 3 gr., to water, 1 fl. oz., as a collyrium, of which a few drops seldom fail to produce full dilation of the pupil in about a quarter of an hour; 1 to 2 grs., to lard, 1 dr., forms an excellent ointment in neuralgic affections.

Obs. Sulphate of atropia (which is intended for external use only) is rather difficult to crystallise, as it has a tendency to assume an amorphous or gum-like condition. It is more soluble than the pure alkaloid, and like it, is a terrific poison.

ATROP'IC ACID. *Syn.* ACIDUM ATROP'ICUM, L. The name given by Richter to a volatile crystallisable substance, possessing acid properties, found in *atropa belladonna* or *deadly nightshade*. In many respects it resembles benzoic acid, from which, however, it is distinguished by not precipitating the salts of iron.

ATROPI'NA, At'ropine. See ATROPIA.

AT'TAR. See OTTO and VOLATILE OILS.

ATTELETTES (-lĕts'). [Fr.] In *cookery*, small skewers, generally of silver, with ornamental heads. The term is also applied to small dishes (ENTRÉES, &c.) in which the articles are mounted on attelettes. Small fish, as smelts, are often served in this way. See AIGUILLETTE.

ATTEN'UANT (-ū-ănt). *Syn.* ATTEN'UANS, L.; ATTÉNUANT, Fr.; VERDÜNNEND, Ger. That makes thin, or less dense or viscid; diluting. In *medicine*, applied to remedies (ATTEN'UANTS, SPANÆM'ICS) which are supposed to act by thinning, diluting, or impoverishing the blood.

ATTENUA'TION. *Syn.* ATTENUA'TIO, L.; ATTÉNUATION, Fr.; VERDÜNNUNG, Ger. A thinning or diminishing; a reducing in consistence. In *medicine*, see the *adj.* (above); in *brewing*, the decrease of the density of worts during fermentation, arising from the gradual conversion of their '*saccharine*' (sugar) into alcohol. See BREWING, DISTILLATION, WORTS, &c.

ATTRAC'TION. [Eng., Fr.] *Syn.* ATTRAC'TIO, L.; ANZIEHUNG, Ger. The power that draws together matter and resists its separation. That force which attracts bodies towards the centre of the earth, and which keeps on its surface those that are movable, is called GRAVITY, or the *attraction* of *gravitation*. It is exerted at sensible, often at immense, distances, and determines the figure and motions of the planets and comets, and causes the descent of heavy bodies to the ground. This force it is which confers the property of weight upon matter.

That force which unites particles of the *same kind* of matter, so as to cause them to assume the condition of solid or liquid masses, *e.g.* particles of chalk to form a mass of chalk, particles of water to form a mass of water, is called COHESION, or the ATTRACTION OF COHESION. That force which binds together *different* substances without changing their properties, as when paint sticks to wood, ink to paper, &c., is called ADHESION, or the ATTRACTION OF ADHESION. CAPILLARY ATTRACTION is a modification of *adhesion*, and is characterised by being exerted between liquids and the internal surfaces of tubes and pervious bodies. The absorption of water by a sponge, the ascent of oil in the wick of a lamp, are examples of this power. The CHEMICAL FORCE or AFFINITY differs from all other kinds of attraction in being exerted between definite and constant quantities (*atoms*) of matter, usually of dissimilar natures, and producing combinations possessing properties different from those of their components. (See AFFINITY.) This force, as well as cohesion and adhesion, is exerted at distances so small as to be immeasurable.

The terms ELEC'TRIC ATTRACTION and MAGNET'IC ATTRACTION are employed in *physics* to denote phenomena which we imperfectly understand, and which operate between bodies

at sensible distances, and simulate those of the attraction of gravitation.

ATTRI″TION (-trĭsh′-ŭn). [Eng., Fr.] *Syn.* ATTRI″TIO, L.; ABREIBUNG, AUFREIBUNG, Ger. In *mechanics*, the wearing away of parts by friction. In *medicine*, a graze, abrasion, or solution of continuity of the cuticle, or the act which causes it. In *surgery*, the crushing or tearing away of any exterior portion of the body by violence. See ABRASION, ANTI-ATTRITION, FRICTION, &c.

AURANTIA′CEÆ (-she-ē). [Lat.; D.C.] The orange tribe. In *botany*, an extensive and important *natural order* of exogenous trees and shrubs, found exclusively in the temperate and tropical parts of the Old World, and unknown in a wild state in America. The *fruit* is pulpy, succulent, sub-acid, and eatable, and separated into cells by membranous partitions, and is covered with a leathery aromatic skin or rind. Some of the genera embrace plants of great beauty and utility. A few of the Indian species are climbers. The genus CIT′RUS, which includes the *orange, lemon, citron, lime, bergamot*, and *shaddock*, is that best known in Europe.

AURAN′TIIN (-she-ĭn). *Syn.* HESPERIDIN; AURAN′TINE* (-tĭn), Eng., Fr.; AURANTIIN′NA, &c., L. The bitter principle of the peel of oranges and lemons.

Prep. The exterior or yellow peel of the *Seville orange* (carefully separated from the white matter, and air-dried) is steeped in hot water, and the filtered liquor gently evaporated to dryness.

Prop., &c. It possesses the bitter properties of the peel without any of its glutinosity or fragrance, and is said to agree better with delicate stomachs. It may be taken in water either with or without the addition of a little sugar or capillaire, or dissolved in wine.

AU″RIC (aw′- *or* awr′-). *Syn.* AU″RICUS, L. Of or relating to gold, or containing it, or formed from it.

AURIF′EROUS. *Syn.* AU″RIFER, AURIF′ERUS, L.; AURIFÈRE, Fr.; GOLDHALTIG, Ger. In *mineralogy*, that yields or contains gold; as *auriferous sand, a. quartz*, &c.

AURIPIGMEN′TUM †. [L.] *Literally*, paint of gold; *appr.*, native orpiment. See ARSENIC.

AURO-CHLO″RIDES (-klōre′-īdz). Compounds of terchloride of gold with chlorides of other bases. They may be *prepared* by mixing the *terchloride of gold* with the *chloride of the base*, in atomic proportions, and setting aside the solution to crystallise.

Prop., &c. Most of the auro-chlorides crystallise in prisms, dissolve in both alcohol and water, have an orange or yellow colour, and are decomposed at a red heat.

AURO-CY′ANIDES (-īdz). In *chemistry*, compounds of cyanide of gold with cyanides of other bases. They may be formed in a similar manner to the auro-chlorides. *Auro-cyanide of potassium* is much used in electro-gilding.

AUTOG′ENOUS (-tŏj′-). *Syn.* AUTOGE″NEAL; AUTOG′ENUS (-tŏj′-), L. Self-generating or effecting; acting without the aid of foreign matter. In *anatomy*, &c., developed from distinct and independent centres; as parts or processes. Among *metallists*, it denotes a method of joining metals by fusing the parts in contact, by means of a flame of hydrogen, or of a mixture of hydrogen and common air, without the intervention of a fusible alloy or solder. Lead, and even ordinary hard solders, are, however, sometimes so employed, and the name, though improperly, retained.

AUTOMAT′IC. *Syn.* AUTOMAT′ICUS, AUTOM′ATUS, L.; AUTOMATIQUE, Fr.; AUTOMATISCHE, Ger. Self-acting or self-moving, or that seems to be so; mechanical; of or resembling an automaton. In *physiology*, involuntary, applied to functions which are performed without the operation of the will; as the movements in respiration, the contractions and dilations of the heart, the persistent contraction of the sphincters, &c. In *mechanics*, &c., moving and acting from concealed machinery; also, as applied to *machinery*, self-regulating and directing, within the limits prescribed by its author, though moved by external power. To the last class belongs the self-acting machinery of our flax and cotton mills, our engineering establishments, &c.; in which the elemental powers are made to animate, as it were, millions of complex organs, infusing into forms of wood, iron, and brass, an agency resembling that of intelligent beings. The manufactures in which such machinery is employed are termed the AUTOMATIC ARTS.

AVE′NA. [L.] The oat; oats.

AVE′NIN (-nĭn). *Syn.* AVENA′INE* (ăv-e-); AVENI′NA, &c., L.; AVÉNINE, &c., Fr. A nitrogenous compound, analogous to, and probably identical with, casein, obtained from oats, and on which its nutritiveness chiefly depends.

Prep. The grain, reduced to the state of powder or meal, is washed on a sieve, and the milky liquid, after being allowed to deposit its starch, is heated to about 200° Fahr., to coagulate the albumen; when cold, acetic acid is added as long as a white powder falls, which is AVENIN; this is collected on a filter, drained, and dried by a gentle heat.

AVEN′TURIN, Avant′urin (-ū-rĭn; -vŏng-tōō —Knowles & Smart). [Eng. Fr.] A beautiful iridescent variety of rock crystal, minutely spangled throughout with yellow scales of mica (AVENTURIN, A. QUARTZ). A variety of felspar (A. FEL′SPAR) of somewhat similar appearance is found in the Continent and the Peninsula, of which the finer kinds are called A. ORIENTALE and PIERRE DE SOLEIL by the lapidaries. Both varieties are now imitated by the glass and porcelain manufacturers. See GLASS, GLAZE, PASTE, &c.

A′VIARY (-ve-). *Syn.* AVIA″RIUM, L.; VOLIÈRE, Fr.; VOGELHAUS VOGELHECKE, Ger. A place for keeping birds; generally applied to an enclosed space or building in which birds

are kept, or bred, on account of their rarity, plumage, or song; and not for food.

Situa., &c. For exotic birds, a place should be selected where the temperature can be maintained at a proper degree throughout the year, and which is well protected from the weather. This is commonly done by choosing a space attached to the summerhouse or hothouse. When the aviary is only intended for birds of climates similar to our own, any part of the open garden may be chosen, and a portion closed in, either with trellis-work or wirework, or netting; care being taken to provide, in some easily accessible portion of it, full protection from vicissitudes of weather and season. Nor must cleanliness, and due ventilation and protection from foul air or noxious fumes, be left unattended to.

AVIGNON' BER'RIES (ăv-veen-yo*ng*). French berries.

AV'OIRDUPOIS' (ăv-ĕr-du-pois'). The common weight of 16 *oz.* or 7000 grs. to the lb., used in these realms for all kinds of goods, except jewelry and the precious metals, and medicines in dispensing, or as ordered in the 'British Pharmacopœia' of 1867.

AX'IS. [L., Eng., Fr.] *Syn.* AXE, Fr.; ACHSE, Ger. *Primarily,* that on or around which anything acts or performs; an axle or axle-tree. In *anatomy,* that on or around which any organ or part rests, gravitates, or centres. In *astronomy,* the diameter on or about which a celestial body revolves. In *botany,* part or parts about which particular organs are arranged; an imaginary line passing from the base to the apex of a pericarp, &c. In *crystallography,* imaginary lines passing through the central points of a crystal, and about which the molecules or particles of matter composing it may be conceived to be symmetrically built up. In *geology,* the centre of a mountain-group. In *mechanics,* the straight line, real or imaginary, about which any body oscillates or revolves. See CRYSTAL, &c.

AX'LE, Ax'le-tree (ăks'l). *Syn.* ESSIEU, Fr.; AXE (am rade), &c., Ger. In *mechanics,* the pin, rod, or material line, on which a wheel, &c., turns. See ANTI-ATTRITION, FRICTION, &c.

AX'UNGE (-ŭnje). *Syn.* AXUN'GIA, L. *Primarily,* 'wheel-grease;' the lard or fat of an animal; restricted in *pharmacy* to hog's lard.—AXUNGIA CURA'TA, A. PREPARA'TA, is prepared or washed hog's lard (which *see*).

AZADIRACHTA INDICA. (Ind. Ph.) Nim or Margosa Tree. (Ind. Ph.) *Habitat.* Common throughout India; often cultivated in gardens. *Officinal parts.*—1. The bark (*Azadirachtæ cortex, Nim bark*). It varies much in appearance, according to the size and age of the tree producing it. The bark from the trunk of a tree above three or four years of age is covered with a thick scaly epidermis, and varies in thickness from ¼ to ½ inch. That from the smaller branches is smooth, of a dullish purple colour, marked by longitudinal lines of ash-coloured epidermis, from ⅛th to $\frac{1}{12}$th of an inch apart. The inner layer of the bark, of a whitish colour in the fresh state, is powerfully bitter, far more so than the outer dark-coloured layer, which, however, possesses a greater amount of astringency. It contains a crystallisable principle (*margosine*) and an astringent principle (*catechin*). —2. The fresh leaves (*Azadirachtæ folia, Nim leaves*).—*Properties.* Bark, astringent tonic and antiperiodic; leaves, stimulant.—*Therapeutic uses.* In intermittent and other paroxysmal fevers, in general debility, and convalescence after febrile and other diseases, the bark has been employed with success. The leaves form a useful application to ulcers and skin diseases when a mild stimulant is required.—*Dose.* Of the powdered bark, a drachm three or four times a day.

Preparations. DECOCTION OF NIM BARK (Decoctum Azadirachtæ). Take of the inner layer of *nim bark,* bruised, 2 *oz.*; *water,* a pint and a half. Boil for 15 minutes, and strain whilst hot.—*Dose.* As an antiperiodic, from 1½ to 3 *fl. oz.*, every second hour previous to an expected paroxysm. As a tonic, 1 or 2 *fl. oz.* twice or thrice daily. As this decoction soon decomposes in hot weather, it should be prepared fresh for use when required.

TINCTURE OF NIM BARK (Tinctura Azadirachtæ). Take of the inner layer of *nim bark,* bruised, 2½ *oz.*; *proof spirit,* 1 pint. Macerate for seven days in a closed vessel, with occasional agitation; strain, press, filter, and add sufficient proof spirit to make 1 pint. It may also be prepared by percolation in the same manner as Tincture of Calumba, *q. v.* —*Dose.* From ½ to 2 *fl. drs.* as a tonic.

POULTICE OF NIM LEAVES (Cataplasma Azadirachtæ). Take of fresh *nim leaves,* a sufficiency; bruise and moisten with tepid water. A good stimulant application to indolent and ill-conditioned ulcers. Should it cause pain and irritation, as it sometimes does, equal parts of rice-flour and linseed-meal may be added. The bitter oil of the seeds is held in high repute by the natives as an anthelmintic, and as an external application in rheumatism. It is also said to be an insecticide.

AZOERYTH'RYN (-rĭth'-rĭn). A substance obtained, by Kane, from *archil.* It is insoluble in alcohol, ether, and water; but is very soluble in alkaline lyes, to which it imparts a port-wine colour.

AZO'IC. *Syn.* AZÖOT'IC; AZO'ICUS, AZÖOT'ICUS, &c., L. Lifeless; wholly destitute of organic life. In *geology,* &c., applied to strata which do not contain organic remains.

AZOLIT'MIN (ăz-o-lĭt'-mĭn). A dark-red substance obtained, by Kane, from *litmus,* of which it forms a large portion of the colouring matter. It is insoluble in alcohol, and in water unless alkalised.

AZ'OTE* (ăz'ōte; a'-zōte). [Eng., Fr.] *Syn.* AZO'TUM*, L.; AZOT*, Ger. Nitrogen

(because it is unfit for respiration, *i.e.* destroys life).

AZOT'IC. *Syn.* AZOT'ICUM, L.; AZOTIQUE, Fr.; AZOTISCH, Ger. Of or like azote, or containing it or formed from it; irrespirable; destructive to life.—AZOTIC ACID† is nitric acid; A. GAS†, nitrogen.—AZO'TOUS ACID† was nitrous acid.

AZ'OTISED (-tīzd). *Syn.* NITROGENISED. Containing azote or nitrogen; a common epithet of nitrogenous substances used as food.

AZ'URE (ăzh'-ūre; ā'-zhure — Knowles, Smart, Walker). *Syn.* CÆRU'LEUM, L.; AZUR, Fr; HELLBLAU, HIMMELBLAU, Ger. In *dyeing* and *painting*, sky-blue; also the name of one or more pigments which possess this colour. See BLUE DYES, BLUE PIGMENTS, SMALTS, ULTRAMARINE, &c.

AZ'URE-STONE. Lapis lazuli.

AZ'URITE (-īte). In *mineralogy*, lazulite; blue malachite; sometimes, lapis lazuli (the name being, unfortunately, very loosely applied by different writers).

AZ'YMOUS† (-e-mŭs). *Syn.* AZ'YMUS, L. Unleavened; unfermented; as, sea-biscuit. Unleavened bread was formerly termed AZ'YME† -e-me) and AZ'YMUS†, by theologists.

BAB'LAH. The rind or shell of the fruit of *mimosa cineraria*. According to Dr. Ure, it contains a considerable quantity of gallic acid, some tannin, a red colouring principle, and an azotised substance, and is the article imported from the East Indies and Senegal under the name of NEB-NEB.—*Used* as a cheap dye-stuff for various shades of drab and grey.

BAC'CA (băk'-ă). [L.; *pl.*, bac'cæ, băk'-sē.] A berry.

BACK. [D., *bak*, a bowl or cistern.] *Syn.* BAC. In *brewing*, a large, open, flat reservoir or cistern; commonly that in which wort is cooled. In *distillation*, the vessel into which the wort is pumped from the coolers, in order to be 'worked' with yeast. The LIQUOR-BACK in a brewery, distillery, or rectifying house, is the water reservoir or cistern.

BACKS. In the *leather trade*, the thickest and stoutest portion of the hide, used for sole-leather.

BACON (bā'-kn). [W., *baccun*, prob. from Ger., *bache*, a wild sow; "old Fr., for dried flesh or pork"—Craig.] The flesh of swine salted and dried, and subsequently either smoked or not. The term is usually restricted to the sides and belly so prepared; the other parts of the animal having distinctive names. Sometimes, though rarely, the term is extended to the flesh of bears, and of other like animals, cured in a similar manner.

Qual., &c. When bacon has been properly prepared from young and well-fed animals, and is neither 'stale' nor 'rusty,' it forms a very wholesome and excellent article of food, especially adapted for a light or hasty meal, or as a relish for bread or vegetables. For persons with a weak stomach, and for invalids, great care should be taken to cook it without injuring its flavour, or rendering it indigestible. This is best effected by cutting it into slices of moderate thickness, and carefully broiling or toasting it; avoiding dressing it too hastily, too slowly, or too much. The common practice of cooking it in almost wafer-like slices, until it becomes brown and crisp, renders it not merely indigestible, but also a most fertile source of heartburn and dyspepsia. Fried bacon is remarkably strong, and is hence more likely to offend the stomach than when it is broiled, or preferably toasted before the fire; the last being, of all others, the best way of dressing it so as to preserve its delicacy and flavour. Gourmands, however, often esteem, as 'une bonne bouche,' bacon dressed in the flame arising from the dropping of its own fat.

Choice. Good bacon has a thin rind, and an agreeable odour; the fat has a firm consistence and a slightly reddish tinge; the lean is of a pleasing red colour, is tender, and adheres, whilst raw, strongly to the bone. When the fat is yellow, it is either 'rusty' or becoming so, and should be avoided. The streaky parts are not only those which are most esteemed, but are the most wholesome.

BAD''GER (băj'-ĕr). *Syn.* ME'LES, L.; BLAIREAU, Fr.; DACHS, Ger. The *ursus me'les* (Linn.), one of the plantigrade carnivora, a burrowing nocturnal animal, common in Europe, Asia, and North America. Since the extirpation of the bear, the badger is the sole representative of the ursine family in our indigenous zoology. Its habits are "nocturnal, inoffensive, and slothful; its food consists of roots, earth-nuts, fruits, the eggs of birds, insects, reptiles, and the smaller quadrupeds; its noxious qualities are consequently few and of slight moment, and by no means justify the extirminating war unintermittently waged against it." (Brande.) Its "muscular strength is great, its bite proverbially powerful; and a dog must be trained and encouraged to enter willingly into combat" with it. (Id.)

Uses, &c. The *flesh* of the badger is prized as food; the *skin*, used for pistol furniture; the *hair*, made into brushes. The *American badger* is commonly called the GROUND-HOG. The *Cape badger* produces HYRACEUM (which *see*).

BAD'IANE (-e-ăhn). [Fr.] *Syn.* BAD'IAN, B.-SEED. Star-anise seed.

BADI''GEON (bă-dizh'-ōne; băd'-e-zhŭn‡, *or* bă-dĭj'-ŭn‡—Smart). Among *operatives* and *artists*, any cement used to fill up holes and to cover defects in their work. Among *statuaries*, a mixture of plaster and free-stone is commonly used for this purpose; among *joiners* and *carpenters*, a mixture of saw-dust and glue, or of whiting and glue; and among *coopers*, one of tallow and chalk. The name is also given to a stone-coloured mixture used for the fronts of houses, and said to be com-

posed of wood-dust and lime, slaked together, stone powder, and a little ochre, umber, or sienna; the whole being mixed up with weak alum water to the consistence of paint, and laid on in dry weather.

BAEL. [Nat.] *Syn.* INDIAN BAËL, BEL*; BA'EL, B. IN'DICUS, BE'LA, B. IN'DICA, L. The *ægle marmelos* (Correa; *crataeva m.*, Linn.) one of the Aurantiaceæ (DC.). Dried half-ripe fruit imported from the E. I., under the name of INDIAN BAEL. Astringent and refrigerant; highly extolled in chronic dysentery, diarrhœa, English cholera, and relaxations generally. It is also used in bilious fevers, hypochondriasis, melancholia, &c. *Root-bark, stem-bark*, and *expressed juice* of the *leaves*, particularly the first, also used in the same cases in India. *Ripe fruit*, fragrant and delicious; used, in the E. I., as a warm cathartic, and regarded as a certain cure for habitual costiveness. *Mucus* of the *seeds* used by painters as size; also as a cement. *Unripe fruit* used to dye yellow. It is generally administered under the form of DECOCTION or EXTRACT (which *see*).

BAGASSE' (-găs'). [Fr.] The dry refuse stalks of the sugar cane as they leave the crushing-mill.—*Used* as fuel in the colonial sugar-houses.

BAGG'ING. The cloth or materials of which bags or sacks are made. In *agriculture*, applied to a method of reaping corn by a chopping, instead of a drawing cut. See RATS, &c.

BAIN-MARIE. [Fr.] In *old chemistry*, a water bath; also, sometimes, a sand bath. In *cookery*, a shallow vessel containing heated water, in which saucepans, &c., are placed, when it is necessary either to make them hot, or to keep them so, without allowing them to boil. It is extremely useful in making sauces, warming soups and small dishes, and when dinners are delayed after they are ready to serve.

BA''KING (bāke'-). *Syn.* ACTION DE CUIRE AU FOUR, Fr. The process of cooking, or of heating, drying, and hardening any substance in an oven or kiln, or by the rays of the sun; the art or trade of a baker ‡; also technically, a batch or ovenful, or the quantity baked at once (= FOURNÉE, Fr.).

In *cookery*, baking is, perhaps, of all others, the cheapest, most convenient, and best way of dressing dinners for small families, where a good domestic oven is at hand. Though the flavour of baked meat is generally considered barely equal to that of the same parts roasted, there are some joints and dishes to which it appears particularly suitable. Among these may be mentioned *legs* and *loins of pork*, *legs* and *shoulders of mutton*, *fillets of veal*, &c. A *baked pig*, if it has been occasionally basted, and the heat has not been too great, eats equal to a roast one. *Geese* and *ducks* treated in the same way are also excellent. A *baked hare* which has been basted with raw milk and butter, also eats well; and so do various pieces of beef, especially the *buttock*. Cooks tell us that this last should be sprinkled with a little salt for a day or two before dressing it, and after being washed, is preferably baked, along with about a pint of water, in a glazed earthen pan tied over with writing paper 'three or four times thick.' A *baked ham* is said to be preferable to a boiled one; to be tenderer, fuller of gravy, and finer flavoured. It should be soaked in water for about an hour, wiped dry, and covered with a coarse thin paste or batter. *Ordinary dishes* require similar treatment in baking to that given them when roasted.

For *domestic use*, where the kitchen-range does not include a really good oven, the portable articles known as a 'DUTCH-OVEN,' and an '*American-oven*,' form an excellent substitute, admirably adapted for small joints, poultry, &c., all of which, when these utensils are skilfully employed, possess a delicacy and flavour fully equal to the same when roasted; whilst not more than one half the fire is required for the purpose. According to Miss Acton, they also "answer excellently for delicate sweet puddings, and for cakes." See BREAD, CAKES, ROASTING, &c.

Baking Pow'der. See POWDERS.

BAL'ANCE. [Eng., Fr.] *Syn.* BA'LANX, BI'LANX, L.; BILANZ, WAGEN, &c., Ger. BALANZA, Sp. Any weighing machine which acts by equipoise; a pair of scales. See SCALES, WEIGHING, &c.

Hydrostat'ic Balance. See SPECIFIC GRAVITY.

Tor'sion Balance. A delicate instrument, invented by Coulomb, for measuring the intensities of the electrical and magnetic forces.

BALD'NESS (bawld'-). *Syn.* CAL'VITAS, CALVI''TIES (-vĭsh'-e-ēz), L.; CALVITIE, CHAUVETÉ, Fr.; KAHLHEIT, KAHLKOPF, KAHLKÖPFIGHEIT, Ger. *Primarily*, absence or loss of any natural covering; *appr.*, destitution or loss of hair, more especially of that of the top and fore-part of the head. In *botany*, absence of beard or awn.

Grey hair and baldness dependent on old age are natural consequences of man's infirmity, and must be regarded as evidence of failing vigour, rather than in the light of a disease. *Premature loss* of *hair* may be induced by various causes. It is common after severe fevers, and is frequently caused by external pressure, friction, or violence, and by such other local actions and conditions which, when long continued, interrupt the normal functions of the skin. Persons with a consumptive, scorbutic, scrofulous, or syphilitic taint, or of a general bad habit of body, frequently lose their hair early. In these cases it probably arises from debility or paralysis of the cutaneous vessels, and the consequent insufficient nutrition of the hair-bulbs. When it occurs in persons under the middle age, and apparently enjoying good health, it may be often traced to the pernicious practice of constantly wearing a hard non-ventilating hat, or to disordered stomach, habitual smoking or

hard drinking, irregular habits, or late hours. Excessive anxiety or grief, and intense study and thoughtfulness, also tend to promote the early decay of the hair. The natural baldness of the aged, and frequently the premature baldness of earlier years, arises from the gradual attenuation of the scalp, which ultimately becomes too thin to afford room for the performance of the functions of the hair-producing organs, and too scantily supplied with blood for their due nutrition and support.[1]

Treatm. The baldness of senility and that arising from the permanent injury or destruction of the hair-bulbs admit of no cure, notwithstanding the daily assurances of advertising impostors to the contrary. In other cases, when a disposition to baldness exists, shown by the hair falling off in large quantities, or ceasing to grow with its usual vigour and rapidity, the frequent, but gentle use of the hair-brush, and of any bland stimulating oil, pommade, or wash, if adopted in time, will generally prove sufficient to arrest the progress of decay, and very frequently, to restore the hair to its pristine condition. The head may be advantageously washed in cold water, at least once a day; or what is better, a shower bath may be taken on rising in the morning. Should this plan not succeed, the head, or the upper part of it, may be shaved, and a wig, or a scalp, adopted for a time. The effect of keeping the hair closely cropped or shaved is to make it grow thicker, stiffer, and stronger, and this often when all other means fail.

Among more active and less common remedies for baldness may be mentioned—mild streaming electricity, stimulant fomentations, cantharadised, ioduretted, phosphuretted, &c., oils and lotions, a night-cap that, without pressing injuriously on the head, lifts, as it were, the scalp into its natural position, &c. &c., all of which are noticed elsewhere.

The celebrated John Wesley recommends rubbing the part morning and evening with a raw onion until it becomes red, and then applying a little honey. The vendors of Rowland's 'Macassar oil' recommend the head to be rubbed with a towel (or hair-brush), until somewhat red, each time before applying their nostrum; and the advice is certainly good, as independent of the stimulus thus given to the skin, and the increased flow of blood through the minute vessels of the scalp, it is rendered more absorbent and sensitive to the action of medicaments. At the same time the reader must be cautioned against placing any reliance on external applications, unless he assists their action by due attention to diet, exercise, ventilation, and such other matters as tend to promote the general health and vigour of the body.

The substances usually employed to medicate hair-cosmetics, the general management of the hair, and the formulæ for various applications to promote its growth, preservation, and beauty, are noticed in the articles HAIR, HAIR-COSMETICS, POMMADES, OILS, WASHES, &c., to which the reader is referred.

BALEEN' (-lēne'). [Fr. *baleine.*] The fisher's name for whalebone.

BALL (bawl). [Eng., Ger., Swed.] *Syn.* BALLE, BOULE, Fr.; BAL, BOL, Dan.; GLOB'ULUS, PI'LA, L. In *commerce, veterinary medicine, perfumery,* &c., applied to various substances made up into a globular, spheroidal, or even a cylindrical form; as *ash-balls, horse-balls, soap-balls,* &c.

BALLOON' (-lōōn'). *Syn.* BALLON, Fr., Ger. Any hollow spherical body of which the sides are extremely thin or attenuated in comparison with its diameter or bulk. In *aërostatics,* a machine or apparatus for elevating and sustaining bodies in the air. In *chemistry,* a globular glass-receiver, with either one or two necks (= GROS RÉCIPIENT, Fr.; GROSSE B., Ger.). In *pyroteehny,* a hollow case or ball of pasteboard filled with fire-works or combustibles, which explodes in the air on being fired from a mortar.

Balloon. In *aërostation,* a bag or hollow pear-shaped vessel, made of varnished silk or other light material, and inflated with some gas or vapour lighter than the air, as hydrogen, carburetted hydrogen, heated air, &c., so as to rise and float in the atmosphere. When filled with gas it is called by way of distinction an AIR-BALLOON (*aérostat,* &c., Fr.; *luftball, luft-schiff,* &c., Ger.); when with heated air, a FIRE-BALLOON or MONTGOLFIER B. (*ballon à feu,* &c., Fr.).

In the early days of aërostation, and indeed for some years afterwards, balloons were inflated with hydrogen gas, obtained by the action of sulphuric acid and water on iron filings or small fragments of iron; but this method of filling them ultimately gave place to the cheaper and more convenient supply afforded by the gas-light companies. Of late years, the coal-gas furnished by the gas-works has been generally, if not solely, used for the inflation of balloons.

The principles of ballooning may be referred to the well-known difference in the specific gravity of bodies, and to the physical properties of the atmosphere. Pure hydrogen, weighed at the level of the sea, is about 16 times lighter than common air; but when prepared on the large scale, and containing water, and other impurities, it is only from 7 to 11 times lighter than the atmosphere. A globe of atmospheric air of 1 foot in diameter, under like circumstances, weighs $\frac{1}{16}$ *lb.*; a similar globe of hydrogen (reckoning it only as 6 times

[1] In such cases it will be found that, owing to this attenuation, the scalp covers a larger portion of the skull than previously; and that its sides have somewhat receded from the top of the head, so that the roots of the remaining hair descend lower towards the forehead, temples, and back of the neck, than when the parts were in vigorous health. This may be perceived by applying the open hand to the part, and then gently closing the fingers, when the scalp may be drawn into its original position, and will then appear loose and wrinkled over the occiput, &c.; and this in a manner very different to what occurs when the top of the head is covered, or well-covered, with hair.

lighter than common air), will, therefore, have an ascensional force of $\frac{1}{10}$ *lb.* Now the weight of the body of air which a balloon displaces must exceed the gross weight of the balloon and all its appendages, in order for the latter to ascend in the atmosphere. The difference of the two weights expresses the ascensional force. The aërostatic power of balloons is proportional to their dimensions, in the ratio of the cubes of their diameters. Thus, it appears that a balloon of 60 feet diameter filled with common hydrogen will ascend with a weight of nearly 7000 *lbs.*, besides the gas case; whilst one of only 1½ foot in diameter, will barely float, owing to the less proportionate volume of gas to the weight of the case containing it. In round numbers the buoyancy of a balloon may be reckoned as equal to 1 *oz.* for every cubic foot of hydrogen it contains, *less* the weight of the case and appendages. The carburetted hydrogen supplied by the gas-works is much heavier than hydrogen gas, and consequently much less buoyant, for which due allowance must be made. That which possesses the least illuminating power is the lightest, and consequently the best adapted for aërostation.

The fabric of which the cases of air-balloons are made is strong thin silk, covered with an elastic varnish of drying oil or india-rubber, or, what is better, a solution of india-rubber in either chloroform or bisulphide of carbon; the netting is of strong light silk or flaxen cord; and the car, of basket-work. Fire-balloons, on the small scale, are generally made of silver-paper, and are inflated with the fumes of burning spirit of wine, by means of a sponge dipped in that liquid, and suspended just within the mouth of the apparatus.

Owing to the increasing rarity of the atmosphere as we ascend from the earth's surface, balloon cases are made very much larger than is required to contain the necessary quantity of gas, to allow for its expansion as it rises into a rarer medium. A cubical foot of gas measured at the level of the sea, occupies a space of two feet at an elevation of 3½ miles.

The following *Table* will prove useful to the amateur aëronaut or balloonist:—

TABLE *showing the relations between the diameters, surfaces, and capacities of spheres.*

Diameters.	Surfaces.	Cubical contents.
1	3·141	·523
2	12·567	4·188
3	28·274	14·137
4	50·265	33·51
5	78·54	65·45
10	314·159	523·6
15	706·9	1767·1
20	1256·6	4189·
25	1963·5	8181·
30	2827·	14137·
40	5026·	33510·

See ATMOSPHERE, GAS, HYDROGEN, PARACHUTE, VARNISH, &c.

BALLOON'ING‡. *Syn.* BALLOON'RY†*. The act, art, or practice of ascending or travelling in balloons; aërostation. A BALLOON'IST‡ is an aëronaut (particularly an amateur or enthusiastic one).

BALLS. The application of this term in *commerce, perfumery, veterinary medicine,* &c., has been already noticed. (See BALL.) The following may be inserted here:—

Balls, Al'mond (ah'-mŭnd). *Syn.* BOULES D'AMANDE, FR. *Prep.* 1. *Spermaceti,* 4 *oz.; white wax* (pure), 8 *oz.; oil of almonds,* 1 pint; melt them together in a glazed earthenware-vessel, by the heat of a water bath, and when the mixture has cooled a little, add *essential oil of almonds,* and *expressed oil of mace,* of each, 2 *drs.*; stir assiduously until it begins to cool, and then pour it into the moulds, which may be ounce-gallipots with smooth bottoms (very *slightly* warmed), when it will form beautiful hemispherical cakes. Very fine.

2. Hard *clarified suet,* 1¼ *lb.; white wax,* ¼ *lb.; ess. oil of almonds,* 1½ *dr.; oil of cloves* (or of *pimento*), ½ *dr.*; as before.

Uses, &c. To soften the skin, and in winter, to prevent chaps and chilblains. Sometimes these balls are coloured, which is done whilst the mixture is in the liquid state. A rich PINK or RED may be given by a little *alkanet-root* or *dragon's blood*; a YELLOW, by *palm oil* or *annotta*; a BLUE, by a little *finely powdered indigo*; and a GREEN, with *spinage* (steeped in the oil before use), or a few grains of *verdigris.* The most appropriate tint for them is a pale yellow or amber.

Balls, Barèges (-rāzhe'). *Syn.* BOULES DE BARÈGES, FR. *Prep.* 1. *Extract of soap-wort,* 3 *oz.; good glue* or *gelatin* 1½ *oz.; water,* 4 *oz.*; dissolve with heat, and add of *sulphide of calcium,* 6 *oz.; common salt,* 1 *oz.* (both in powder); mix thoroughly, and form the mass into balls weighing 2½ *oz.* each, adding a little *powdered gum,* if required, to thicken it, and using *powdered starch* to roll them in.

2. *Gelatin,* 8 *oz.; sulphide of calcium,* 12 *oz.; common salt,* 2 *oz.; water,* q. s.; after solution and admixture, add *carbonate of soda* and *Castile soap,* of each (in powder), 2½ *oz.* One ball is added to the water of a bath for an adult, to be used as a substitute for that of Barèges.

Balls, Bitter. *Prep.* 1. *Powdered gentian,* 2 *lbs.; extract of gentian,* 1 *lb.; grains of paradise* (ground), ½ *lb.; syrup,* q. s.; mix with heat, and divide into half-pound rolls. For ALE.

2. To the above add of *Spanish-juice,* 1½ *lb.*; previously softened with a little *boiling water.* For PORTER and STOUT. Both are *used* by fraudulent brewers; and by publicans in reducing their beer.

Balls, Black'ing. *Prep.* 1. (Bailey's.) *Gum-tragacanth,* 1 *oz.; water,* 4 *oz.*; dissolve, add

of *sugar candy*, 4 *oz.*; and afterwards, *ivory-black* and *Prussian blue* (in very fine powder), of each, 2 *oz.*; *neat's foot oil*, 2 *fl. oz.*; thoroughly incorporate, and evaporate by a gentle heat, constantly stirring, until of a proper consistence, then pour it into oiled moulds.

2. *Gum-arabic*, *moist sugar*, and *ivory-black*, of each, ½ *lb.*; *lamp-black*, ¼ *lb.*; *glue* (melted with a little water), 2 *oz.*; *water*, 1 quart, or q. s.; *neat's foot oil*, ½ pint; as before.—*Used* by the shoemakers, harness-makers, &c., to blacken and polish leather. See HEEL BALLS.

Balls, Breech'es. *See* SCOURING BALLS.

Balls, Bronze. *See* COPYING BALLS.

Balls, Cam'phor. *Syn.* CAM'PHOR-CAKES, CHAP'-BALLS‡, CHIL'BLAIN B.‡, &c.; GLOB'ULI CAMPHORA'TI, PLACEN'TÆ CAMPHORA'TÆ, &c., L. *Prep.* 1. *Spermaceti* and *white wax*, of each, 2 *oz.*; *almond* or *olive oil*, ½ pint; melt together by a gentle heat, add of *camphor* (in small pieces), 1 *oz.*; when dissolved, stir until partly cold, and then pour it into moulds, as directed under ALMOND-CAKES (*above*).

2. *Clarified suet*, 1 *lb.*; *spermaceti* and *white wax*, of each, 3 *oz.*; *camphor*, 2 *oz.*; as before.

3. *Spermaceti cerate* (Ph. L.), 1 *lb.*; *spermaceti*, 2 *oz.*; *camphor*, 1½ *oz.*; as before.

4. To either of the above add of *balsam of Peru*, ¼ to ½ *oz.*; and, after solution, either strain the mixture through muslin, or allow it to settle, and decant the clear portion from the dregs.

Use, &c. A popular preventive of chapping and chilblains. A little is well rubbed into the skin, previously washed clean and wiped dry. Some persons add colour and scent; but they are generally sold without either. The only *suitable colours* are amber, pink, or yellow. The best perfumes are *allspice*, *ambergris*, *cassia*, *cloves*, *mush*, *nutmeg*, *rondoletia*, *vanilla*, and *violets*. See ALMOND CAKES (*antè*).

Balls, Clothes. See SCOURING BALLS.

Balls, Contrayer'va. *Syn.* LA'PIS CONTRAYER'VÆ, GLOB'ULI C., L. *Compound contrayerva-powder* made into balls with *gum-water*. An obsolete preparation, once in great repute as a stimulant, tonic, diaphoretic, and absorbent.

Balls, Cop'ying. These have a similar composition to 'heel-balls' (see *below*). For BLACK, the best colouring matter is *lamp-black* or *plumbago* with about *half* its weight of *indigo*; for a BRONZE-COLOUR, *bronze-powder* is substituted; and for a mellow BROWN, burnt *terra di Sienna*. These should be all in *very fine* powder. The semi-fluid mass is poured into small flat cylindrical moulds—paper pill-boxes answer the purpose well.—*Used* by artists and amateurs to copy inscriptions, monumental brasses, and other slightly raised or sunken patterns; the ball being rubbed over the paper previously laid flat on the design, and held securely in its place. They are sometimes rendered more permanent by damping the *wrong* side with a sponge dipped in *water*, *strong spirit*, or *oil of turpentine*; or by passing the wrong side over a *hot iron* held with the face upwards.

Balls, Cosmet'ic. See SAVONETTES, &c. (also *above*).

Balls, Cream. See SAVONETTES, SOAP BALLS, &c.

Balls, Dog. See DOGS.

Balls, Gas'coign's. *Syn.* GLOB'ULI GASCOIG'NII, L. *Gascoign's powder* made up into small balls with thin mucilage. See POWDERS.

Balls, Heel. *Prep.* 1. (Ullathorne's.) *Bees' wax*, 1 *lb.*; *suet*, 4 *oz.*; melt together, and stir in of *ivory-black* (very finely powdered), 4 *oz.*; *lamp-black* (sifted, 3 *oz.*; *gum arabic* and *sugar-candy*, of each (in very fine powder), 2 *oz.*; and, when thoroughly mixed and partly cold, pour the composition into tin or leaden moulds.

2. To the last add of *resin*, 3 *oz.*; *oil of turpontine*, 2 *oz.*

3. *Hard suet* and *bees' wax*, of each, 4 *oz.*; *powdered gum*, *sugar candy*, and *Venice turpentine*, of each, 1 *oz.*; *ivory-black* and *lamp-black*, of each, 2 *oz.*; as before.

4. *Suet* and *bees' wax*, of each, 4 *oz.*; *lamp-black* and *brown sugar*, of each, 8 *oz.*; *common size*, 5 *oz.*; melt together and stir until incorporated.

Uses, &c. Employed to black leather, and more especially by shoemakers for the edges of the soles; the ball being first rubbed on, and the part afterwards smoothed over with a burnisher or polished iron tool gently heated. Also used by artists to copy inscriptions, basso relievos, &c. To produce a good article, the gum, colouring matter, and sugar, must be in the state of *extremely fine* powder, and the mixture very carefully made; no lumps being left. Some persons dissolve the gum in a little water, and then stir the mixture over the fire until it acquires the proper consistence for moulding (as in No. 4, *above*); but the first is accounted the best method.

Balls, Horse. See VETERINARY MEDICINE, &c.

Balls, Martial. *Syn.* GLOB'ULI MARTIA'LES, L. *Prep.* 1. Those of the P. Cod. consist of *tartarised iron* mixed with *aromatics*, and made up into small globular masses.

2. (BOULES DE NANCY.) Equal parts of *iron filings* and *red tartar*, in fine powder, made into balls with *proof spirit* or *brandy*. Both are *used* as chalybeate tonics, either in the form of pills or dissolved in hot water. Seldom employed in England.

Balls, Physic. (Vet. Med.) See MASSES.

Balls, Poultry. See POULTRY.

Balls, Scent. See PASTILS (Toilet), PERFUMERY, POMAMBRA, SCENTS, &c.

Balls, Scouring. *Syn.* BREECH'ES BALLS, CLOTHES B., CARPET B., &c. *Prep.* 1. *Curd soap* (sliced), 1 *lb.*; *water*, 2 *oz.*; melt in a water

bath, or a glue-pot, and when cooled a little, add *ox-gall* and *oil of turpentine*, of each, 2½ *oz.*; mix well and roll or mould the mass into balls or cakes.

2. *Fuller's earth*, 2 *lbs.*; *curd-soap*, 1 *lb.*; beat to a stiff paste with *ox-gall*, q. s.

3. *Soft soap* and *fuller's earth*, equal parts, beat up with a little *oil of turpentine*, and either with or without a little *essence of lemons*.—*Obs.* The above are used to remove paint, grease, and dirt from cloth, carpets, &c. The spot, first moistened with hot water, is rubbed with the cake, and allowed to soak a few minutes, or to become nearly dry, when it is well rubbed with a little warm water and a brush or piece of woollen cloth, and afterwards rinsed in clean water, and finally rubbed dry and smoothed off with a piece of dry cloth or a dry brush. The *last* formula produces the composition so commonly vended about the streets of London in penny cakes.

4. *Whiting* and *pipe-clay*, equal parts; *water*, q. s. *Used* for soldiers' belts, trousers, &c.

5. *Pipe-clay*, 2 *lbs.*; *fuller's earth*, 1 *lb.*; *whiting*, ½ *lb.*; *water*, q. s.

6. *Bath brick*, 1 *lb.*; *pipe-clay*, 2 *lbs.*; *soft soap*, ¼ *lb.*; *ox-gall*, ½ pint.

7. To the last add of *pumice-stone*, in very fine powder, 6 *oz.*—*Obs.* The last four are used for cloth and leather, especially for drab and light-coloured coats, trousers, leather breeches, belts, and gloves. *Rose pink*, *yellow ochre*, *umber*, *Irish slate*, or other like colouring matter, may be added to produce any desired tint. *White pepper*, *cloves*, &c., are also occasionally added to drive away moths and insects; and *orris root*, or *essence of bergamot* or of *lemon grass*, as perfume.

Balls, Sweet. See SCENT BALLS (*antè*).

Balls, Tan. The *muddy sediment of tan-pits* made into balls or lumps.—*Used* by the poor for summer fuel.

Balls, Wash. See SAVONETTES, SOAP, &c.

BALM (bahm). *Syn.* BAL'SAMUM, L.; BAUME, Fr.; BALSAM, Ger. Primarily, balsam (of which it is a contraction); formerly and still popularly applied to anything assumed to be soothing, healing, or genial in its action, particularly if also aromatic or fragrant; but chiefly to *medicines* and *liqueurs*, supposed to possess these properties. See BALSAMS, LIQUEURS, QUACK MEDICINES, &c.

Balm. *Syn.* COM'MON BALM, GAR'DEN B.; MELIS'SA, L.; BAUME, MÉLISSE, Fr. The *melis'sa officina'lis* (Linn.), an aromatic perennial herb, a native of the south of Europe, but commonly cultivated in our gardens. It is reputed to be diaphoretic, diuretic, emmenagogue, exhilarating, nervine, and stomachic; and under the form of infusion (BALM-TEA) has long been a popular remedy in hypochondriacal, hysterical, and nervous affections, and in amenorrhœa and chlorosis. It is still sometimes ordered as a drink in fevers and in hypochondriasis.

BAL'SAM (bawl'-săm; -sŭm‡§—Knowles, Walker). [Eng., Ger.] *Syn.* BAL'SAMUM (băl'-), L.; BAUME, Fr. *Originally*, any strong-scented oleo-resinous vegetable juice or exudation, of about the fluidity of treacle, and supposed to possess medicinal virtues. In *modern chemistry* and *pharmacy*, any vegetable production which is either semi-liquid, or which naturally becomes concrete, and which contains either benzoic acid, or cinnamic acid, combined with resin and aromatic essential oil. Several of the substances popularly termed *balsams* contain no benzoic acid, and are consequently now classed with the *turpentines*. This distinction, however, is far from being universally adopted, and a late high authority defines balsams to be "Exudations from plants, which are liquid or soft solid, and consist of a substance resembling a resin, either combined with benzoic acid, or with an essential oil, or both." (Brande.)

The leading properties of the true natural balsams are—Insolubility in water, almost entire solubility in alcohol, and partial solubility in ether and in the volatile and fixed oils; the possession of a powerful, and generally, an agreeable odour, a hot, resinous or terebinthinate taste, and the usual stimulant and tonic properties of the milder turpentines. Distilled with water, ethereal oil and some acid pass over, and the residuum consists chiefly or entirely of acid-resin.

The TRUE BALSAMS, as those of *benzoin*, *Peru*, *styrax*, and *tolu*, and the celebrated *Chinese varnish-balsam*, contain either benzoic or cinnamic acid. Among those falsely termed *balsams*, are copaiba, opobalsam, Japan lac-varnish, and some of the turpentines.

The following list includes most of the substances, natural and artificial, which pass, or have passed, under the name of balsams:[1]—

Balsam, Acous'tic. See DROPS.

Balsam, Amer'ican†. Balsam of Peru.

Balsam, An'odyne. *Syn.* SOOTH'ING BALSAM; BAL'SAMUM ANO'DYNUM (-dĭn-), B. TRANQUIL'LANS, L.; BAUME ANODIN, B. TRANQUILLE, B. TRANQUILLISANT, &c., Fr. *Prep.* 1. (Bate's.) See PATENT MEDICINES.

2. (Guy's.) A vulnerary balsam invented by Guy, of Caliac, once in great repute, but now obsolete. It consisted of *aloes*, *amber*, *ammoniacum*, *balsam of Peru*, *bdellium*, *caranna*, *castor*, *galbanum*, *labdanum*, *myrrh*, *olibanum*, *storax*, *tacamahaca*, and *Venice turpentine*, digested in *alcohol*.

3. (B. TRANQUILLANS, P. Cod.) *Fresh leaves* of *belladonna*, *henbane*, *black nightshade*, *tobacco*, *poppies*, and *stramonium*, of each (bruised), 4 oz.; *olive oil*, 6 pints; heat them together until all the moisture is evaporated, leave them to digest for 2 hours, and then strain with pressure; next pour the 'hot oil' on *dried* '*tops*' of *wormwood*, *hyssop*, *lavender*,

[1] For articles and preparations often called '*balsams*,' and not found under this head, see ELIXIRS, OILS, PATENT MEDICINES, PERFUMERY, TINCTURES, &c. &c.

marjoram, costmary, round-leaved mint, rue, sage, and *St. John's wort*, and the *dried 'flowers'* of *elder* and *rosemary*, of each, 1 oz.; macerate for a month, press, strain, and preserve the oil in a cool dark place.[1]

4. (BAUME TRANQUILLE DE CHOMEL.) *Henbane, hound's tongue,* and *tobacco*, of each, 1 lb.; *white wine*, 3 pints; boil down to a quart; press, strain, and add to the hot 'strained liquor' of *olive oil*, 1 quart, and again boil.

Balsam, Ap'oplexy. *Syn.* BAL'SAMUM APOPLEC'TICUM, B. AD APOPLEC'TICOS (Ph. E. 1744), L. Prep. 1. *Amber, civet, musk, Peruvian balsam*, and some *volatile oils*, made into a balsam.

2. (Ph. E. 1744.) *Expressed oil of nutmeg*, 1 oz.; liquefy by a gentle heat, and stir in of the *oils of cloves, lavender*, and *rosemary*, of each, ½ dr.; *oil of amber*, 10 drops; *balsam of Peru*, 1 dr. Both were formerly *used* to anoint the head and nostrils of apoplectic patients, and were believed to be of great efficacy.

Balsam, Asiat'ic†. Balm of Gilead.

Balsam, Bate's. See BALSAM, ANODYNE.

Balsam, Brazil'ian. Balsam of copaiba.

Balsam, Calaba'. *Syn.* TACAMAHA'CA. A fragrant resinous substance produced by *calophyl'lum cal'aba*, or Santa Maria tree.

Balsam, Cam'phor. *Syn.* CAM'PHORATED BALSAM; BAL'SAMUM CAMPHORA'TUM, &c., L. *Prep.* 1. As *camphor-liniment*, Ph. L.

2. (B. ACE'TICUM C., Sanchez's GOUT-B.:—Pelletier.) *Curd-soap* and *camphor*, of each, 5 drs.; *oil of thyme*, 2 scru.; *acetic ether*, 5 oz.; digest together in a stoppered bottle until the solids are dissolved. Recommended as an efficacious anodyne liniment in certain forms of rheumatism and gout.

Balsam, Can'ada. See TURPENTINES.

Balsam, Cana'ry. A volatile oleaginous substance obtained by distillation from *dracoceph'alum Moldav'icum*.

Balsam, Carpa'thian. Riga Balsam.

Balsam, Cephal'ic (Saxon). *Syn.* BAL'SAMUM CEPHAL'ICUM SAXON'ICUM, L. A liquid preparation obtained from the *essential oils of amber, lavender, marjoram, nutmeg, pennyroyal, rue, sage*, &c., distilled together. Once in high repute; but long disused in England.

Balsam, Chil'blain. See LINIMENTS.

Balsam, Chi'na Varnish. The aromatic varnish-like exudation of *au'gia sinen'sis*, used by the Chinese as a varnish or lacquer, for which purpose it is, perhaps, unequalled. It is highly fragrant, and abounds in benzoic acid.

Balsam, Command'er's†. Compound tincture of benzoin.

Balsam, Copalm'. Liquid-ambar.

Balsam, Egyp'tian†. Balm of Mecca.

Balsam, Fe'male. *Syn.* BAL'SAMUM EMBRYO'NUM, A'QUA E., L. An obsolete preparation made by digesting *misletoe, civet, musk*, and several other *aromatics*, in a *mixture of wine* and various *medicated waters*, and submitting the whole to distillation. Formerly taken both internally and externally, as a tonic for both fœtus and mother; and particularly to prevent abortion, &c.

Balsam, Fri'ar's. Compound tincture of benzoin.

Balsam, Gen'oa. Locatelle's balsam.

Balsam, Glyc'erin (glis'-). *Syn.* BAL'SAMUM GLYCERI'NÆ, L. *Prep.* To *white wax* and *spermaceti*, of each, 1 *oz.*; *almond oil*, ½ *lb.*; melted together, add of *glycerin*, 2 *oz.*; *balsam of Peru*, ½ *oz.*; and stir or agitate until nearly cold. 12 or 15 drops of *otto of roses* may be substituted for the balsam.—*Used* to soften and whiten the skin, and to prevent chaps and chilblains.

Balsam, God'bold's Vegetable. See PATENT MEDICINES.

Balsam, Goulard's'. *Syn.* BAL'SAMUM GOULAR'DII, B. SATUR'NI, L.; BAUME DE GOULARD, Fr. *Prep.* (Van Mons.) *Acetate of lead* (in fine powder, and quite dry) is triturated for some time, with *hot oil of turpentine*, in a heated mortar, or until no more will dissolve; after repose, and whilst still hot, the clear portion is decanted. Recommended as a useful application to foul and painful ulcers, and to scalds and burns.

Balsam, Green. *Syn.* BAL'SAMUM VIR'IDE, &c., L.; BAUME VERT, Fr. *Prep.* 1. *Linseed-oil*, 6 lbs.; *gum-elemi*, 1 lb.; heat them together; add of *powdered verdigris*, 3 oz., or *q. s.* to impart a rich green colour, and, after repose, decant the clear portion.

2. *Linseed oil* strongly coloured with *verdigris*. Both were formerly much used by surgeons as detergents. 'Green-oil' or 'oil of elder-leaves' is now commonly sold for it.

A natural balsam, brought from Peru, and produced by *chlorox'ylon verticilla'tum*, is also popularly called GREEN BALSAM (of Peru).

Balsam, Gurgun' (-gōōn'). *Syn.* GURGI'NA BALSAM, WOOD-OIL (of India). From *dipterocar'pus triner'vis*, and other species, by applying a slow fire to a notch or wound made in the trunk. Has a mixed smell of copaiba and naphtha. *Properties* and *dose* similar to those of balsam of copaiba. Sp. gr. ·962 to ·964. See COPAIBA and WOOD-OIL.

Balsam, Hill's, of Honey. See PATENT MEDICINES.

Balsam, Hunga'rian. *Syn.* BAL'SAMUM HUNGAR'ICUM, L. A terebinthinate exudation from the extremities of the branches of *pi'nus pumil'io* (Willd.) or *mountain-pine*. It is also obtained by pressure from the 'cones' of the same tree.

Balsam, Io'duretted. See LINIMENTS.

Balsam, Japan' Varnish. *Syn.* JAPAN LACQ'UER. Exudes from incisions made in the trunk of *melanorrhœ'a usitatis'sima*, according to Wallich; or *stagma''ria vernicif'lua*,

[1] A specimen of the absurd complexity of French formulæ.

according to Lindley. It constitutes the celebrated lac-varnish of the Japanese. It differs from that of China, and from the true balsams, in not containing benzoic acid. It is extremely acrid and irritant; and even its fumes affect the eyes and respiration.

Balsam†, Jews'. Balm of Gilead.

Balsam, Locatelle's'. *Syn.* LOCATEL'LI'S BALSAM; BAL'SAMUM LOCATEL'LI, B. LUCATEL'LI, B. ITAL'ICUM, B. GENOFE'ÆE, &c., L. var. *Prep.* 1. (Original Formula.) *Olive oil*, 6 oz.; *yellow wax*, 4 oz.; *sherry wine*, 5 fl. oz.; *red sanders* (in very fine powder), 4 dr.; simmer them together until the moisture is nearly evaporated, then add of *Strasburgh turpentine*, 6 oz.; *balsam of Peru*, 2 drs.; strain through linen, and stir until nearly cold.

2. (Ph. E. 1744.) *Olive oil*, 24 fl. oz.; *yellow wax*, 1 lb.; melt, and add of *Venice turpentine*, 1½ lb.; and, when cooled a little, further add, *powdered dragon's blood*, 1 oz.; *balsam of Peru*, 2 oz.; and stir until cold.

3. (Ph. L. 1746.) *Olive oil*, 16 fl. oz.; *Venice turpentine* and *yellow wax*, of each, ½ lb.; *red sanders*, 6 drs.

Uses, &c. A once highly esteemed pectoral, and still occasionally used, by the lower classes, in phthisis and chronic coughs (mixed with an equal weight of *conserve of roses*), and as a mild stimulating ointment.—*Dose.* ½ dr., or more.

Balsam, Mercu"rial†. Ointment of nitrate of mercury.

Balsam, Metz's. *Syn.* BAL'SAMUM VIR'IDE METEN'SIUM, L.; BAUME VERT DE METZ, Fr. *Prep.* (Guibourt.) *Linseed oil* and *olive oil*, of each, 6 oz.; *oil of laurel-berries*, 1 oz.; *common turpentine*, 2 oz.; melt by a gentle heat, and add of *verdigris*, 3 drs.; *aloes*, 2 drs.; *sulphate of zinc*, 1½ dr.; (all in powder;) mix well, strain or pour the liquid into a bottle, and add *oil of juniper*, 4 drs.; *oil of cloves*, 1 dr.—*Used* on the Continent as a common detergent dressing to wounds and ulcers.

Balsam, Mex'ican†. Balsam of Peru.

Balsam, Nat'ural†. That which exudes from plants, as opposed to those formed by art.

Balsam, Nerv'ine. See OINTMENTS.

Balsam, Odontal'gic. See DROPS.

Balsam, Opodel'doc. See OPODELDOC (French).

Balsam, Pec'toral. *Syn.* BAL'SAMUM PECTORA'LE, L.; BAUME PECTORAL, Fr. *Prep.* 1. *Tincture of tolu* and *compound tincture of benzoin*, of each, 2 oz.; *rectified spirit*, 4 oz.; mix.—*Dose.* ½ to 1 teaspoonful, night and morning; in chronic coughs, hoarseness, &c.

2, 3. See BALSAM OF HONEY, B. OF HOREHOUND, &c.

Balsam, Per'sian†. Friar's Balsam.

Balsam, Peru"vian. See BALSAM OF PERU (*below*).

Balsam, Pol'ychrest. See DROPS & ELIXIRS.

Balsam, Ri'ga (rē'-). *Syn.* CARPA'THIAN BALSAM; BAL'SAMUM CARPATH'ICUM, B. LIB'ANI, &c., L.; BAUME DE CARPATHES, Fr. A pellucid white fluid obtained by careful distillation from the young shoots of *pi'nus cem'bra* (Linn.) or *Siberian stone-pine*. It much resembles oil of juniper; and, like that article, is powerfully diuretic. It is regarded as vulnerary, and is highly esteemed by some in sprains and bruises. The bottoms of *oil of juniper* are commonly sold for it in the shops. The *spirit* distilled from *pine-tops* (*spiritus turionum pini*) is also frequently, although incorrectly, called RIGA BALSAM.

Balsam, Sanchez's Gout. See CAMPHORATED BALSAM (*above*).

Balsam, Sooth'ing. See ANODYNE BALSAM.

Balsam, Stomach'ic. (-mäk'-). *Syn.* BAL'SAMUM STOMACH'ICUM, L.; BAUME STOMACHIQUE, Fr. *Prep.* (Ph. Slesv.-Hols. 1831.) *Oils of cloves, mace, wormwood*, and *peppermint*, of each, 1 dr.; *balsam of Peru*, 2 drs.; *oil of nutmeg*, 2 oz.; mix. 1 to 5 or 6 drops, on sugar, or dissolved in spirit.

Balsam, Syr'ian. Balsam of Mecca.

Balsam, Thibaut's. See PATENT MEDICINES.

Balsam, Tooth'ache. See DROPS, &c.

Balsam, Traumat'ic. Compound tincture of benzoin.

Balsam, Tur'key. *Syn.* TUR'KEY BALM. The distilled oil of the *dracocephalum moldavicum*.

Balsam, Tur'lington's. See PATENT MEDICINES.

Balsam Univer'sal. *Syn.* BAL'SAMUM UNIVERSA'LE, L. *Prep.* (Ph. Slesv.-Hols. 1831.) *Rape oil* (recent), 1½ lb.; *yellow wax*, ½ lb.; *acetate of lead* (in fine powder), 3 oz.; *powdered camphor*, ½ oz.; melted together; observing to triturate the 'acetate' with a small portion of the 'oil' before adding it to the mixture, and not to add the 'camphor' until the heat is reduced a little.—*Obs.* This name has also been given to 'compound cerate of lead,' and even to 'cerate of acetate of lead.'

Balsam, Ver'vain's†. Compound tincture of benzoin.

Balsam, Wound. Several vulnerary preparations have been so called; but FRIAR'S BALSAM ('comp. tinct. of benzoin') is that usually intended.

Balsam of Acon'chi. A yellowish aromatic liquid, of a terebinthinous nature and consistence, obtained from the wounded branches and shoots of the *icica heterophyl'la* (DC.). It is highly esteemed as vulnerary by the Caribs of Guiana. (Lindley.)

Balsam of Alpi'nus. Balm of Gilead; because Prosper Alpinus wrote a learned (?) treatise on it.

Balsam of Am'ber. *Syn.* BAL'SAMUM SUCCINI, L.; BAUME D'AMBRE, Fr. The article to which this term is usually applied has been already noticed. *Oil of amber* was also formerly so called; and the same name has

been given to the following and other like preparations by their inventors:—

1. (Radius.) *Oil of amber*, 4 fl. oz.; *oil of myrrh*, 2 fl. oz.; *oil of turpentine*, 1 fl. oz.; mix with a gentle heat.

2. (Bate.) See PATENT MEDICINES. They are all stimulant and antispasmodic, and are used either internally or as a friction, like oil of amber.

Balsam of Arcæ'us. *Syn.* BAL'SAMUM ARCÆ'I, L.; BAUME D'ARCÆUS, Fr. A digestive ointment formerly in great repute, and still much employed on the Continent. It is now superseded in England by the *comp. elemi ointment* of the Pharmacopœias. In the original formula, *boiling water*, 4 parts, were ordered to be stirred in.

Balsam of Can'ada. See TURPENTINES.

Balsam of Cloves. *Syn.* AROMAT'IC BALSAM OF CLOVES; BAL'SAMUM CARYOPHYL'LI, L. *Prep.* (Bories.) *Oil of cloves* and *oil of nutmeg*, of each, ½ dr.; *spirit of juniper berries*, 3 oz.; mix. Rubefacient and diuretic.—*Used* chiefly as a stimulating friction. *Internally*, ½ to 1 teaspoonful.

Balsam of Copai'ba. See COPAIBA.

Balsam of Fern. Oil of male fern.

Balsam of Fiovaren'ti. *Syn.* BAL'SAMUM FIOVAREN'TI, L. *Prep.* (P. Cod.) *Venice turpentine*, 16 oz.; *amber*, *elemi*, *galbanum*, *myrrh*, *styrax*, and *tacamahaca*, of each, 3 oz.; *aloes*, 1 oz.; *bay-berries*, 4 oz.; *cinnamon*, *cloves*, *galangal*, *ginger*, *nutmegs*, and *zedoary*, of each, 1½ oz.; *dittany of Crete*, 1 oz.; *rectified spirit*, 8 lbs.; macerate a week and distil off 7 lbs. The distilled spirit constitutes this notable preparation of, professedly, many virtues. It is reputed aromatic, diuretic, antispasmodic, and stimulant. One of its applications is as a collyrium—a drop or two being rubbed on the palm of the hands, which are then held to the eyes, so as to cover, without touching them—in chronic ophthalmia, conjunctivitis, &c.[1]

Balsam of Gil'ead. See BALSAM OF MECCA.

Balsam of Gua'iacum (gwā'-yă-). *Syn.* BAL'SAMUM GUAI'ACI, B. GUAIACI'NUM, L. *Prep.* (Ph. L. 1745.) *Gum-guaiacum*, 1 lb.; *balsam of Peru*, 3 drs.; *rectified spirit*, 1 quart; digest 10 days and filter. Diaphoretic, arthrodynic, and anodyne.—*Dose.* 30 to 60 drops, in milk or water; in agues, rheumatism, &c. *Externally*, reputed also antisuppurative.

Balsam of Hon'ey. (hŭn'e). *Syn.* PEC'TORAL BALSAM, P. B. OF HONEY; BAL'SAMUM MEL'LIS, B. PECTORA'LE, B. P. MELLIS, L.; BAUME DE MIEL, &c., Fr. *Prep.* 1. *Balsam of tolu*, 1 lb.; *honey* (finest), 2½ lbs.; *rectified spirit*, 1 gal.; *turmeric*, 1 oz.; make a tincture.

2. To the last, before maceration, add of *powdered opium*, 2 oz.

3. (Hill's.) See PATENT MEDICINES.

Uses, &c. A good pectoral in colds, tickling chronic coughs, hoarseness, &c., when unaccompanied with fever.—*Dose.* For an adult, ½ to 1 teaspoonful, twice or thrice a day; an occasional dose of some mild aperient being also taken. Tincture of balsam of tolu, or a mixture of the tinctures of tolu and benzoin, is frequently sold in the shops under the name of '*balsam of honey*.' See PECTORAL BALSAM, &c.

Balsam of Hore'hound. *Syn.* BAL'SAMUM MARRU'BII, L. *Prep.* 1. *Extracts of horehound* and *liquorice*, of each, 2 oz.; *hot water*, ½ pint; dissolve, and when cold, add of *paregoric*, ¾ pint; *oxymel of squills*, 6 oz.; *tincture of benzoin*, 2 oz.; *honey*, 10 oz.; and, after thorough admixture, strain through flannel.

2. (Ford's.) See PATENT MEDICINES.

Uses, &c. A popular pectoral.—*Dose, &c.*, same as of BALSAM OF HONEY (*above*).

Balsam of Houmi"ri. [Nat.] From *humir'ia balsamif'era*, or the *houmiri-tree* of Guiana. It resembles '*balsam of umiri*' produced by another tree of the same genus. (See *below*.)

Balsam of Lead. See GOULARD'S BALSAM.

Balsam of Life. *Syn.* BALM OF LIFE; BAL'SAMUM VI'TÆ, L.; BAUME DE VIE, ELIX'IR DE VIE, &c., Fr. Several compound medicines have been called by this name. Those of Gabius, Hoffman, and Turlington, are noticed under PATENT MEDICINES (which *see*). The following are distinct preparations:—

1. BAUME DE VIE EXTERNE:—*Soap-liniment*, 2 parts; *oil of turpentine*, 1 part; mix. Stimulant and rubefacient. *Used* as a friction.

2. BAUME DE VIE PURGATIF; Elixir de vie:—*a.* (Briett.) *Socotrine aloes* and *saffron*, of each, 2 drs.; *rhubarb*, 6 drs.; *liquorice-root*, 1 oz.; *proof spirit* or *brandy*, ½ pint; digest a week, and filter.

b. (Original Swedish formula.) *Aloes*, 9 drs.; *agaric*, *gentian*, *rhubarb*, *saffron*, *theriaca*, and *zedoary*, of each, 1 dr.; *proof spirit* or *brandy*, 1 quart. A mild stomachic purge.—*Dose.* 1 to 6 drs. *Tincture of rhubarb-and-aloes* (Ph. E.) is commonly substituted for it. See ELIXIRS.

Balsam of Liq'uorice. See PATENT MEDICINES.

Balsam of Mec'ca. *Syn.* BALM OF GIL'EAD, B. OF MEC'CA, OPOBAL'SAM (-bawl'-), JEWS' BALSAM†, OIL OF B.†, &c., Eng.; BAL'SAMUM (băl'-) GILEADEN'SE, B. È MEC'CA, OPOBAL'SAMUM (-băl'-), &c., L.; BAUME DE LA MECQUE, B. DE MECCA*, B. DE JUDÉE, OPOBALSAMUM, &c., Fr.; BAL'SAMUM ÆGYPTI'ACUM†, B. ALPI'NI†, B. ANTIQUO"RUM GENUI'NUM†, B. ASIAT'ICUM†, B. SYRI'ACUM†, O'LEUM BAL'SAMI†, &c., L. A fragrant oleo-resinous substance, obtained from *balsamoden'dron gileaden'se* (Kunth.; *amyris gileaden'sis*, Linn.; *a. opobal'samum*, Forsk), a middle-sized tree of the *nat. ord.* Terebinthaceæ (DC.), growing in Arabia Felix, Asia Minor, and Egypt. It is the BAŁM of the Old Testament, and the *βάλσαμον* of Theophrastus and Dioscorides.

[1] See *Note* 1, p. 171.

It is chemically classed with the turpentines.

Prop., &c. When fresh it is turbid and whitish, but becomes by degrees transparent, of a rich golden colour, and slightly thicker; and by exposure, eventually solid. It possesses a penetrating and delicate fragrance; tastes sharp, bitter, spicy, and somewhat astringent; is not entirely soluble in rectified spirit, but dissolves more or less completely in both the fixed and volatile oils, which then assume the fragrance of the balsam. A drop let fall on hot water, spreads itself over the whole surface, like a film of oil, and again contracts on the water cooling. This, with its fragrance, is the common test of its genuineness in Turkey. The inferior qualities, or those of commerce, are generally opaque and thick, rapidly resinifying and turning of a dull yellow by age. When applied to the skin it causes redness and swelling. It was formerly regarded as possessing the most varied and exalted virtues, particularly as an antiseptic, stimulant, vulnerary, and nervine; and its fumes were supposed to prevent barrenness. It is still highly prized in the East as a cosmetic and perfume; and is said to be unequalled for giving a healthy glow to the complexion and promoting the growth of the hair. Its medicinal qualities are intermediate to those of the aromatic turpentines and balsam of tolu.—*Dose.* From 3 to 6, or even 10 or 12 drops.

Obs. According to Bruce, and others, the best *balm of Gilead* is a spontaneous exudation from the tree; a second quality is obtained by cutting the bark with an axe, and receiving the juice which exudes in a small earthen bottle. A large branch is said to produce not more than 3 or 4 drops a day; and even the most resinous trees seldom yield more than 60 drops daily. Hence its scarcity and costliness. Both varieties are held in such high estimation by the Turks and Egyptians, that none of them are exported as an article of commerce. That which is sent to England is obtained by boiling the leaves and young twigs of the *balsam tree* in water, and is rejected by the Orientals as worthless. Most of that sold in the shops of England is entirely spurious (see *below*).

The *cosmetics* recently so much advertised as 'BALM OF MECCA,' do not contain even a trace of this article; nor do we believe that there is a single drop of the genuine balm to be purchased in London.

The following formulæ are current in the trade for Fac'titious Balm of Mecca:—

1. *Gum-benzoin* (bright, coarsely powdered), 4 *oz.*; *liquid styrax* (finest), 3 *oz.*; *balsam of tolu*, 2 *oz.*; *Canadian balsam*, 1½ pint; are mixed together in a flask, and exposed (closed) to the heat of a water bath, with frequent agitation, until the liquid is saturated; when cold, the clear portion is decanted, and a sufficient quantity of the *oils of lemon, cassia, rosemary, nutmeg*, and *vanilla*, added to give it a strong aromatic odour.

2. From *gum-benzoin* and *balsam of Peru*, of each, 1 *oz.*; *vanilla* and *nutmeg*, of each (cut small), 1 *dr.*; *Canadian balsam*, ½ pint; digested as before, and some *essential oils* added to the decanted liquid.

Balsam of Nut'meg. *Syn.* BAL'SAMUM MYRIS'TICÆ, B. NUCIS'TÆ, L. *Prep.* (Ph. Br. 1847.) *Expressed oil of nutmeg* (—? mace), 3 *oz.*; *olive oil*, 1 *oz.*; *yellow wax*, ½ *oz.*; melt them together by a gentle heat, pour the mixture into paper moulds, and, when cold, cut the mass up into cakes.

Balsam of Peru' (-rōō'). *Syn.* PERU'VIAN BALSAM; BAL'SAMUM PERUVIA'NUM (Ph. L., E., and D.), L.; BAUME DU PÉROU, B. PERUVIEN, Fr.; PERUVIANISCHER BALSAM, Ger. A balsam obtained from *Myroxylon Pereiræ* (*Myrospermum* of Sonsonate). It exudes from the trunk of the tree after it has been scorched and removed. From Salvador, in Central America. B. P.

Prop., &c. A chocolate-coloured or a reddish-brown liquid, of the consistence of treacle, possessing a bitterish, rather pungent taste, and an agreeable aromatic odour somewhat similar to that of a mixture of vanilla and benzoin. It is reputed stimulant, tonic, and expectorant, and has long been a popular remedy in chronic asthma, catarrh, and other pulmonary affections, debility, &c. It is now, however, principally used as an ingredient in pommades, hair-oils, lip-salves, and other cosmetics, in which it is only inferior to 'balm of Mecca;' and in compound perfumery. It is also used to scent lozenges, pastils, and chocolate and liqueurs; for these last, chiefly as a *substitute* for 'vanilla' when it is scarce and dear.—*Dose.* 10 or 12 to 30 grs. (even 1 dr. is sometimes given), either on sugar, or made into a bolus with liquorice powder, or into an emulsion with honey, mucilage, or yelk of egg.

Pur., Tests, &c.—1. The sp. gr. should *not be lower* than 1·15; nor *higher* than 1·16:—2. Ether *dissolves* it *readily* and *completely*:—3. Soluble in 5 parts of rectified spirit:—4. It should undergo *no diminution* in *volume* when agitated with water:—5. 100 grs., by its benzoic or cinnamic acid, should saturate not *less* than 7½ grs. of pure crystallised carbonate of soda:—6. Sulphuric acid converts it into *resin, artificial tannin*, or *charcoal*, according to the quantity employed; if, on adding water, a *brittle* resin is not formed, some fixed oil (probably *castor oil*) is present:—7. Treated with nitric acid, some *hydrocyanic acid* is formed, *benzoic acid sublimes*, and the residual matter is *artificial tannin*:—8. The alkalies and their carbonates form with it a *thickish semi-crystalline mass*, which, on being treated with sulphuric acid, deposits a peculiar resinous matter, with crystals of benzoic and cinnamic acid:—9. If a few drops are distilled, and, when iodine is added to the

distillate, an *explosion* results, it has been adulterated with 'copaiba':—10. The genuine balsam contains about 6½ % of *benzoic* (cinnamic) acid.

Obs. Balsam of Peru was formerly very generally adulterated, and often entirely factitious, but, owing to its present reduced price, this is now only confined to a few of the most unprincipled venders. The following formulæ for this purpose are still extant in the trade:—

Balsam of Peru, Factitious:—From *gum-benzoin* (in coarse powder), 3 *lbs.*; dissolved in the least possible quantity of *rectified spirit*, and then mixed with *balsam of tolu*, 1 *lb.*; and *liquid styrax*, 2 *oz.*; subsequently adding of *rectified spirit*, q. s.

Balsam, Reduced Peruvian:—1. *Balsam of Peru*, 3 *lbs.*; *balsam of tolu*, 2 *lbs.*; *rectified spirit*, q. s. to reduce it to a proper consistence:—2. *Balsam of Peru*, 3 *lbs.*; *gum-benzoin* (dissolved in a little rectified spirit), 1 *lb.*; as before.

Balsam of Rackasi'ri. *Syn.* BALSAM OF RAKASI'RA; BAL'SAMUM RACKASIRI, B. RACAZZI'RÆ, B. RHADASI'RI. A species of balsamic turpentine, said to be obtained from the *bursera balsamifera* (Pers.), an Indian tree of the *natural order* Terebinthaceæ. It has a slightly bitter taste, adheres to the teeth when chewed, and, when heated, smells like balsam of tolu. It has been extolled as possessing the virtues of copaiba in an exalted degree. The nostrum vended under the name of BALM OF RACKASIRI by certain quacks, simply consists of *English gin, coloured, sweetened, and aromatised.*

Balsam of Saff'ron. See ELIXIRS.

Balsam of Soap. Soap-liniment.

Balsam of Soap (Ethe"real). *Syn.* BAL'SAMUM SAPO'NIS ÆTHE"REUM, L. *Prep.* (Cottereau.) *Castile soap* (powdered) and *camphor*, of each, 1 dr.; *oil of thyme*, 10 drops; *acetic ether*, 1 oz.; dissolve in a close vessel with the aid of a gentle heat, and decant the clear portion. *Used* as an embrocation or liniment in gout, rheumatism, &c.

Balsam of St. John's Wort. See OILS.

Balsam of Sto"rax. Liquid-ambar or styrax.

Balsam of Sul'phur. See OILS.

Balsam of Syri'acum. See BALSAM OF MECCA and PATENT MEDICINES.

Balsam of Tolu' (-l'ōō'). *Syn.* TOLU' BAL'SAM*; BAL'SAMUM TOLUTA'NUM (Ph. L., E., & D.), B. DE TO'LŬ, L.; BAUME DE TOLU, Fr.; TOLUTANISCHER BALSAM, B. VON TOLU, &c., Ger. Balsam flowing from the incised trunk of "*myrosper'mum toluif'erum.*" (B. P.) The tree which produces it is a native of the mountains of Tolu, Turbaco, &c., in South America.

Prop., Uses, &c. When first brought over it is soft and tenacious, but by age and careless keeping becomes hard, and even brittle, somewhat similar to resin. It is perfectly soluble in alcohol and in ether, and gives out its acid (benzoic or cinnamic) to water. Its odour is fragrant, though less powerful than that of either styrax or balsam of Peru; and it has a pleasant sweetish taste. It softens under the teeth, melts readily, and burns with an agreeable odour. As a *medicine*, it is a stimulating expectorant, and, as such, is employed in chronic bronchial affections unaccompanied with inflammatory action. It has long been a popular pectoral. *Syrup of Tolu* is an agreeable and common adjunct to pectoral mixtures, and, with *Tolu lozenges*, is often serviceable in tickling coughs. It is also used by confectioners, perfumers, &c., and in fumigating pastils.—*Dose*, 5 to 20, or even 30 grs., dissolved in spirit, or made into an emulsion.

Pur. This is shown by its perfect solubility in rectified spirit, forming a transparent tincture, and by its odour. When adulterated it has a weaker smell, is only partially soluble in alcohol, and the *tincture* formed with that fluid is opaque. The presence of colophony (or lac), according to Ulex, may be detected by the balsam, instead of dissolving in sulphuric acid, swelling up, blackening, and disengaging sulphurous fumes.[1] Castor oil may be detected in the way noticed under BALSAM OF PERU.

Balsam of Tolu, a Factitious, was formerly met with in trade, made of equal parts of *orange-lac* and *white sugar*, reduced to a proper consistence with *rectified spirit*, and 'brought up' with some *tincture of benzoin*, and a few drops of the *oils of cassia* and *nutmeg* dissolved in a little *essence of vanilla.*

Balsam of Tur'pentine (-tine). *Syn.* BAL'SAMUM TEREBIN'THINÆ, L. A name formerly given to Strasburgh, Venice, and other like turpentines.

Balsam of Tur'pentine (Emollient). *Syn.* B. TEREBINTHINA'TUM, L. *Prep. Olive oil*, 6 oz.; *oil of turpentine*, 2 oz.; *yellow wax*, 1 oz.; *balsam of Peru, oil of nutmeg*, and *camphor*, of each, 2 drs. A stimulant emollient; in contusions, ulcerations, engorgements, nephritic pains, &c.

Balsam of Umi"ri. [Nat.] By incision, from the *humiri'a floribun'dum* (Mart.), or the *umiri-plant* of Para. It is fragrant, limpid, of a palish-yellow colour, and in its medicinal properties is said to combine those of the balsams of copaiba and Peru.

BALSAM'IC (băl-). *Syn.* BALSAM'ICUS, BALSA'MEUS, BALSAM'INUS, L.; BALSAMIQUE, Fr.; BALSAMISCH, Ger. Of the nature of balsam, or containing or resembling it; bland, soothing, healing; balmy.

BAMBOO' (-bōō'). [Nat.] *Syn.* BAMBU'SA, L.; BAMBON, Fr.; BAMBUS, BAMBUSROHR, INDIANISCHER ROHR, Ger. The name of several species of the genus 'bambusa,' but appr. of *b. arundina'cea* or 'common bamboo.' See BAMBUSA (*below*).

Bamboo'-habit (-hăb-). A species of 'life-preserver,' or 'float,' used in China and the

[1] "*Archiv der Pharm.*," 1855.

Indian Archipelago, consisting of four pieces of bamboo tied together so as to form a square.

BAMBU'SA. [Endl.] The bamboo. In *botany*, a genus of magnificent arborescent grasses, of the *nat. ord.* Gramineæ (DC.), having hollow jointed stems, of a hard woody texture, externally coated with siliceous matter, and sometimes secreting a similar siliceous substance (TABASHEER') in their internal cavities. They are all of rapid growth, and vary in height from 6 to 150 feet.

There, is, perhaps, scarcely any other plant, besides the palm, which serves for so many purposes useful to man, as the various species of bamboo. Its grain is used for bread; the young shoots are eaten like asparagus, and are also pickled; the smaller stalks are made into walking canes, umbrella and parasol sticks, flutes, &c.; whilst its fibres are manufactured into cloth, and even paper. It is employed extensively in the construction of *houses, bridges, masts for boats, domestic furniture, boxes, mats, baskets, utensils of various kinds, fences, water pipes* and *vessels, quicksilver bottles*, &c., and for numerous other purposes connected with everyday life. The genus is confined to the East and West Indies and tropical America. See CANE, PICKLES, TABASHEER, &c.

BANA'NA (-nā'- *or* -nă'-). [Nat.] The *mu'sa sapien'tum* (Linn.), a species of plantain; also its fruit. See PLANTAIN.

BAND'AGE (-āje). *Syn.* DELIGA'TIO, FAS"CIA, LIGA'MEN, LIGATU"RA, VINCTU"RA, L.; BANDAGE, BANDE, Fr.; BINDE, VERBAND, Ger. In *surgery*, the fillet, roller, or cloths, used to support parts, to exert pressure on them, or to retain dressings in their proper places.

Bandages are usually formed of long narrow slips of calico or linen, and, occasionally, of flannel, which are generally made into a roll (ROLLER) of moderate size, so as to be the more conveniently handled and applied. They are either SIMPLE, as the *circ'ular*, the *spi'ral*, or the *unit'ing bandage*; or COMPOUND, as the T-*bandage*, *suspen'sory b.*, &c.

The application of bandages, as in the dressing of wounds, ulcers, &c., though of such frequent occurrence, is often very carelessly and badly done. The form and nature of the part, and the object in view, should always receive consideration; as should also the condition of the patient after their application—whether of repose, exercise, or labour. Ordinary ingenuity will supply the rest. The safest, simplest, and most effective means of fastening them, is, in most cases, furnished by a common needle and thread or cotton.

Bandage, Mus'tard. A woollen roller soaked in a mixture of the best flower of mustard and warm water, of the consistence of fresh cream, the excess of moisture being expelled by gentle pressure.—*Used* to envelope the body, or a limb, by repeatedly folding it round the part; in the cold stages of cholera, and in other cases requiring an energetic stimulant. Other medicaments, particularly those of a stimulating and anodyne character, are sometimes applied in the same manner. See EMBROCATIONS, LOTIONS, POULTICES, &c.

BANDAN'A. [Ind.] *Syn.* BANDAN'NA. A handkerchief, originally from the East Indies, having white spots on a red, blue, or other dark ground. In *calico-printing*, a 'discharge style' in imitation of the Indian badanas. The fabric, many folds thick, is placed between leaden plates having the pattern cut out of them; hydraulic pressure is then applied, and a clear solution of chloride of lime forced through, followed by a stream of pure water.

BAND'OLINE (-lĭn; -lēne‡). See FIXATURE.

BANE. Poison; anything deleterious or destructive; a word often found joined to another, in the popular and vulgar names of plants and diseases, to denote their character; as BANE'-BERRY, the herb *Christopher;* BANE'-WORT, *deadly-nightshade;* SHEEP'S BANE, the rot; &c.

BANG, Bangue (băng'). [Nat.] See INDIAN HEMP.

BAN'IAN (băn'-yăn). The *fi'cus In'dicus* (Linn.), or *Indian fig.* The fruit and young branches yield one species of gum-lac; and both the juice and bark are used medicinally.

Among sailors, BANIAN' DAYS are those on which butcher's meat is not served up at dinner.

BANN'OCK (-ŭk). In *Scotland* and the northern counties of England, a flat round cake made of *oat, rye,* or *barley meal*, baked on an iron plate over the fire, or on the hot hearth.

BAR (Management). See COUNTER, RETAIL, &c.

BAR'BERRY. *Syn.* PEP'PERIDGE-BUSH‡, THORNY BOX-'TREE*; BER'BERIS, B. VULGA"RIS (Linn.), L.; EPINE-VINETTE, VINETTIER, Fr.; BERBERITZE, Ger. A perennial bush or shrub common in woods and hedges. *Berries* (BAR'BERRIES, PEP'PERIDGES), gratefully acid, cooling, and astringent; *used* in pastry, but require, according to their degree of ripeness, from one half their weight to an equal weight of sugar. Both *bark* and *berries* were formerly esteemed in jaundice, biliary fluxes, &c. The *crushed berries* with *water* form a refreshing fever-drink. The *root* dyes a fugitive yellow. See BERBERINE, JAMS, PRESERVES, &c.

BAREGE (*barège*, băr-rāzhe'). [Fr.] A light woollen fabric so named from having been first made in the valley of Barèges. Of late years Paris has become celebrated for its barèges; but these are generally woven with the 'warp' of silk, and the 'woof' of wool. In the common imitations of the shops, the 'warp' is generally of cotton.

BAREGINE (barégine). See GLAIRINE.

BARIL'LA. [Eng., Ger., L., Sp.] *Syn.* SO'DÆ CAR'BONAS VENA'LE, L.; BARIG"LIA, BARIL'LOR, Sp., Lev.; BARILLE, SOUDE, Fr.

The alkaline residuum of the combustion of *salsola, salicornia, chenopodium*, and other species of the order *chenopodiaceæ*. These plants, which are cultivated on the sea-coast for the purpose, are cut down when ripe, dried, and burned in heaps, on iron bars laid across pits dug in the earth. The alkali and saline matter contained in them is thus fused, and flows into the cavity below, forming, when cold, a hard grey or bluish porous mass which is BARILLA.

Comp. Carbonate, sulphate, chloride, and sulphide of sodium, carbonate and sulphate of calcium, alumina, silica, oxide of iron, and imperfectly consumed carbonaceous matter, with a little iodine and bromine. The proportion of soda varies in different varieties:—

ALICANT' BARILLA; obtained chiefly from several species of *salso'la* and from *chenopo'dium setig'erum* (-tĭj'-), &c.; contains from 25% to 40% of carbonate of soda. (Guibourt.)

CANA''RY B.; from *salso'la ka'li*. (Loudon.)

French barillas:—

a. NARBONNE' B., SALICOR; from *salicor'nia ann'ua* or *herba'cea*; contains 14% to 15% of carbonate of soda.

b. B. OF AIGUEMORTES, BLANQUETTE; from mixed plants; contains 3% to 8% of carbonate of soda. (Guibourt.)

c. NOR'MANDY B., N. SODA; from *fuci*.

SIC'ILY BARILLA (sĭs'-). Principally from *salso'la sati'va*; furnishes 55% of carbonate of soda. (Fée.)

Good barilla, on the *average*, contains about 20% of real or available alkali, chiefly under the form of carbonate, besides sulphates, muriates, &c.

Assay. See ALKALIMETRY.

Uses, &c. Barilla is chiefly used in the manufacture of soap and glass; but the gross quantity imported, though annually increasing, only reached 54,608 *cwt.* in 1856; whilst the exports of soda in the same year reached to about 1,500,000 *cwt.*, and in 1859 to above 2,000,000 *cwt.* This enormous quantity was chiefly furnished by our home manufactories.

Barilla is chiefly imported from Spain, Sicily, Teneriffe, and the Levant; but since the introduction of Le Blanc's process for obtaining soda from common salt, its importance and value has considerably lessened. See KELP, SODA, &c.

BARIUM. Ba. A metallic radical or element, of which baryta is the chief oxide, and somewhat extensively distributed. First obtained in 1808 by Sir H. Davy. Prepared from baryta by strongly heating it in an iron tube, through which the vapour of potassium is conveyed; the reduced BARIUM being subsequently extracted from the mixed residuum by quicksilver, which is afterwards driven off in a small green-glass retort, in a vapour of mineral naphtha.

Prop., &c. Greyish-white, approaching silver in colour and lustre; decomposes water, and gradually oxidises in the air, with the formation of the ordinary oxide (BARYTA). It is malleable, fusible under a red heat; burns in contact with air with a deep red light, and has the sp. gr. 4·70.

Salts. Barium forms numerous salts, which are all either colourless or white, except a few, whose acids are coloured, as the chromate, manganate, &c. Some of them are soluble in water; one or two only are soluble in alcohol, and that very sparingly; and (with the exception of the sulphate) they are all extremely poisonous. They may be prepared by saturating solutions of the acids with either baryta-water, or carbonate of barium; and some of them may be prepared by double decomposition.

The various soluble barium salts are known by the following reactions, and they are all (except the sulphate) soluble either in water or in dilute hydrochloric acid, except the nitrate and chloride, which are not soluble in aqueous solutions of their respective acids. Their solutions give an immediate heavy white precipitate with dilute sulphuric acid, and with solutions of the sulphates, which is insoluble in dilute acids and solutions of the alkalies and of the salts of ammonia, that with a solution of sulphate of lime being very sensitive and characteristic:—Hydrofluosilicic acid gives a very characteristic colourless crystalline and quickly subsiding precipitate, only slightly soluble in hydrochloric acid and nitric acid; alcohol, in equal volume, being added, so hastens and completes the reaction, that the filtrate is unaffected by sulphuric acid:—Chromate of potassium gives a bright yellow precipitate in neutral solutions, soluble in hydrochloric acid and in nitric acid, but insoluble in acetic acid:—Caustic potassa or soda (when quite free from carbonate), and caustic ammonia, cause no precipitate. except in highly concentrated solutions:—Alkaline carbonates give a heavy white precipitate with baryta-water or a solution of baryta, and which is all but insoluble in water, and freely soluble in dilute hydrochloric acid:—Heated with proof spirit, or pyroxilic spirit, the barium salts give a greenish-yellow tinge to the flame:—The barium salts, and particularly the chloride, when exposed on a platinum wire to the inner flame of the blowpipe, colour the outer flame yellowish-green:—Insoluble sulphate of barium may be mixed with powdered charcoal, and exposed for a short time to a full red heat, when sulphide of barium will be formed, which is freely soluble in water, and which, after being neutralised with hydrochloric acid, or acetic acid, will yield a solution suitable to the application of the usual tests. The carbonate, and the salts of barium with the organic acids, are all convertible into pure baryta by exposure to a bright red heat.

Baryta is distinguished from lime and from magnesia by its great solubility in hot water, and by the entire insolubility of its sulphate; from strontia, by being precipitated by hydro-

fluosilicic acid, and by not giving a red colour to the flame of alcohol; from alumina, by its causticity and alkaline reaction, and by not being precipitated from its solution in water by ammonium sulphydrate.

Pois., &c. The sulphate, owing to its insolubility, is the only salt of barium which is not poisonous.—*Symp.* Nausea, vomiting, pains in the head, ringing in the ears, vertigo, and intermitting cramps and convulsions; the respiration is frequently suspended for several moments, and the pupil is generally dilated. The symptoms, however, often vary, and are not very distinctive.—*Treatm., Ant., &c.* Vomiting, followed by copious draughts of water soured with sulphuric acid, or sulphate of soda (*Glauber-salt*) or sulphate of magnesia (*Epsom-salt*), dissolved in a large quantity of water. When carbonate of barium has been swallowed, a mixture of one of the above sulphates and weak vinegar should be taken after the vomiting, in order that a soluble barium salt may be first formed, on which the alkaline sulphate will act more readily. Subsequent irritation may be soothed by opium or morphia, and antiphlogistics.

Barium, Ac'etate of. $Ba(C_2H_3O_2)$. *Syn.* BARY'TÆ ACE'TAS, L. *Prep.* From dilute sulphuric acid, neutralised with carbonate of barium, and the solution evaporated and crystallised. Very soluble in water; insoluble, or nearly so, in rectified spirit.—*Uses, Dose, &c.* Same as the chloride. It is seldom employed.

Barium, Arse"niate of. $Ba_3(PO_4)_2$. *Syn.* BARY'TÆ ARSE"NIAS, L. *Prep.* A *solution* of *chloride of barium* is added to another of *arseniate of potassium* or *sodium*, and the precipitate collected, washed, and dried. By dissolving this salt in a *solution* of *arsenic acid*, and crystallising, BINARSE"NIATE OF BARIUM is obtained. Has been recommended in certain skin diseases, and in phthisis complicated with scrofula.—*Dose.* $\frac{1}{12}$ to $\frac{1}{4}$ gr.

Barium, Ar'senite of. $Ba(AsO_2)_2$. *Syn.* BARY'TÆ AR'SENIS, L. Very slightly soluble. —*Use, &c.* As the last.

Barium, Bromide of. $BaBr_2$. *Syn.* BA"RII BROMI'DUM, L.; BROMURE DE BARYUM, &c., Fr. *Prep.* Boil a solution of *protobromide of iron* with *moist carbonate of barium*, in slight excess; filter, evaporate to dryness, and heat the residuum to redness. By careful evaporation of its aqueous solution it may be obtained in crystals. It is soluble in both alcohol and water, and its physiological properties resemble those of iodide of barium.

Barium, Carbonate of. $BaCO_3$. *Syn.* CARBONATE OF BARY'TA; BARY'TÆ CAR'BONAS, L.; CARBONATE DE BARYTE, &c., Fr.; KOHLENSAURES BARYT, &c., Ger. A heavy white mass or powder, very nearly insoluble in water, and decomposed by nearly all the acids. It is found in the crude state abundantly in nature, but can only be obtained absolutely pure by adding an alkaline carbonate to a solution of chloride of barium, or by saturating the hydrate with carbonic anhydride, and in either case washing and drying the precipitate. Native carbonate of barium (*witherite*) is ordered in the pharmacopœias, and is sufficiently pure for making the barium salts, the only purpose to which it is therein applied.

Uses. In *pharmacy*, &c., chiefly to prepare barium salts. In *chemistry*, to separate certain metallic oxides when occurring together in solutions. In the *arts*, as a base for certain delicate colours, as an ingredient in plate-glass, in the manufacture of beet-sugar, &c. It is not used in medicine. It is extremely poisonous.

Barium, Chloride of. $BaCl_2 . 2Aq$. *Syn.* CHLORIDE OF BARIUM; BARII CHLORIDUM, L.; CHLORURE DE BARYUM, CHLORHYDRATE DE BARYTE, &c., Fr.; SALZSÄURE SCHWERERDE, CHLORBARIUM, Ger. Neutralise a hot dilute solution of hydrochloric acid with carbonate of barium, evaporate down, and crystallise. Sulphide of barium can be substituted for the carbonate. If required chemically pure, gaseous hydrochloric acid is transmitted through a concentrated solution of common or impure chloride of barium, as long as a precipitate forms; the resulting crystalline powder, which is nearly the whole of the chloride of barium present, is collected on a filter, and, after draining, is washed repeatedly with small quantities of pure hydrochloric acid, until the washings, diluted with water, and precipitated with sulphuric acid, give a filtrate which, upon evaporation in a platinum-capsule or a watch-glass, leaves no residue; the last traces of acid having been removed by a little alcohol, applied in a like manner, the powder is at once dried, and then carefully preserved from the air.—*Used* in analysis.

Prop., &c. Crystals, flat four-sided tables, colourless and transparent; sometimes double eight-sided pyramids; slightly efflorescent in dry warm air, but otherwise permanent; decrepitate when heated, and lose their water of crystallisation; fuse at a red heat; volatilise at a white heat; insoluble in hydrochloric acid and in alcohol, slightly soluble in rectified spirit, and very soluble in water; water, at 60°, dissolves 43$\frac{2}{5}$ of the crystals, and nearly 37$\frac{2}{5}$ of the dry salt; and when boiling, 75$\frac{2}{5}$ of the former, and about 66$\frac{2}{5}$ of the latter; a saturated boiling solution (223° Fahr.) contains 100 parts of water, and 78 parts of the crystallised salt.

The crystals contain 2 atoms of water; and a formula of $BaCl_2 + 2Aq$.

Uses, Phys. eff., &c. In *chemistry*, it is employed as a test for sulphuric acid and the soluble sulphates. In *medicine*, it has been employed, both internally and externally, as an alterative, resolvent, and deobstruent, in scrofula, glandular swellings, and enlargements, scirrhous cancer, skin diseases, &c.; and more particularly in the first with marked benefit. In large doses it is poisonous. According to Sir B. Brodie, its action on animals is analo-

gous to that of arsenic. Locally, it acts as an irritant. A very weak solution, used as a lotion, often proves serviceable in herpetic eruptions, and as a collyrium in scrofulous ophthalmia.—*Dose.* ½ gr. thrice a day, in water, gradually increased to 2 or 3 grs.

Barium, Chlo″rate of. $Ba(ClO_3)_2$. *Syn.* CHLORATE OF BARY′TA; BARY′TÆ CHLO″RAS, L. *Prep.* From a solution of chloric acid neutralised with freshly precipitated carbonate of barium; the resulting solution, after filtration, being crystallised by evaporation.

By passing chlorine through strong milk of hydrate or of carbonate of barium, in the same way as in making chlorate of potassium.

Prop., &c. Soluble in 4 parts of cold water. —*Used* in *pyrotechny*, and to make chloric acid.

Barium, Ferrocy′anide of. $Ba_2FeC_6N_6$. *Syn.* BA″RII FERROCYANI′DUM, L. From pure ferrocyanide of iron digested in baryta-water. By careful evaporation, efflorescent prismatic crystals may be obtained, soluble in 4½ parts of water.

Barium, Flu′oride of. BaF_2. *Syn.* BA″RII FLUORI′DUM, &c., L. A white powder, formed by digesting freshly precipitated carbonate of barium in hydrofluoric acid, in excess.

Barium, Hydrate of. $Ba(HO)_2$. *Syn.* HYDRATE OF BARYTA; BARYTÆ HYDRAS, L. *Prep.* By digesting caustic baryta, or barium oxide, with a little water, or igniting gently the crystallised hydrate. It can be obtained crystallised as follows:—

1. From a concentrated solution of either nitrate or chloride of barium, precipitated with a rather strong solution of pure potassa, or of pure soda, perfectly free from carbonic acid.

2. A strong solution of sulphide of barium is boiled with successive portions of black oxide of copper, until it ceases to give a black precipitate with a salt of lead; the liquid, after filtration, yields crystals of the hydrate on cooling.

Prop., Uses, &c. Forms a bulky white powder, containing 10½ % of water of hydration, which it retains even after ignition. In this state it is soluble in 20 parts of cold water, and in 2 parts of boiling water. The hot saturated solution, as it cools, deposits abundantly columnar crystals (CRYS′TALLISED HYDRATE OF B.), which contain 51½ % of water, of which they lose, by drying and ignition, 88¾ % (=45¾ % of their weight), being reduced to the state of the common or amorphous hydrate. Of *all* the bases it has the strongest affinity for both sulphuric and carbonic acid; and hence its solution (BARY′TA-WATER) and those of its neutral salts (*nitrate* or *chloride*) form our most sensitive *tests* for these substances. Sp. gr. 4·3 to 4·7. The crystallised hydrate is converted into the ordinary hydrate at a gentle heat, and this last fuses at a low red heat without losing its water of hydration, which it only slowly and with difficulty begins to part with at higher temperatures. In *chemistry*, its uses are, for the most part, similar to those of BARIUM, OXIDE OF.

Barium, Io′dide of. Ba_2I. *Syn.* BA″RII IODI′DUM, L.; IODURE DE BARYUM, &c., Fr. *Prep.* 1. Dissolve sulphide of barium in water, and add iodine (gradually) in excess; after the reaction is complete, filter, and either evaporate to dryness, or crystallise.

2. Digest freshly precipitated carbonate of barium, in excess, in a hot solution of protiodide of iron; filter and evaporate to dryness; then re-dissolve and crystallise.

3. By saturating hydriodic acid with oxide or carbonate of barium.

Prop., &c. A white or greyish-white mass, or acicular crystals (according to the mode of its preparation); very soluble in water and in alcohol; and decomposed by exposure to the air. It has been highly recommended as an alterative, resolvent, and liquefacient, particularly in scrofula, glandular swellings, chronic inflammations, and the other affections in which chloride of barium and iodine are given.—*Dose.* $\frac{1}{12}$ to ½ gr. (gradually and cautiously increased to 1 gr.), in distilled water, 2 or 3 times a day. *Externally*, as an ointment (3 or 4 gr., to *lard*, 1 oz.), as an application to scrofulous swellings. (Biett.) It possesses all the irritant, corrosive, and poisonous properties of the chloride, but in a much more violent degree.

Barium, Ni′trate of. $Ba(NO_3)_2$. *Syn.* NI′TRATE OF BARYTA; BARY′TÆ NI′TRAS, L. *Prep.* As the acetate or chloride of barium, substituting pure nitric acid for acetic or hydrochloric acid.

Prop., &c. Transparent, colourless octahedrons, which are anhydrous, insoluble in alcohol, and require about 8 parts of cold water, and about 3 parts of boiling water, for solution.

Uses. In *chemistry*, to prepare baryta, and as a test for sulphuric acid and the soluble sulphates; and in *pyrotechny*, to give a green tinge to flame.

Barium, Ox′alate of. BaC_2O_4. *Syn.* OX′ALATE OF BARYTA; BARY′TÆ OX′ALAS, L. *Prep.* By precipitating a barium salt with oxalate of ammonium. Very nearly insoluble.

Barium, Oxide of. BaO. *Syn.* BARYTA, BARY′TES, CAU′STIC BARYTA*, OX′IDE OF BA″RIUM, PROTOX′IDE OF B., HEAV′Y EARTH; BARYTE, OXIDE DE BARIUM, TERRE PESANTE†, &c., Fr.; BARYT, BARYTERDE, SCHWEERERDE, &c., Ger. One of the earths discovered by Scheele in 1774.

Sources. Sulphate and carbonate of barium are abundant minerals, forming the 'vein-stone' of many lead-mines. It is from the latter that baryta and the barium salts are almost exclusively obtained.

Prep. 1. A mixture of carbonate of barium

and charcoal (both in fine powder and moistened) is strongly ignited, for some time, in a porcelain, Hessian, or black-lead crucible, and then allowed to cool out of contact with the air, from which it must also be subsequently carefully preserved.

2. (Pure.) Crystallised nitrate of barium is calcined in a capacious covered porcelain or Hessian crucible, at a bright red heat, until red (nitrous) vapours are no longer disengaged, even on raising the temperature; and the residuum, as soon as the temperature has fallen sufficiently, but whilst still warm, is at once transferred to a bottle, as before.

Prop. A greyish-white, spongy, earthy-looking mass, fusible only before the oxy-hydrogen blowpipe; highly caustic, corrosive, and alkaline, and slaking, like quick-lime, on the addition of water, but with the evolution of more heat.

Barium, Peroxide of. BaO_2. *Syn.* DEUTOX'IDE OF BARIUM; BA''RII BINOX'YDUM, &c. L.; BINOXIDE DE BARYUM, &c., Fr. *Prep.* Pure baryta is heated to full redness in a porcelain tube, and a stream of pure dry oxygen passed over it as long as the gas is absorbed.

Baryta, 4 parts, is heated as above in a platinum crucible, and *chlorate of potassium*, 1 part, gradually added to it; the chloride of potassium formed along with the binoxide being afterwards washed away with cold water.

Prop., &c. Grey or greyish-white; with water it forms a hydrate, which is slightly soluble in water, and undecomposed by it in the cold. It is interesting chiefly in its relations with peroxide of hydrogen and the oxygenised acids of M. Thénard.

Barium, Phosphate of. $Ba_3(PO_4)_2$. *Prep.* In a similar manner to the oxalate, which it resembles in being an almost insoluble white powder.

Barium, Sulphate of. $BaSO_4$. *Syn.* SULPHATE OF BARYTA, HEAV'Y SPAR, BOLO''GNIAN S., CAWK (mi); BARY'TÆ SUL'PHAS (Ph. E. & D.), SPA'THIUM PONDERO'SUM, &c., L.; SULFATE DE BARYTE, SPATH PESANT, &c., Fr.; SCHWEFELSAURES BARYT, SCHWERSPATH, &c., Ger. This salt is found native, often in beautiful tabular crystals, but more frequently in white or reddish-white masses. It is also occasionally prepared artificially, as a pigment and chemical, by decomposing a solution of chloride of barium with dilute sulphuric acid, or with a solution of sulphate of sodium; the resulting precipitate being collected, well washed, and dried.

Prop., &c. When pure, or free from iron, its powder is white. It is insoluble in water, and nearly insoluble in all other menstrua. Before the blowpipe it decrepitates, fuses with great difficulty (by which it is distinguished from the sulphates of strontium and calcium), and ultimately melts into a hard, white enamel. Mixed with charcoal, and heated to redness in a covered crucible, it is reduced to sulphide of barium. It is readily decomposed by fusion with alkaline carbonates; also very slightly so by their cold solutions; but ultimately completely, though slowly, by their boiling solutions. Sp. gr. 4·3 to 4·75.

Uses. Chiefly as a pigment (PER'MANENT WHITE), and to adulterate white-lead; for which purposes the native sulphate is commonly well washed, first in very dilute sulphuric acid, and afterwards in pure water, to remove any iron which may contaminate it, and impair its whiteness. It is also used to form sulphide of barium; and, in *pyrotechny*, instead of the more expensive nitrate.

Barium, Sulphide of. BaS. *Syn.* SUL'PHIDE OF BARIUM, SUL'PHURET OF BARYTA; FA''RM SULPHURE'TUM, &c., L.; SULFURE DE BARYUM, &c., Fr. *Prep. Sulphate of barium*, well dried and in fine powder, 3 parts; *powdered charcoal* or *powdered coal*, 1 part; the mixture is pressed tightly into an earthen crucible, and the cover being fitted on, it is exposed for 1½ to 2 hours, to a bright red heat; after it has cooled, the black mass thus obtained is powdered, and boiled in water, and the resulting solution allowed to crystallise. Some authorities recommend forming the mixed powders into a stiff paste with oil, or oil of turpentine, before calcination; but this is not at all necessary.

Prop., Uses, &c. Crystals, thin and nearly colourless plates, containing combined water; very soluble in hot water, less so in cold water; and rapidly decomposed by exposure to the air. It is principally used to form the BARIUM SALTS, and in organic analysis. Care should be taken in its preparation to expose the solution to the air as little as possible. SULPHIDES of a higher grade may be formed by boiling this compound with sulphur; but they possess little practical interest.

Barium, Sulphite of. $BaSO_3$. *Syn.* SUL'PHITE OF BARYTA. *Prep.* By testing a soluble barium salt with sodium sulphite, and washing the precipitate. Insoluble.

Barium, Tartrate of. $BaC_4H_4O_6$. *Syn.* TAR'TRATE OF BARYTA. *Prep.* Like that of oxalate of barium. White powder. Slightly soluble.

BARK. [Eng., Dan.] *Syn.* COR'TEX, L.; ÉCORCE, Fr.; BAUMRINDE, RINDE, Ger. The rind or exterior covering of vegetables, corresponding to the skin of animals. It consists of the—*cu'ticle* or *epiderm'is*—*cellular substance*, containing colouring matter, &c., and —*li'ber*, the inner or true bark. The last is formed of woody fibre in great quantity, intermixed with cellular tissue. At the commencement of the annual growth of a tree, the bark separates spontaneously from the wood, in order to make room for the new matter forming beneath. It thus increases by yearly layers, and gradually perishes on the outside, owing to distension, from the growth of the interior portion. Its physiological uses are numerous and important. It is the depository of many of the secretions of plants,

and it acts as a living filter, separating secretions from each other, and allowing a part of them to pass off horizontally through the medullary processes on their way to the centre of the tree. But its principal offices appear to be to act as a protection to the tender wood, and as a channel for the sap in its descent from the leaves. "True bark only exists in *exogens* and *gymnosperms;* in *endogens* its place is supplied by cortical integuments, which cannot be separated from the adjacent wood, without violence." (Lindley.)

According to Liebig, the characteristic ingredients found in bark are excrementitious—"substances evidently expelled by the living organism." True wood yields only ·25% to 2% of ash; whilst the bark of some trees give 6, 10, to 15 times more; and these, like the organic constituents, differ materially in their composition and characters.

The *uses* of different species of bark in medicine and the arts are well known. CINCHONA-BARK is invaluable in fevers; OAK-BARK furnishes the tanner with one of the most important materials of his trade; and the tenacious fibres of other varieties are manufactured into cordage and textile fabrics.

Barks should be collected at that season in which they can be most easily separated from the wood, which, with a few exceptions, is late in the spring; because at this time the active principles deposited in their cells are most abundant. OAK-BARK, collected in spring, contains four times as much astringent matter as that collected in winter.

Bark. (In *medicine.*) See CINCHONA.

Bark. (In *tanning.*) See OAK-BARK.

Bark, Jes'uit's. Cinchona-bark.

Bark, Salt of (Essential). See EXTRACTS and SALTS.

BAR'LEY. *Syn.* HOR'DEUM, L.; ORGE, Fr.; GERSTE, Ger., Anglo-S. A well-known grain, the produce of several species of the genus *hordeum.*

Var., Cult., &c. Those principally cultivated in England are—TWO'-ROWED, LONG'-EARED, *or* COMM'ON BARLEY (*hor'deum dis'tichon,* Linn.); SPRING'-BARLEY, SQUARE'-B., *or* BERE (*h. vulga're,* Linn.); and SIX'-ROWED BARLEY, WINTER B., Scotch BERE *or* BIGG (*h. hexqs'tichon,* Linn.). PUT'NEY, SPRAT, *or* BATT'LEDORE B. (*h. zeocriton,* Linn.), is another species less frequently met with. Of each of the above there are several varieties. In Spain and Sicily, two crops of barley are obtained in a year; but, in countries so far north as Britain, it produces only one, and is a delicate species of grain. In England it is generally adopted as a succession crop on light lands, following turnips or green crops. (Loudon.) The 'yield' per acre varies from 28 to 64 bushels, and is usually from 28 to 40 bushels. The average weight per bushel is 50 to 51 *lbs.;* but the best Norfolk and Essex samples weigh 53 to 54 *lbs.* per bushel.

Comp. The leading constituents of barley are nearly similar to those of wheat, but it is scarcely so rich in nitrogenised matter. According to Einhof, the ripe SEEDS *or* GRAINS are composed of—

Meal	70·05
Husk	18·75
Moisture	11·20
	100·

According to Johnston, average fine BARLEY-MEAL contains—

Starch	68·
Albumen, gluten, &c.	14·
Fatty matter	2·
Ash or saline matter	2·
Water	14·
	100·

According to Dr. Ure, the sp. gr. of ENGLISH BARLEY is 1·25 to 1·33 (*average,* 1·235), and the weight of the husk is about 1-6th; that of BIGG, 1·227 to 1·265, and weight of husk, 2-9ths.

Qual., Uses, &c. Its employment and value as food, and in the manufacture of malt, are well known. It forms good wholesome bread well adapted for persons who live luxuriously; but which, for the abstemious and the delicate, is inferior to that made of wheat, as it is rather less nutritious, and less easy of digestion, and commonly proves laxative to those unaccustomed to its use. *Barley-flour* and *b.-meal* are also more perishable than wheat-flour; being very apt to acquire a hot nauseous taste, which even the heat of the oven does not remove. In a medical point of view, barley is regarded as the mildest and least irritating of the cereals. It has always been in high estimation as a demulcent and emollient. The decoction (BAR'LEY-WATER), made with pearl barley, is a common and useful drink in inflammatory diseases, particularly in those of the chest and urinary organs. Among the Ancients, decoctions of barley (κριθή) were the principal aliments and medicines employed in acute diseases.

Barley, Cau'stic. Sabadilla.

Barley, Pat'ent. *Syn.* FARI'NA HOR'DEI, L. *Pearl barley* reduced to fine powder by grinding in a mill.

Barley, Pearl. *Syn.* PEARL'ED BARLEY*; HOR'DEUM DECORTICATUM (B.P.), L.; ORGE PERLÉ, Fr.; PERLENGRAUPEN, Ger. The seeds of *hordeum distichon* deprived of the husks. That of commerce is usually made by steaming spring-barley, to soften the skin, then drying it, and grinding it in a mill with the stones set wide apart, so as to round and polish the grains, and to separate the whole of the husk except that left in the furrow of the seed. SCOTCH PEARL-BARLEY and FRENCH BARLEY resemble the last, but are smaller, being generally made from *winter-barley* or *bigg.* FARO

DE ORZO is another variety made from *sprat-barley*. See BARLEY (*above*).

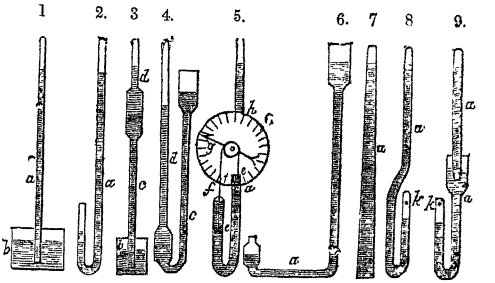
Barley, Scotch. *Syn.* HULLED BARLEY‡, POT-B.‡; HOR'DEUM MUNDA'TUM, L.; ORGE MONDÉ, Fr.; GERSTENGRAUPEN, GRAUPEN, Ger. The grains deprived of the husk by a mill, as noticed above, but less completely, and without rounding them.

BAR'LEY SUGAR. See CONFECTIONERY, and SUGAR.

BARM. See YEAST.

BAROM'ETER (-rŏm'-). *Syn.* WEATHER-GLASS‡; BAROM'ETEUM, L.; BAROMÈTRE, Fr.; BAROMETER, WETTERGLAS, Ger. An instrument for measuring the weight or pressure of the atmosphere. It was invented by Torricelli, of Florence, A.D. 1643.

The barometer is made of several forms, but the principle of its construction, with the exception of the aneroid barometer, is the same



1. Torricelli's cistern barometer.
2. ——— syphon ditto
3. Huygen's barometer.
4. ——— modified.
5. Wheel barometer
6. Bernoulli's syphon ditto
7. Amunton's conical ditto
8. Gay Lussac's ditto.
9. ——— modified by M. Bunten.

(*a*) Tube containing a column of mercury.
(*b*) Mercurial cistern
(*c*) A column of mercury supporting another of water (*d*).
(*e, e.*) Weights, one of which floats on the surface of the mercury, and by means of the cord (*f*) moves the index (*g*).
(*h*) Graduated dial.
(*k*) Capillary hole drilled laterally to admit air.

in each, and essentially consists of a column of fluid (usually mercury) supported in vacuo, in a glass tube, by the pressure of the atmosphere on its surface. The annexed *engr.* exhibits the principal varieties at present known; several of which have been proposed with the view of improving the original instrument, either by increasing its range, or its portability. None, however, equal in simplicity, cheapness, and usefulness, the old forms proposed by Torricelli, and repr. by the figs. 1 & 2. To avoid confusion, the graduated scales and cases of the instruments are not shown.

The construction of a barometer requires the utmost skill and care of a practised artist, and will therefore be seldom undertaken by the amateur or experimentalist—a fact which renders it unnecessary for us to enter into the details here. In the choice of his instrument, the purchaser must greatly depend on the known experience and integrity of the manufacturer; as nothing but lengthened use, and frequent comparisons with other instruments, can possibly prove its excellence. An ordinary barometer, however carefully made, is found to suffer gradual deterioration, from the external air insinuating itself between the mercury and the glass tube, by which the perfection of the vacuum is destroyed. Various plans have been proposed to remedy this inconvenience and source of error. Prof. Daniels forms the bottom part of the tube, to the extent of about ½rd of an inch, of solid platinum, welded to the glass. This plan has proved completely satisfactory. Dr. Ure proposes the use of platinum-foil for the same purpose. Before purchasing an instrument it is as well to ascertain that this has been done. In those called 'STANDARD BAROMETERS' the scale is movable and adjustable by a delicate screw, so as to enable the observer to bring the lower point or zero (0) of the scale coincident with the surface of the mercury in the cistern. Exact contact is readily effected by making the point, and its image as seen by reflection from the surface of the mercury, to coincide. In this case the cistern is made of glass. Provided the ivory scale be connected with the zero-point with a strip of brass, correction as to temperature is very nearly effected by this simple adjustment. The WHEEL-BAROMETER is chiefly serviceable as a domestic or land weather-glass.

Uses, &c. The barometer is employed for ascertaining the amount of atmospherical refraction in astronomical calculations, and in measuring altitudes, and in prognosticating the weather. For the last purpose, on land, it sometimes proves a false prophet; but at sea, its monitions are highly trustworthy. As a mere *weather-glass*, the indications, as read off from the scale of the instrument, are generally sufficiently accurate; but in all observations connected with meteorology, altitudes, astronomy, &c., certain corrections must be made; the height of the mercury being influenced both by the size of the tube and by the temperature of the air by which it is sur-

rounded, as well as by variations in the weight or pressure of the atmosphere. (See *below*.)

Barometrical Corrections:—

1. As to CAPILLARITY:—This applies to all *cistern-barometers* formed of tubes of very small diameters, owing to the mercury assuming a convex surface in the tube. As the tube increases in diameter, so the depression of the mercury lessens. Hence, "the interior diameter" of a barometer "should, in every case, exceed one fourth of an inch." (Brande.) Syphon barometers that have each of their legs of equal size, require no correction, as the depression is equal at both ends.

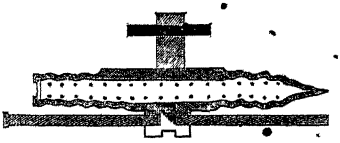
TABLE *of Barometrical Corrections for* CAPILLARITY, *from the* 'Encycl. Brit.'

Diam. of Tube.	Depression.
·10 inch.	·1403 inch. +
·15 ,,	·0863 ,,
·20 ,,	·0581 ,,
·25 ,,	·0407 ,,
·30 ,,	·0292 ,,
·35 ,,	·0211 ,,
·40 ,,	·0153 ,,
·45 ,,	·0112 ,,
·50 ,,	·0083 ,,
·60 ,,	·0044 ,,
·70 ,,	·0023 ,,
·80 ,,	·0012 ,,

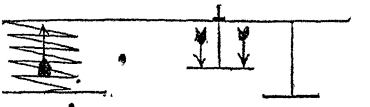
2. As to TEMPERATURE:—These depend on the expansion of the mercury, and of the scale on which the divisions are marked. The *Rule* for reducing an observed height to the corresponding height at the freezing-point, or 32° Fahr., the usual standard temperature, is—Subtract 1-10000th *part of the observed height of the barometer for every degree of Fahr. above* 32° *at the time of the observation.* Or—

(*obs. t.*—32) × *obs. h.* × ·0001 = *corr. req.*

Barometer, An'eroid. An instrument invented, or at least perfected, by M. Vidi, of Paris, in which the pressure of the atmosphere is measured without the employment of a fluid, as in the ordinary barometer.[1] Externally, it



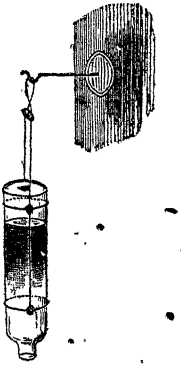
somewhat resembles in appearance a carriage clock or a ship's chronometer; internally, it consists of a small air-tight cylindrical box, formed of thin corrugated copper-plates, and partially exhausted of air, the sides of which yield to the pressure of the atmosphere; the effect being regulated by a spring, multiplied by a system of levers, and ultimately recorded



by the index on a graduated dial. Compensation for changes of temperature are self-effected, with almost perfect accuracy, by the elastic force of the spring being so adjusted to that of the air in the cylinder, that the loss of force in the one, and the increased expansive force of the other, shall, independently of changes of atmospheric pressure, preserve the lever in equilibrio.

The indications of the aneroid barometer closely correspond to those of the mercurial barometer, at ordinary ranges; the differences never exceeding the ·01 of an inch. It is so extremely sensitive that an ascent or descent of only a few feet is distinctly indicated by it; whilst its portability adapts it for service in situations for which an ordinary barometer is unfitted. On the other hand, it is liable to move by jerks, and the elasticity of the spring, and consequently the zero-point of the scale, has been found to be sometimes affected by time and a rough journey. On this account it is necessary to compare it occasionally with some standard mercurial barometer, to determine its amount or rate of variation, if any.

Barometer, Phi'al. This amusing philosophic toy is made by cutting off the rim and part of the neck of a common *glass-phial* with a file. The phial is then nearly filled with *water*, either pure or tinged blue or red; and the finger being placed on its mouth, it is inverted, and suspended in a vertical position by means of a piece of *twine* or *wire*, when the finger is withdrawn. (See *engr.*) In *dry weather* the under surface of the water remains level with the neck of the bottle, or even concave; in *damp weather*, on the contrary, a drop appears at the mouth and continues enlarging until it falls, and is then followed by another in the same way.



Barometer, Port'able. The most accurate are those of Gay-Lussac and Bunten, and after them the *aneroid*. They should be set on universal joints, and well balanced. The common instrument made with a box and leather cistern, seldom continues long correct.

Barometer, Wheel. The common form of the instrument having a dial-face and hands.

[For further information in connection with

[1] An instrument founded on the same principle, and of nearly similar construction, was described by M. Conté, in 1798, in the "*Bull. des Sci. Nat.*," t. i, No. xiii, p. 106.

the *above subject* the reader is referred to the 'articles' ANEROID, ATMOSPHERE, GAS, HEIGHTS, STEAM, STORM-GLASS, VAPOUR, WEATHER, &c.]

BAR'OSCOPE† (-skōpe). [Eng., Fr.] *Syn.* BAROSCO'PIUM, L. A barometer; sometimes applied to the wheel-barometer, of Hooke.

BAR'RAS. The concrete resinous exudation from the bark of fir-trees. † That from *pi'nus marit'ima* is called GALIPOT.

BARSE. [Provincial.] The common perch.

BAR'WOOD. A red dye-wood imported from Angola and other parts of Africa. It closely resembles cam-wood and sanders-wood in its colouring matter, being of a resinous nature, and scarcely soluble in water. In *dyeing*, this difficulty is obviated by taking advantage of the strong affinity existing between it and the proto-salts of tin and iron. Thus, by strongly impregnating the goods with protochloride of tin, either with or without the addition of sumach, according to the shade of RED desired, and then putting them into a boiling bath containing the *rasped wood*, the colour is rapidly given out and taken up, until the whole of the tin in the fibres of the cloth is saturated, and the goods become of a rich bright hue. In like manner the DARK RED of bandana handkerchiefs is commonly given by a mordant of acetate of iron followed by a boiling bath of this dye-stuff. See DYEING, MORDANTS, &c.

BASALT' (bă-sôlt').[1] [Eng., Ger.] *Syn.* BASAL'TES (-săl'-tēz), L.; BASALTE; Fr. In *geology*, &c., a species of trap-rock, essentially composed of the minerals felspar and augite. It is of a fine compact texture, of a dark-green, gray, or black colour, and usually occurs in regular columns, of which the Giants' Causeway and the Island of Staffa furnish magnificent examples. It is fusible; and when rapidly cooled forms a dark brittle glass; but when slowly cooled retains its original beauty and hardness almost unimpaired. Messrs. Chance, Brothers, of Birmingham, have availed themselves of this property to apply it to decorative and ornamental purposes. Their process is to melt the material[2] in a reverberatory furnace, and, when sufficiently fluid, to pour it into red-hot moulds of sand enclosed in iron boxes. The corresponding *adj.* is BASALT'IC (-sôlt'-; BASAL'TICUS, -săl'-, L.; BASALTIQUE, Fr.).

BASE. [Eng., Fr.] *Syn.* BA'SIS (*pl.*, ba'ses), L., Gr.; GRUND, GRUNDFLÄCHE, Ger. *In chemistry*, it was formerly, and is now occasionally, applied to metallic oxides which possess the property of forming salts with acids. The *alkaloids* are also designated *organic bases*. *In pharmacy*, the characteristic or principal ingredient in any medicine or compound preparation; or that on which its qualities or efficacy depends.

BAS'IL (băz'-). *Syn.* SWEET BAS'IL, CIT'RON B.; BASIL'ICUM, L.; BASILIC, Fr.; BASILIKUM, Ger. The *oc'ymum* (ŏs'-) *basil'icum* (Linn.), an annual aromatic herbaceous plant, of the *nat. ord.* Labiatæ (DC.). It is a native of India, but is largely cultivated in every part of Europe as a pot-herb. Leaves, strong-scented; popularly reputed emmenagogue; much used to flavour salads, soups, &c., especially in French cookery. *Mock-turtle soup* derives its peculiar flavour from this herb; as also did the original Fetter-lane sausages, once so highly esteemed by Cockney gourmands. In India it is commonly employed as an anodyne, in childbirth.

BAS'IL (băz'-). *Syn.* BAS'AN; BASANE, Fr. A sheep-skin, tanned; particularly one dressed on the grain-side, for book-binding.

BASIL'ICON. See CERATES and OINTMENTS.

BAS'KET (băs'-). *Syn.* COPH'INUS (kŏf'-), L.; PANIER, CORBEILLE, &c., Fr.; KORB, Ger. BASKETS are generally STAINED or COLOURED with the simple liquid dyes used for straw or wood; and that, for variegated work, the twigs, after being carefully peeled, washed, and wiped dry or slightly air-dried, are stained before being woven. See OSIERS, &c.

BASS‡. [Provin.] The linden-tree; also a hassock or mat made of its inner bark. See BAST.

BAS'SORIN (-rĭn). *Syn.* BASSORI'NA, L. A substance first noticed, by Vauquelin, in *Bas'sora-gum*. See INSOLUBLE GUM, TRAGACANTHINE, &c.

BAST (băst). *Syn.* BASS (which *see*). The inner bark of the *linden-tree* or *tiel-tree*; also matting, &c., made of it.

BAS'TARDS (-tärdz). *Syn.* BAS'TARD SUG'AR (shŏŏg'-), PIECES, &c. In *sugar-refining*, impure or damaged sugar resulting from the heat and chemicals used in the process of manufacture, and which will not pay for purifying.

BA''SYL (bāse'-ĭl). In *chemistry*, any simple or compound body, acting as a basic radical.

BATH (bahth). *Syn.* BAL'NEUM, L.; BAIN, Fr.; BAD, Ger., Sax. A place for bathing; a vessel or receptacle, natural or artificial, containing or adapted to contain water, and used to bathe in. In *architecture* and *hygiene*, a building fitted up for, and appropriated to bathing.

Constr., &c. Here one of the first subjects which must engage our attention is the selection of the material of which the bath is to be formed. For FIXED BATHS polished white marble has always been in favour, owing to its cleanliness and beauty. For this purpose, slabs of sufficient thickness and free from flaws or cracks should be chosen; and they should be securely and properly bedded in good water-tight cement, in a well-seasoned wooden case. The objections to marble, independent of its costliness, are, that it is apt to get yellow

[1] *Ba'salt*—Mayne; a 'notation' contrary to that of *all* our leading orthoepists and lexicographers.

[2] Rowley-rag is used by the Messrs. C.; as beside ordinary basalt, *greenstone*, *whinstone*, and other similar minerals, possess the same property.

or discoloured, and to lose its polish, by frequent and careless use; and that the restoration of its surface to its original purity, is a matter of considerable expense and difficulty. It is also only fitted to contain water with, at the most, soap, weak alkalies or alkaline carbonates, aromatics, or neutral organic principles; and cannot be employed with water medicated, however slightly, with acids, sulphurets, iodine, chlorine, salines (others than those just named), or colorific substances. As a cheaper material thick slabs of *Welsh slate* are often substituted for marble; but even this substance is attacked by chemicals, though much more slowly. A lining of large *Dutch tiles* is sometimes used; but here the joints are very apt to leak. For baths adapted to all the requirements of health and disease, and which are at the same time durable and comparatively inexpensive, we must, therefore, seek further. *Porcelain*, *glass*, and *hard-glazed stone-ware* have been proposed, and are even sometimes used for baths; but they possess the disadvantages of being fragile, and very liable to crack when filled with hot water in cold weather. *Wedgewood-ware* is very beautiful and durable; but it is expensive, and baths formed of it can only be obtained on special order. *Stourbridge-ware*, as produced of late years, is the only product of the potter's art, that appears entirely to meet the case; but even this yields in durability to *enamelled*

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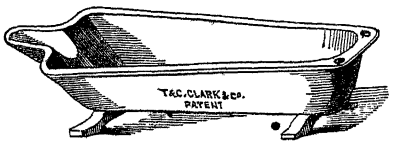
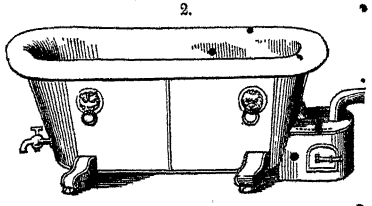


iron as a material for baths adapted to all liquids and temperatures, and to rough or careless usage. (See *engr.* 1.) The better qualities of PORTABLE BATHS (see *engr.* 2) are generally made of *copper*. Stout *tinned* or *galvanised iron*, and even stout *block-tin* thickly covered with waterproof paint or japan, are also employed; but though less ex-

2.



pensive than copper, they have the disadvantage of being much less durable. All these substances are, however, readily acted on by chemicals. A durable and cheap portable bath, adapted to all purposes, must, therefore, like a fixed one, be made of one or other of the materials already noticed. For MED'ICATED BATHS large wooden troughs are frequently employed, particularly for acidulated, iodureted, and sulphuretted baths.

The arrangements for supplying cold and hot water must necessarily greatly depend on circumstances, and the quantity required. For a single FIXED BATH, or even for 2 or 3 of them, the common circulating water-heater or boiler, placed in some apartment on a rather lower level than the bath, is, perhaps, the most convenient; but where this is not attainable the water may be run, by means of a pipe, from a boiler situated on a somewhat higher level. In either case a supply of cold water must also be at hand, and conveyed in a like manner, to enable the bath to be reduced to any required temperature. On the large scale, as in our public baths, where numerous baths are in constant use during the day, the hot water is best supplied from a large cistern somewhere above the level of the bath-rooms, and which is heated by a coil of pipe supplied with high-pressure steam from a boiler situated on a lower level, as the ground-floor or basement. The hot and the cold water, conveyed by separate pipes of about 1½ inch diameter, unite in a two-way cock close to the bath, so as to enter it together, by which only *one* aperture in the end of the bath is required for the purpose. The bath is emptied, and excess of water removed, by a grated aperture in the bottom, also stopped by a cock which, like the former, has handles or keys so placed as to be accessible to the attendant outside the bath-room, as well as to the bather; whilst the danger of overflowing is obviated by a two-inch waste-pipe, opening into the bath at about two inches from the top.

For heating portable baths so many plans are in use, and have been suggested, and even patented, that the reader cannot possibly be at a loss for one to suit his particular case. A small grate for burning charcoal is the one most commonly adopted; but where attainable, a ring or cross of small inflamed gas-jets, is more cleanly and manageable.

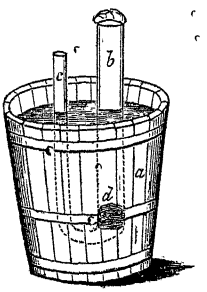
When the bath consists of a wooden tub, or any other deep vessel, a simple and inexpensive apparatus brought out in America, under the title of the 'ITAL'IAN BATH'-WARMER' (see *engr.* 3), and made of thin sheet-iron, will occasionally be found useful.[1]

The situation and the minor details connected with the comfort and convenience of the bath, must greatly depend on the character of the building, and the sum to be devoted to the purpose. When possible, the bath-room should always be on the same floor as the bed-rooms, of easy access to them, and so situated and arranged, that a plentiful and constant supply of pure water can be ensured, and the

[1] A small cast-iron 'horse' with three legs (not shown in the *engr.*) to support the 'warmer' about 2 inches above the bottom of the bath-tub, and to keep it steady and upright, is usually sold with it.

waste water removed without trouble or inconvenience. The basement story should always be avoided; for, as observed by Dr. Ure, there is a coldness and dampness belonging to it, in almost all weathers, which is neither agreeable nor salubrious.

8.



(*a.*) Bath-tub.
(*b.*) The larger arm of the warming-tube by which the charcoal is introduced, and by which the fumes fly off.
(*c.*) The smaller arm to admit air to support the combustion.
(*d.*) The fire grate, to support the burning charcoal.

The ranges of the temperature of water appropriate to the respective baths, according to the common nomenclature, are shown in the following Table:—

Name.	Temperature. Fahr.
Cold bath	33° to 75°
Temperate bath	75 „ 82
Tepid bath	82 „ 90
Warm bath.....	90 „ 98
Hot bath.....	98 „ 112

Concluding remarks. The importance, and indeed, the absolute necessity of frequent personal ablution, has been already insisted on and explained. But however important and beneficial the use of water in this way may be, the effects arising from the immersion of the body in that liquid, as in the practice of bathing, are far more extensive and complete. What the one does usefully but not completely, the other accomplishes readily, satisfactorily, and perfectly. There is no absolute succedaneum for the entire bath. Its physiological effects are peculiar to itself, and of the utmost importance in pathology and hygiène. The practice of wearing flannel, the daily use of clean linen, the mere washing of the more exposed parts of the body, are but poor attempts at cleanliness, without the occasional, if not frequent, entire submersion of the body in water. Nor should the action of judicious bathing in the promotion of personal comfort and personal beauty be forgotten. Intellectual and moral vigour are also gradually, but materially, influenced and promoted by the beneficial action of bathing on the system; for mind and conscience being linked to matter in the 'house we live in,' become perturbed, or lethargic, in almost exact accordance with the fluctuations of our physical health. The neglect of bathing in this country is, to us, an absolute enigma. We are always talking about health, and continually professing to be seeking it; but the practical applications of the principles which we advocate, and the doctrines which we teach, are, unfortunately, the exceptions and not the rule.

Our recommendation of bathing applies chiefly to the warm bath and the tepid bath, which are alike adapted to the delicate and the robust, and to every condition of climate and season. Cold bathing, in this climate, is only suited to the most healthy and vigorous, and can only be safely practised during the warmer months of the year, and in a mass of water sufficient to permit of the heat of the body being maintained by swimming or other active exercise. The plunge and shower baths are partial exceptions to these remarks; whilst sea-bathing, for the reasons given elsewhere, comes under another category. This last, "on account of its stimulative and penetrating power, may be placed at the head of those means which regard the care of the skin; and it certainly supplies one of the first wants of the present generation, by opening the pores, and thereby re-invigorating the whole nervous system." "Besides its great power in cases of disease, it may be employed by those who are perfectly well, as the means most agreeable to nature for strengthening the body and preserving the health." Another important advantage which sea-bathing has over bathing in fresh water is, that persons seldom take cold from indulging in it.

We may add, that for bathing to produce its best effects, the water should be soft and pure, and good soap sparingly, but regularly, employed whenever the skin requires it.

The medical and hygienic properties of baths are noticed below, under their respective *names*:—

Bath. In *chemistry*, &c., a vessel or apparatus containing some medium in which the vessel holding the substance to be heated is immersed, instead of being exposed to the direct action of the fire; by which means a limited and uniform temperature may be ensured.

The highest temperature that can be given to any substance contained in a vessel placed in another of boiling water, is about 205 or 206° Fahr.; but by adding ⅓th part of common salt to the bath, a heat of fully 212° may be obtained. Baths of fusible metal, saturated solutions of salt, sand, and (on the large scale) steam, are also used for the same purpose. A bath of oil may be safely heated to about 500° Fahr. without suffering decomposition, and will be found an exceedingly appropriate and convenient source of heat in many

processes. For a Table of Boiling-points, see EBULLITION.

Bath. In *medicine*, the medium in which the body, or a part of it, is bathed or immersed, for some object beyond that of mere personal cleanliness or enjoyment; the composition, use, or temperature of the medium, being generally indicated by some epithet, as in the instances below. When only the last is pointed out, pure water is, of course, intended to be used.

Baths are divided by medical writers into classes, and even minor subdivisions, in a manner which is more ingenious than useful. They are said to be SIMPLE, when water or its vapour forms the bath; and COMPOUND, when the water or vapour is medicated by the addition of other substances (COM'POUND BATHS; BAL'NEÆ COMPOS'ITA, L.). The latter class is also subdivided into THERAPEU'TIC BATHS (MED'ICATED BATHS; BAL'NEA MEDICA'TA, B. THERAPEU'TICA, L.); and NUTRIT'IVE BATHS (B. NUTRIEN'TIA, B. NUTRI"TIA*, B. NUTRITO"RIA*, L.). Thus, besides the ordinary water and vapour baths, the medical uses of which are hereafter noticed, we have WINE'-BATHS, MILK'-BATHS, SOUP'-BATHS, &c. (used to convey nourishment, or to sustain the body, as in occlusion of the œsophagus, certain diseases of the stomach, &c.); CHLO"RINE BATHS, SUL'PHUROUS B., MERCU"RIAL B., &c. (used in skin diseases, syphilis, &c.); AROMAT'IC and CHALYB'EATE BATHS (employed as tonics); and ACID BATHS (sometimes used to remove the effects of mercury).

On the Continent a variety of substances are employed to medicate baths, which are seldom or never so used in this country.

The quantity of any medicinal substance used to medicate a bath, for an adult, may be, in general, for each gallon of water employed, about the same as that which is used to form a half-pint lotion of medium or rather weak strength. Thus; taking the quantity of bichloride of mercury to form the lotion at 5 grs., and that of sulphurated potash at ½ dr., the quantity required for a bath of 30 to 40 *galls.* will be about 2½ drs. of the first, and about 1¾ oz. of the second of these substances. Much, however, depends on the nature of the case, the length of the immersion, the periods of recurrence, and the intended number of repetitions. In the case of very active remedies it will be safest and best to begin with less than (say ¼ *to* ⅓) the quantity thus indicated.

Medicated baths are, in nearly all cases, taken warm or fully tepid.

*** In the following notices, which are given as examples, the quantity of the ingredients ordered, when not otherwise indicated, is that proper for an ordinary full-sized bath for an adult; *viz.*, from 40 to 60 *galls.* Those which do not contain volatile substances may be used more than once; and many of them several times by adding a small quantity of fresh ingredients to keep up their strength.

Bath, Acid (ăs'-). *Syn.* BAL'NEUM AC'IDUM (ăs'-), L. See HYDROCHLORIC, NITRIC, NITRO-HYDROCHLORIC, and SULPHURIC ACID BATHS (*below*). Enamelled, hard-glazed, or wooden vessels must be used with all of them.

Bath, Air. *Syn.* BAL'NEUM PNEUMAT'ICUM, L.:—*a.* (Cold.) Simple exposure of the body, in a state of nudity, for a short time to the atmosphere. Tonic, anodyne, and sedative; in febrile excitement, nervous irritability and restlessness accompanied by a quick or full pulse, &c. Safe and often very effective. It will frequently induce sleep when all other means fail.

b. (Hot:—ASSA, A. SUDA'TIO, L.) An apartment to which dry *heated air* is admitted. Sometimes the arrangement is such that the air is *not* inhaled. Stimulant; sudorific; more so than even the vapour bath; produces copious perspiration, being, indeed, the most powerful and certain diaphoretic known. It has been advantageously employed in cholera (for which its advocates state that it is almost a specific), congestive fevers, chronic rheumatism, contractions, stiff joints, paralysis, scaly skin-diseases, dropsical swellings, and most of the cases in which the vapour bath is usually employed. The temperatures are—as a sudorific, 85° to 105° Fahr.; as a stimulant, 100° to 130°. When not inhaled it may be often raised, with advantage, 15° to 25° higher. See TURKISH BATH.

c. (Compressed.) Recommended, by M. Tarberie, in aphonia, &c. It has recently been employed in asthma, phthisis, and some other like diseases, with extraordinary success, at Ben Rhydding.

d. (Rarefied.) Applied locally. Revulsive; resembles DRY CUPPING (which *see*).

Bath, Al'kaline. *Syn.* AL'KALISED BATH; BAL'NEUM ALKALI'NUM, B. ALKALIZA'TUM, L. *Carbonate of potash* (salt of tartar), ¾ *lb.* In itch, prurigo and chronic skin diseases accompanied with dryness and irritation, acute gout, lithic gravel, scurvy, diarrhœa, &c. *Scotch soda*, 1 *lb.*, is sometimes substituted for the 'potash;' but is less effective, and is theoretically objectionable.

Bath, Al'um. *Syn.* BAL'NEUM ALU'MINIS, L. *Alum* (in powder, or previously dissolved in hot water), ¾ *lb.* to 1½ *lb.*, or even 2 *lbs.* In troublesome excoriations, extensive burns, obstinate vesicular eruptions, diarrhœa, &c.; also in obstinate piles and prolapsus ani. See ASTRINGENT BATH.

Bath, Ammoni'acal. See HYDROCHLORATE OF AMMONIA BATH (*below*).

Bath, Animal. *Syn.* BAL'NEUM ANIMA'LE, L. The skin or any part of an animal just killed, wrapped round the body or a limb. Once much esteemed; now, happily, disused in this country.

Bath, Antimo"nial. *Syn.* BAL'NEUM ANTIMONIA'LE, L. *Tartar-emetic*, 1 to 2 oz. (Sou-

beiran.) In lumbago and certain skin diseases; also as a counter-irritant.

Bath, Antipso"ric. *Syn.* BAL'NEUM ANTIPSO"RICUM, L. See SULPHURETTED BATH (also others both *above* and *below*).

Bath, Aromat'ic. *Syn.* BAL'NEUM AROMAT'ICUM, L. *Balm, chamomile, lavender, mint, rosemary, sage, thyme,* with any other like aromatic herbs (at will), of each, a handful, mixed together and steeped in a (covered) pail of boiling or very hot water, for an hour, and then strained, with pressure, into the bath. Sometimes 2 or 3 *oz.* of *sal-ammonia,* a ¼ *lb.* of *alum,* or 1 *lb.* of *common salt,* is also added. Occasionally used in cutaneous affections, chronic rheumatism, diarrhœa, dyspepsia, stiff-joints, &c.; also in debility arising from loss of blood, spermatorrhœa, suppressions, hysteria, hypochondriasis, &c.

The AROMATIC VAPOUR BATH is made by causing the *vapour* to pass through the herbs.

Bath, Astrin'gent. *Syn.* BAL'NEUM ASTRIN'GENS, L. *Prep.* (Most.) *Alum,* (2 to) 4 *lbs.*; dissolve in *boiling water*; and add, *whey,* 6 or 8 pailfuls, or q. s. In extensive burns, piles, prolapsus ani, &c. See ALUM BATH, OAK-BARK BATH, &c.

Bath, Balsamic. *Syn.* BAL'NEUM BALSAM'INUM, L. *Bordeaux turpentine* and *tar,* of each, 2 *lbs.* (or of *tar* alone, 3 to 4 *lbs.*); *hot water,* 6 or 7 galls.; stir continuously until nearly cold, then add the clear portion to *water,* q. s. to form a bath. In mumps, pruriginous diseases of the skin, eczema, impetigo, &c.

Bath, Barèges (Factitious). *Syn.* BAL'NEUM BARETGINEN'SE (Factitium), L. *Prep.* 1. *Crystallised sulphuret of sodium,* 3½ oz.; *chloride of sodium,* 1½ oz.; *gelatine* (dissolved), 4 oz.

2. (Trousseau & Reveil.) *Dry sulphuret of potassium,* 4 oz.; *water,* 16 oz.; dissolve, and add the solution to the bath; then further add, of *sulphuric* or *hydrochloric acid,* ½ oz., previously diluted with *water,* 8 oz. In itch, moist skin diseases, chronic diarrhœa, chronic rheumatism, lead colic, &c. See BALLS, WATERS, &c.

Bath, Benzo'ic. *Syn.* BAL'NEUM BENZO'ICUM, L. 1. *Benzoin* (in powder), ½ *lb.*; *water* (at 90°) q. s. In irritations, hysteria, hypochondriasis, &c. It is also reputed to be feebly aphrodisiac.—2. A common warm bath, with a little powdered benzoin laid on a heated plate near the bather, so that the fumes may be inhaled. Slightly soothing or anodyne; in chronic laryngitis, relaxed uvula, &c.

Bath, Bichlo"ride of Mer'cury. See MERCURIAL BATH.

Bath, Bran. *Syn.* BAL'NEUM FUR'FURIS, L. *Bran,* 5 to 7 *lbs.*; *boiling waters,* 2 or 3 galls.; *digested* together for an hour, or boiled for 15 minutes; the strained liquid being added to the bath. Emollient; in dry and scaly skin disease, and to allay itching and surfacial irritation; also to promote suppuration, &c.

Bath, Cam'phor. *Syn.* BAL'NEUM CAM'PHORÆ, B. CAMPHORATUM, L. *Camphor,* 3 or 4 drs., coarsely powdered, and placed on a plate heated by boiling water, in the bath-room. Anodyne, anaphrodisiac, and diaphoretic; in spasmodic asthma, chronic cough, relaxation of the uvula, ardor urinæ, nervous irritability, &c.

Bath, Carbon'ic. *Syn.* CARBON'IC ACID BATH; BAL'NEUM CARBON'ICUM, B. AC'IDUM CARBONICUM, L.

1. *Carbonic acid gas* applied, by means of a suitable apparatus, to prevent its being respired. Antiseptic, diaphoretic, and excitant to the vascular system; in amenorrhœa, chlorosis, hysteria, scrofula, cancerous and other ulcers (particularly foul ones), &c.

2. *Water,* at 50° Fahr., charged with the *gas.* Powerfully antiseptic and sedative; in foul ulcers, gangrene, &c.

Bath, Chlo"ride of Ammo"nium. *Syn.* BAL'NEUM AMMO"NII CHLORI'DI, B. AMMO"NIÆ HYDROCHLORA'TIS, L. *Sal-ammoniac,* 2 to 3 *lbs.*, or even 4 *lbs.* In chronic inflammations, glandular enlargements and indurations, chronic rheumatism and affections of the joints, leucorrhœa, chilblains, frost-bites, &c.

Bath, Chlo"rine. *Syn.* BAL'NEUM CHLORIN'II, B. CHLORINA'TUM, L. *Tepid water* to which a little *chlorine* has been added. Antiseptic, stimulant, and subsequently sedative and antiphlogistic; in itch, foul and gangrenous ulcers, chronic liver affections, &c. Chloride of lime is commonly substituted for chlorine.

2. (Magendie; Wallace.) *Chlorine gas* (obtained from *salt,* 1½ oz.; *oil of vitriol* and *water,* of each, 1 oz.; and *black oxide of manganese,* ½ oz. to 1 oz.) diluted with *air,* at a temperature of 104° to 150° Fahr., and applied, by means of a suitable apparatus, for 10 minutes to ½ an hour; every possible precaution being taken to prevent it being inhaled. In chronic liver affections, gradually and cautiously increasing the ingredients to three times the above quantity, and decreasing the dilution with *air* until the gas is used nearly pure.[1]

Bath, Cold. *Syn.* BALNEUM FRIG'IDUM (-frĭj'-), FRIGIDA"RIUM, L.; BAIN FROID, Fr. *Water,* fresh, saline, or mineral, at a temperature varying from 33° to about 75°; but usually understood to apply to water between 50° and 70° Fahr. When below 50° it is considered *very cold.* At a temperature ranging from 60° to about 75° it is commonly used by the healthy and vigorous as a luxury, and for cleanliness.

"The immediate effects of the cold bath are a sensation of cold (speedily followed by one of warmth), contraction of the cutaneous vessels, paleness of the skin, diminution of

[1] A dangerous remedy in careless or unskilful hands; and even with the experienced, not always free from danger. The writer of this article once nearly lost his life from a single inspiration of the gas which accidentally escaped its proper limits. Terrific spasms of the glottis and a convulsive cough immediately came on, and lasted, with more or less severity, for nearly 14 hours.

perspiration, and reduction of the volume of the body. Shivering, and, as the water rises to the chest, a kind of convulsive sobbing, are also experienced. Continued immersion renders the pulse small, and ultimately imperceptible, and the respiration difficult and irregular. A feeling of inactivity succeeds; the joints become rigid and inflexible; pain in the head, drowsiness, and cramps, come on; the temperature of the body falls rapidly; and faintness, followed by death, ensues." "Its primary effects constitute the SHOCK — its secondary effects, the REACTION *or* GLOW."[1] Hence it is that immersion of the body in water below about 65° Fahr. cannot be tolerated for any length of time without such a loss of animal heat, as frequently to induce highly sedative and depressing effects, from which the constitution does not readily recover. Water at a temperature of below about 50° Fahr. can only be safely used as a plunge-bath. The sedative effects of sea and mineral waters, is much less than that of pure water, or of spring or river water.

The cold bath, medically considered, is tonic, stimulant and restorative, when judiciously taken, and when not too long continued or too often repeated. When beneficial, the patient feels a pleasant glow on the surface of the body immediately following it. If a sensation of coldness or shivering ensues, it acts injuriously, and should not be repeated. The duration of the immersion may vary from 2 to 15 minutes, the precise time depending upon the temperature of the water, and the feelings of the bather; the longer period being only proper in fine weather, and when accompanied by swimming or violent exercise.

As a remedial agent, the cold bath is principally recommended to increase the tone and vigour of the system; and is contra-indicated when there is a tendency to apoplexy, or to chronic affections, functional or organic, of the heart, lungs, or kidneys. It should never be taken when the party feels chilly, languid, or depressed; or if drowsiness and shivering follow it.

The temperature of the water of the rivers and the coasts of England ranges, in summer, from 55° to 70 or 72° Fahr.

Bath, Douche. See SHOWER-BATH, DOUCHE, &c.

Bath, Dry. *Syn.* BAL'NEUM SIC'CUM, L. The immersion of the body in any dry material, as *ashes, salt, sand*, &c. EARTH-BATHING, as administered by the once notorious quack, Dr. Graham, was of this kind. In the *sudatorium*, or sweating room, of the ancients, the body was immersed in heated sand.

Bath, Elec'tric. *Syn.* BAL'NEUM ELEC'TRICUM, L. The patient, placed on an insulated stool, is put in contact, by means of a metallic wire, with the prime conductor of an electrical machine in action. The surface of the body is thus rendered electro-positive, and the surrounding air, by induction, electro-negative. It has been recommended in chronic rheumatism, scirrhous tumours, &c.

Bath, Electro-chem'ical (of Dr. Caplin). This is founded on the supposition that all diseases arise from the presence of mineral, or other extraneous morbific matter, in some organ, or the whole organism, and which is capable of removal by electrolysis. The patient is placed in an appropriately arranged voltaic bath, and there "saturated with the electric fluid." This "decomposes everything which is foreign to the organism, the vital parts being protected by the law of conservation belonging to every organic production." These foreign substances are said to be thus carried out of the system by the electric current, and to be "fixed and plated on the copper in the same way, and according to the same law and principle (only reversed), as in the process of electro-plating."[2]

Bath, Fec'ula. *Syn.* BAL'NEUM AM'YLI, B. FÆC'ULÆ, L. *Potato-starch* or *wheat-starch*, 1 to 4 *lbs.*; *boiling water*, q. s. to dissolve. Resembles the BEAN-BATH.

Bath, Ferru'ginous. *Syn.* CHALYB'EATE BATH; BAL'NEUM FERRUGIN'EUM, B. CHALYBEA'TUM, L. *Green sulphate of iron*, 1 to 2 *lbs.* A well-tinned copper, wooden, or japanned bath, may be used. In general debility when chalybeates are indicated, and the stomach will not bear iron; also in piles and prolapsus. The stains on the towels used to wipe the patient, may be removed by at once soaking them in water acidulated with hydrochloric acid.

2. (Ioduretted.) See BATH OF IODIDE OF IRON.

Bath, Foot. *Syn.* PEDILU'VIUM, L. Warm (or hot). Revulsive, counter-irritant; in colds, menstrual and hæmorrhoidal suppressions, rheumatism, stiffness of the ankles, tender feet, &c. A little *common salt, flour of mustard*, or *sal-ammoniac*, is often added to render it more stimulant, to prevent 'taking cold,' &c. See FEET, &c.

Bath, Gelat'inous. *Syn.* BAL'NEUM GELATINO'SUM, B. GELATI'NII, L. *Gelatine* or fine *Salisbury glue*, 3 or 4 *lbs.*; dissolved in *boiling water*, 2 *galls.*, or q. s.; and added to a warm bath. At the 'Hospital for Cutaneous Diseases' 8 *lbs.* of *patent size* is used for a bath of 30 to 35 *galls.* Emollient; formerly, but erroneously, considered nutritive. *Used* in skin diseases; generally combined with sulphur. See BARÈGES BATH.

Bath, Glyc'erin (glis'-). *Syn.* BAL'NEUM GLYCERIN'II, B. G. COMPOS'ITUM, L. *Glycerin*, 2 *lbs.*; *gum arabic* (dissolved), 1 *lb.* *Used* as a soothing emollient, in itching, dryness, irritation, and hardness of the skin, &c. Where expense is an object, 3 or 4 *lbs.* of *good honey*, and 1 *oz.* of *salt of tartar*, form an excellent substitute for the glycerin.

Bath, Hem'lock. *Syn.* BAL'NEUM CO'NII, L. 1. *Dried hemlock-leaves* (or *herb*), 4 to 6 hand-

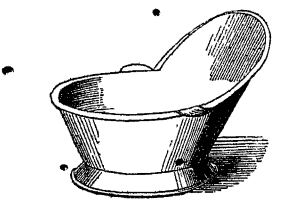
[1] Pereira, "*Mat. Med. and Therap.*," 4th ed., i, 29.

[2] "*Hist. Records of the Electro-chem. Bath*," by Mons. J. F. J. Caplin, M.D. Baillière, 1869.

fuls; *water*, 1 gall.; infuse 2 hours, and strain. The part to be immersed in, or bathed with, the warm infusion, observing not to apply it, if the skin is unsound; or it may be added to the water of a bath in the usual manner. In gout, cancer, chronic rheumatism, and certain skin diseases.

2. (Cut. Hosp.) *Extract of hemlock*, 2 oz.; *starch*, 1 lb.; *boiling water*, 1 gall.; dissolve. For a bath of about 30 *galls.* As the last.

Bath, Hip. *Syn.* COXÆLU'VIUM, L. Usually warm; sometimes fully warm, or somewhat hot. In inflammatory, spasmodic, and chronic affections of the abdominal and pelvic viscera; in suppressed and painful menstruation, hæmorrhoids, strangury, prolapsus, ischuria, &c.; also as a substitute for a full bath, when this



last is contra-indicated by some affection of the lungs, heart, brain, or great vessels. Like full baths, it may be often advantageously medicated. See BIDET.

Bath, Hot. *Syn.* BAL'NEUM CAL'IDUM, CALDA''RIUM, L.; BAIN CHAUD, Fr. Usual temperature, 98° to 106° Fahr.

The hot bath has a remarkably tranquillising effect upon the nervous system, producing a strong tendency to quietude and sleep. It also acts as a powerful antispasmodic, and by determining the blood to the surface of the body, tends to relieve visceral inflammation and congestion. In chronic affections arising from the action of cold and damp and from exhausted energy, in stiff joints, rheumatism, neuralgia, diarrhœa, and numerous other affections, its effects are often rapid and remarkable. At higher temperatures it strongly stimulates the arterial system, and arouses nervous energy and vital action, producing excessive excitement and turgescence, followed by copious perspiration, which has been often found successful in cholera, paralysis, &c. If the immersion be too long continued, or the bath be injudiciously employed, lassitude, debility, and somnolency ensue, and the good effect of the bath is more or less lost. In these cases violent throbbing and painful distension of the vessels of the head, with a distressing feeling of suffocation and anxiety, are premonitory symptoms of impending apoplexy, an accident which sometimes, though seldom, follows its improper use.

Bath, Hydrochlo''rate of Ammonia. See CHLORIDE OF AMMONIUM BATH.

Bath, Hydrochlo''ric Acid. *Syn.* MURIAT'IC ACID BATH; BAL'NEUM HYDROCHLO''RICUM, B. ACIDUM H., B. MURIAT'ICUM, &c., L. *Commercial hydrochloric acid*, 1 to 3 *lbs.* (in chronic liver affections); or 3 to 6 fl. oz. (in prurigo and lichen).

Bath, Hydrosul'phuretted. *Syn.* BAL'NEUM HYDROSULPHURE'TUM, L.—1. A *tepid sulphuretted bath* with the addition of *hydrochloric acid*, 2 or 3 fl. drs., immediately before immersion. In rheumatism, chronic skin diseases, hooping-cough, and certain forms of paralysis:—2. A tepid bath to which 3 to 6 fl. oz. of (liquid) *hydrosulphate of ammonia* is added immediately before use. *Used* as the last. It often acts almost as a specific in hooping-cough and certain breath-ailments.

Bath, I'odide of I'ron. *Syn.* BAL'NEUM FER'RI IODI'DI, L. *Prep.* (Pierquin.) *Iodide of iron*, ½ oz. to 2 oz. In amenorrhœa, leucorrhœa, chlorosis, scrofula, &c.; gradually increasing the quantity of the iodide until 4 oz., or more, is used for a bath.

Bath, I'odine. *Syn.* BAL'NEUM IODIN'II, L.:—1. *Iodine*, 3 to 5 drs.; *dry siliceous sand*, 2 oz.; triturated together until reduced to *fine powder*, and then agitated with the *water* of a *tepid bath* for 10 or 15 minutes:—2. (Cutan. Hosp.) *Iodine*, 4 drs.; *liquor of potassa*, 4 oz.; *water*, 2 pints; dissolve; for a bath of 30 *galls.* In skin diseases complicated with scrofula, glandular enlargements, amenorrhœa, &c.

Bath, Io'duretted. *Syn.* IO'DURATED BATH, I'ODISED B., COMPOUND IODINE-B., &c.; BAL'NEUM IODURE'TUM, B. IODURA'TUM*, B. POTAS''SII SUPERIODI'DI, &c., L. Lugol, the leading authority on this subject, employs this bath of the different strengths, &c., shown in the following *Tables*:—

a. For ADULTS:—

Degree.	Iodine.	Iodide of Potassium.	Water for the bath.
	dr	dr.	gal.
1	2 to 2½	4 to 5	50
2	2 „ 3	4 „ 6	60
3	3 „ 3½	6 „ 7	75

b. For CHILDREN:—

Age.	Iodine.	Iodide of Potassium.	Water.
	gr.	gr.	gal.
4 to 7	30 to 36	60 to 72	9
7 „ 11	48 „ 72	96 „ 144	18
11 „ 14	72 „ 96	144 „ 192	31

*** The dry ingredients of the first Table are to be dissolved in a pint of *water*, and of the second, in ½ pint of *water*, before adding them to the bath.

In scrofulous affections and the other cases in which the external use of iodine or the

iodides is indicated. Enamelled ware, stoneware, or wooden vessels must be employed.

Bath, Lime. *Syn.* BAL'NEUM CUM CAL'CE, L. *Lime, 3 lbs.;* slaked, and added to the bath. In gout, lithic diathesis, itch, &c. See VAPOUR BATH.

Bath, Mercu"rial. *Syn.* ANTISYPHILIT'IC BATH; BAL'NEUM MERCU'RIA'LE, B. HYDRAR'GYRI BICHLORI'DI, B. ANTISYPHILIT'ICUM, &c., L.; BAIN MERCURIEL, B. ANTISYPHILITIQUE, &c., Fr. *Bichloride of mercury,* in fine powder, 1 to 3 drs.; *hot water,* 1 pint; agitate together until solution is complete, before adding them to the bath, the 'water' of which (contained in an enamelled or wooden vessel) must be soft (rain) and pure. At the 'Cutan. Hosp.' *hydrochloric acid* (=½rd the weight of the chloride), is commonly added; and at the 'Fr. hospitals,' an equal, or rather more than an equal weight, of sal-ammoniac. These additions facilitate the solution of the chloride, and retard its decomposition by any slight impurity in the water forming the bath.

Uses, &c. In syphilitic affections, either with or without skin disease; in chronic rheumatism, swelled joints, and chronic skin diseases generally, where the use of mercury is indicated, and the remedy is rejected by the stomach; especially in these affections in women and children (for the last, proportionately reduced in strength and quantity). Also used in itch, and to destroy pediculi on the body.

Bath, Met'al. See BATH (in *Chemistry*), FUSIBLE METAL, &c.

Bath, Mud. *Syn.* BAL'NEUM LU'TEUM, B. LU'TI, L. Mud-bathing (ILLUTA'TION) was common among the ancients. The slime of rivers, and the mud on the sea-shore, were especially prized for this purpose. The Tartars and Egyptians still employ baths of this description in hypochondriasis, scrofula, and scurvy. At Franzenbad, in Germany, an acidulous species of black *bog-earth* found there, is beaten up with warm water to a semi-liquid consistence, and used as a bath. This is said to render the skin satin-like and soft; and to be useful in debility, and in paralytic affections of a gouty origin. In France, hot dung (DUNG BATH) is occasionally used in rheumatism; and in Poland, in syphilis. The husk of grapes and the refuse of olives, after undergoing a partial fermentation, have been successfully employed in France against acute rheumatism.[1]

Bath, Muriat'ic*. See HYDROCHLORIC ACID BATH.

Bath, Mus'tard. *Syn.* BAL'NEUM SINA'PIS, L.:—1. *Flour of mustard, 2 lbs.; warm water,* 1 gall.; make a thin soup; in fifteen minutes pour it into a coarse linen bag or cloth, and press out the liquid, which is to be stirred up with the bath. In cholera, diarrhœa simulating cholera, &c.; also to cause reaction; the patient remaining in the bath until a somewhat painful sense of burning and irritation is experienced:—2. *Flour of mustard,* 3 to 8 *oz.;* as before. *Used* as a gentle stimulant to excite the skin, and promote its healthy action, &c.

Bath, Ni'tro-hydrochlo"ric. *Syn.* AC'ID BATH‡ (äs'-), NITRO-MURIAT'IC B.*, N. A. B.*; BAL'NEUM NITRO-HYDROCHLO"RICUM, B, AC'IDI (äs'-), B. A. NITRO-HYDROCHLO"RICI, B. A. NITRO-MURIAT'ICI*, &c., L.:—1. *Water* slightly acidulated with the *acid,* so that its sourness to the taste is about that of common vinegar. According to Ainslie, 1 *oz.* of *acid* is sufficient for 1 gall. of *water.*[2] Other formulæ in use are—

2. (Cutan. Hosp.) *Nitric acid,* 1½ lb.; *hydrochloric acid,* 1 lb.; for a bath of 60 to 70 *galls.*

3. (Soubeiran.) *Nitro-hydrochloric acid,* 4 to 16 fl. oz.; according to the case.

4. (Dr. Scott.) *Nitric acid,* 2 fl. oz.; *hydrochloric acid,* 3 fl. oz.; *water,* 5 fl. oz.; mix. 1½ to 2 *fl. oz.* to each *gall.* of *water* for a general bath; 3 *fl. oz.* to the *gall.* for a foot, knee, or sponge bath.

Uses, &c. In its weaker forms, in skin-diseases depending on disordered liver; in others, chiefly in liver complaints, and to relieve the pain on the passing of gall-stones. It must be contained in an enamelled or wooden vessel, and may be used as a hip, knee, or foot-bath; a knee-bath being the one generally adopted in England. Dr. Scott, of Bombay, who first brought this bath into notice, once plunged the Duke of Wellington up to his chin in one, in India, and thus cured him of a severe hepatic affection. In its stronger form it causes tingling and pricking of the skin, and a peculiar taste in the mouth, and affects the gums and salivary glands, often producing plentiful ptyalism, without which, indeed, its advocates regard its action as incomplete. Time of application, 15 to 20 minutes daily, for a fortnight or three weeks; and afterwards, every second or third day.

Bath, Oak-Bark. *Syn.* BAL'NEUM QUER'CÛS B. QUER'CI, L. *Oak-bark,* 3 or 4 handfuls for a child; 10 to 15, for an adult; made into a decoction, and strained with pressure into the bath. In hæmorrhoids, prolapsus, leucorrhœa, hernia, diarrhœa, ill-conditioned and bleeding ulcerations, &c. Drs. Elaesser, Eberle, and Fletcher, have successfully employed it in the intermittents of infancy and childhood, tabes mesenterica or scrofula, &c. It has also proved useful in phthisis.

Bath, Oil. *Syn.* BAL'NEUM OLEO'SUM, L. *Olive* or other oil (hot), strongly aromatised with the *oils* of *cassia, cloves, nutmegs, cedron,* and *juniper;* and digested for a week on *ambergris* and *vanilla,* of each (bruised), about 10 grs. to the gallon. *Used,* in the East, to anoint the body, as a preservative against the plague and other contagious diseases; also as a full bath or hip-bath, the immersion being for 15 to 30 minutes.

Bath, Pneumat'ic. See AIR BATH.

Bath, Saline' (Gelatinous). *Syn.* BAL'NEUM

[1] Mérat and De Lens, "*Dict. Univ. de Mat. Méd.*"

[2] "*Mat. Med. Indica,*" ii, 340.

SALI'NO-GELATINO'SUM, L.; BAIN DE PLOMBIÈRES, Fr. *Prep. Common salt* and *Flanders glue*, of each 2 *lbs.*; *water*, 1 gall.; dissolve separately, and add the solutions to the bath. In scrofula, &c.

Bath, Salt. See SALINE BATH, SEA BATH, &c.

Bath, Sand. *Syn.* BAL'NEUM ARE'NÆ, L.; BAIN DE SABLE, Fr. See BATH (*in Chemistry*), DRY BATH, &c.

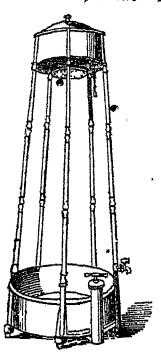
Bath, Sand. *Syn.* BAL'NEUM MARI'NUM, L.; BAIN MARIN, Fr. Immersion in the sea or in recent sea-water (temperate, tepid, warm, or hot). Owing to the saline matter which it contains, it possesses stimulant, alterative, and resolvent properties, superadded to those of pure water at the corresponding temperature. When taken, in summer, on our coasts, the reaction and glow follow more speedily and certainly than after a common water bath; and it may be taken with greater safety, and for a longer period. It often proves very serviceable in diseases accompanied with debility, in phthisis, scrofula, glandular enlargement, &c. A warm or hot sea-water bath is one of the most restorative imaginable; often removing the effects of fatigue and exposure — exhaustion, stiff joints, cramps, rheumatism, &c. —like a charm. See BATH (*above*), WATERS, &c.

Bath, Sea (Factitious). *Syn.* BAL'NEUM MARI'NUM FACTI''TIUM, L. Artificial sea-water, or rather a substitute for sea-water, for this purpose, is commonly prepared by adding about 3½ of *common salt* to ordinary *water*.[1] The following are, however, more serviceable imitations:—

1. As above, with the addition of 1 dr. of *iodide of potassium* to every 3 or 4 galls. of *water*.

2 (Cutan. Hosp.). *Common salt*, 8 lbs.; *sulphate of magnesia*, 2 lbs.; *chloride of calcium*, 1 lb.; *water*, 50 to 60 galls.

3. *Salt*, a *handful*; *water*, a *pailful*; *flour of mustard*, 1 *oz.* For a foot-bath.



Bath, Show'er. *Syn.* IMPLU''VIUM, BAL'NEUM PENSILE, &c., L.; DOUCHE, Fr. Similar in its effects to the cold bath or plunge-bath; but without many of its advantages. It is less alarming to nervous persons, and less liable to produce cramp, than immersion in cold water; whilst the reaction or glow follows more speedily and certainly. It is considered the best and safest mode of cold bathing, and is often highly serviceable in nervous affections. A good plan is to allow the water to remain in the bedroom all night, by which any undue degree of coldness is removed. Tepid water may be commenced with; and at first, in extreme cases, the patient may stand in hot or warm water at the time of taking the bath. The reaction following its use is greatly promoted by friction of the surface with dry rough towels.

Bath, Soap. *Syn.* BAL'NEUM SAPO'NIS, L. *White soap*, 2 to 3 *lbs.*; *water*, 3 quarts; dissolve by heat, and add it to a warm bath. Detergent, lubricating, and discutient; in itch and other skin diseases, &c.

Bath, Spon''ging (spŭnje'-). This title explains itself. In the sponging bath exercise and ablution are combined, and its employment by persons of sedentary habit is highly advantageous.

Bath, Sulphur. *Syn.* BAL'NEUM SUL'PHURIS, L. 1. *Flowers of sulphur*, ½ to 1 *lb.*; *water*, a pailful; mix, agitate occasionally for 12 to 24 hours, and then add the whole to an ordinary bath. Useful in various mild, but obstinate, skin diseases. Its occasional employment, even in health, seldom fails to render the skin soft, smooth, and delicate. Soap may be used with it.

2. (Compound; B. S. COMPOS'ITUM, L.)—*a.* (Cutan. Hosp.) *Precipitated sulphur*, 2 lbs.; *hyposulphite of soda*, ½ lb.; *water*, 1 gall.; dissolve, and add of *sulphuric acid*, 1 dr. One pint to every 30 *galls.* of *water*. In various skin diseases (see *below*).

b. See SULPHURETTED BATH.

Bath, Sul'phurous. *Syn.* SUL'PHUROUS ACID BATH; BAL'NEUM SULPHURO'SUM, B. SUL'PHURIS‡, L. From *sulphur*, ½ *oz.*, sprinkled on a *hot plate* placed under or near the patient; the proper *precautions* being taken as directed under CHLORINE BATH. In itch, lepra, psoriasis, &c. Cleanly, but seldom used, chiefly on account of the number of baths required to prove serviceable. See SULPHURETTED BATH.

Bath, Sul'phuretted. *Syn.* BAL'NEUM SULPHURE'TUM, B. SULPHURA'TUM, B. SULPHU''REUM, &c., L.; BAIN SULFURÉ, &c., Fr. 1. *Sulphurated potash*, 1 oz.; for every 10 or 12 *galls.* of *water* employed. Sometimes *sulphurated soda*, or (in the Ger. hosp.) *sulphurated lime*, is the sulphur-salt employed. ½ dr. of *sulphuric acid* is also occasionally added to the bath; but this increases its fœtor, without adding much, if anything, to its curative power; whilst, without care, the evolved gas may impede respiration.

2. (Gelatinous; GELAT'INO-SUL'PHUROUS B.; B. S. GELATINO'SUM, L.). *Flanders glue*, 1½ to 2 *lbs.*; dissolved and added to a 'sulphuretted bath.' Recommended, by Dupuytren, as a substitute for the 'Barèges bath.'

Obs. The sulphur or sulphuretted bath, under any of its forms, is a powerful remedy in almost every description of skin disease. *Leprosy*, the most obstinate of all, has been

[1] Or (say) for small quantities—
1½ *oz.* to the quart;
5 *oz.* to the gallon.
And for large quantities, as a full bath—
2 *lbs.* to every 7 gallons.

completely cured by it; the *common itch* requires only one or two applications to eradicate it entirely; all the *scurfy* and *moist skin-affections, local irritation, pimples, inflammatory patches*, &c., speedily yield to its influence; *scrofula*, and, indeed, *all* those affections in which the warm or vapour bath is serviceable, also derive powerful assistance from the sulphur bath.

Bath, Tem'perate. *Syn.* BAL'NEUM TEMPERA'TUS*, L.

Bath, Tep'id. *Syn.* BAL'NEUM TEP'IDUM, B. EGEL'IDUM, TEPIDA''RIUM, L.; BAIN TIÈDE, &c., Fr. Approaches the warm bath in its hygiènic and medical properties; and is, perhaps, the one best adapted for the mere purposes of personal cleanliness. In the spacious public tepid baths of London, swimming may be safely indulged in, even in cold weather.

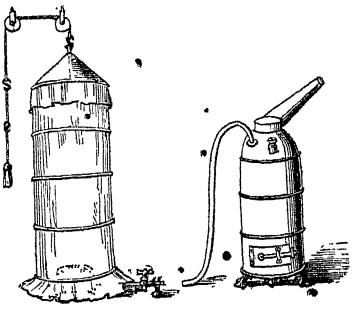
Bath, Tum'ble. An obsolete form of the shower bath.

Bath, Turk'ish. *Syn.* BAL'NEUM TUR'CICUM, L. A hot vapour bath or sweating bath, with massing or shampooing, ending with a warm bath or warm ablutions and friction. The EGYPTIAN, PERSIAN, and RUSSIAN BATHS, are essentially similar. In the ANGLO-TURKISH BATH, recently introduced to this country, hot dry air wholly takes the place of vapour. See AIR BATH (*antè*).

Bath, Turpentine. *Syn.* BAL'NEUM TEREBINTHINA'TUM, L. *Prep.* (Dr. T. Smith.) *Camphine* (rectified oil of turpentine), ¼ to ½ pint; *Scotch soda*, 2 lbs.; *oil of rosemary*, ½ dr.; for an adult. It calms the pulse, softens the skin, and renders the perspiration freer.

Bath, Va'pour. *Syn.* DEW'-BATH*; BAL'NEUM VA'PORIS, B. RO''RIS†, AS'SA SUDA'TIO, A. VAPORA'TIO, VAPORA''RIUM*, L.; BAIN DE VAPEURS, Fr. The vapour of hot water, either pure or medicated.

The simplest form of vapour bath is, perhaps, produced by placing some wet cloths, or sprinkling a little water, on two or three heated bricks, laid under a chair on which the patient is seated; both the patient and whole apparatus being covered with a sheet, or blanket, or, better still, a spacious waterproof cloak, to keep in the heated vapour. A large lump of quick-lime, set in a pan or an old iron pot and sprinkled with a little water, or else wrapped up in a thick coarse towel which has been previously soaked in water, may be substituted for the hot bricks; and often advantageously so. The slaking of the lime, and the consequent evolution of vapour, may be kept up or renewed, when necessary, by sprinkling on a little more water. This forms the "POOR MAN'S VAPOUR BATH" of the French. Dr. Serres has suggested, as something apparently orginal, that—a lump of quick-lime, wrapped in a wet cloth, and covered with a dry one, be placed on each side of the patient;[1] and the whole being covered up, allowed to remain until copious perspiration is established. It must, however, be recollected, that by none of these minor contrivances, can the temperature of the vapour, and its supply, be regulated, as in a perfect bath, even a portable one, such as is shown in the *engraving*.



The following are the temperatures, &c., of this bath:[2]—

	Temperature of Vapour, Fahr.	
	Breathed.	Not breathed.
Tepid vapour bath	90° to 100°	96° to 106°
Warm „	100 „ 110	106 „ 120
Hot „	110 „ 130	120 „ 160

Uses, &c. It is one of the most powerful diaphoretics known, and is almost specific in nearly all those cases wherein warm or hot bathing proves advantageous. It is one of the most certain agents existing in cases of chronic rheumatism, contracted muscles and tendons, stiffness of joints, indurations, dysentery, diarrhœa, suppressions, &c. Instances are numerous, in which the lame have thrown aside their crutches, and the bedridden have again mixed with the world, after a few applications of this bath. It is no uncommon thing to hear a patient start and shriek with agony before entering the bath, and to receive his congratulations and thanks on his coming out. They often exclaim—"It is wonderful. I could not have believed it!"[3]

Bath, Warm. *Syn.* BAL'NEUM CAL'IDUM, B. CALID'ULUM, B. THERMA'LE, THERM'A, &c., L., BAIN THERMAL, B. CHAUD, &c., Fr. A bath at a temperature equal, or nearly equal, to that of the human body.

The sensations attendant upon immersion in a warm bath are most delicious. Its first effect is to increase the circulation of the blood, and to determine it to the skin. After a few minutes an agreeable and universal increase of heat is experienced; the face and head are

[1] "In bed" (!) says the Dr.; but surely one who could only afford such a bath, would find it difficult to obtain a fresh, dry bed; whilst it would be equally improper for him to lie in a wet or damp one.

[2] The temperatures of baths given here, and previously, are those now generally adopted in the profession. See Dr. Forbes's "*Cycl. of Prac. Med.*," v. i, 265; Pereira's "*Mat. Med.*," i, 17; &c.

[3] Culverwell "*On Baths and Bathing.*"

generally soon bedewed with perspiration; a pleasing and prevailing calm, both mental and physical, follows; and after remaining in it some 12 or 15 minutes the effect is of the most refreshing and happy character.

The idea that the warm bath is relaxing, is erroneous. It is only so where persons remain in it too long, or take it too frequently. Nor are those who indulge in it more liable to take cold than others. On the contrary—they are less liable, unless they wilfully expose themselves, insufficiently clad (particularly about the neck and chest), to draughts of cold air.[1]

As a remedial agent, the warm bath is adapted to general torpor of the system, liver and bowel complaints, hypochondriasis, hysterical affections, morbid suppressions, dryness of the skin, nearly all cutaneous and nervous diseases, chronic rheumatism, &c. As a tonic or stimulant after excessive fatigue, great mental excitement, or physical exertion, it is unequalled, and furnishes one of the most wholesome, and at the same time luxurious sources of refreshment we are acquainted with. "To those who are past the meridian of life, who have dry skins, and begin to be emaciated, the warm bath for half an hour, twice a week, I believe to be eminently serviceable in retarding the advances of age." (Darwin.) The healthy longevity of the late Duke of Wellington, after a period of exposure and trials equal to the entire life of many individuals, has been by some, and we think correctly, mainly attributed to the free and constant use of the warm bath. See BATH (*antè*), &c.

Bath, Wa'ter. *Syn.* BAL'NEUM A'QUÆ, B. AQUO'SUM, B. MA''RIÆ, B. MA''RIS, L.; BAIN-MARIE, Fr. A water bath; in *chemistry* and *cookery*, applied to a bath of *hot* or *boiling water*. See BATH (in *chemistry*), BAIN-MARIE, &c.

BATH'ING (bā*th*e'-). See BATH.

BATH METAL. A species of brass having the following composition:—

1. *Zinc*, 3 parts; *copper*, 16 parts; melted together under charcoal.

2. *Fine brass*, 32 parts; *spelter*, 9 parts; See BRASS and ALLOYS.

BATH PIPE. See PIPE.

BATHS and WASH'-HOUSES. See BATH.

BATTER. Ingredients beaten together so as to form a semi-fluid mass. In *cookery*, a semi-fluid paste, which becomes hard in dressing, formed of flour, and milk or water, or a mixture of them, enriched and flavoured with eggs, butter, and (frequently) spices, currants, &c., at will. *Used* for frying vegetables, fillets, &c., and as a material for fritters and pancakes; also to form puddings, which are either baked alone, or under meat; and to cover various articles during the operation of cooking them. Miss Acton gives the following formulæ:—1. (For the Frying-pan.) *Butter*, 2 *oz.*; *boiling water*, (nearly) ¼ pint; mix, and stir in, gradually, of *cold water*, ½ pint; when quite smooth, mix it by degrees, very smoothly with fine dry *flour*, ¾ *lb.*; adding (for fruit) a small pinch of *salt* (but more for meat or vegetables); just before use, stir in the *whites* of two *eggs* (or the *white* and *yelk* of one—and fry until light and crisp. In humble cookery, the eggs may be omitted.

2. (For Puddings.) *Eggs* (yelk and white), about 4 in no.; *flour*, ½ *lb.*; *milk*, q. s.

Obs. When *fruit*, &c., are added, the batter must be made thicker than when none is used, to prevent it sinking. When sufficiently dressed it should cut smoothly and not stick to the knife. Eggs increase its firmness.

BATT'ERY. In *frictional electricity*, a series of Leyden jars so arranged as to admit of being charged and discharged together. See ELECTRICITY, &c.

Battery. In *electro-chemistry*, *galvanism*, &c., a pair, or series of pairs, of 'excited' metallic plates, so arranged as to act in unison, producing an electrical current by chemical decomposition.

Baume Nerval. See OINTMENTS.

BAUMÉ (Baumé). See AREOMETER.

BAY. See SWEET BAY.

BDEL'LIUM (dĕl'-yŭm). The commercial name of two gum-resins:—

Bdellium Af'rican. *Syn.* BDELLIUM AFRICA'NUM, L. From the *heudola'tia africa'na* (Guillem.), a terebinthaceous tree, of Senegal.

Bdellium In'dian. *Syn.* IN'DIAN MYRRH, FALSE M.; BDELLIUM (of *Scripture*); BDELLIUM IN'DICUM, L. From *am'yris commiph'ora* (Roxb.), or *balsamoden'dron Roxbur'gii*, a terebinthaceous tree of India.

Prop., &c. Once considered slightly deobstruent; sometimes used as a pectoral and emmenagogue, and, externally, as a stimulant and suppurative. It is now seldom met with in this country.

BDELLOM'ETER (dĕl-). *Syn.* MECHAN'ICAL LEECH; BDELLOM'ETRUM, L.; BDELLOMÈTRE, Fr. In *surgery*, a contrivance combining the principle of the cupping-glass, scarificator, and exhausting-syringe, in one small instrument.

BEAD (bēde). *Syn.* GLOB'ULUS, SPHÆR'ULA, &c., L.; GRAIN (de collier), &c., Fr.; BETHE, PERLE, &c., Ger. A little ball or spheroid pierced for stringing; any very small globular body‡; a bubble (‡ *or* tech.). A number of the first mounted on a thread or ribbon form a '*string of beads*' or 'chaplet.'

Materials, Manuf., &c. Beads are often formed of coral, gems, jet, pearls, porcelain, rock-crystal, &c.; but much more frequently of white and coloured glass. The mode in which these last are produced is as follows:—*Glass tubes*, appropriately ornamented by co-

[1] We have been for many years accustomed to take baths at 98° to 100° Fahr., in *all* weathers and seasons, even during our severest winters, and on leaving the bath have often been engaged, for hours, moving about in the open air, even until midnight, without 'catching cold,' or the slightest inconvenience. However, we do not recommend others to follow our practice without due care.

lour, reticulation, &c., are drawn out in various sizes, and from 100 to 200 feet in length. These tubes are cut into two-feet lengths, and then, by means of a steel knife, divided into pieces having, as nearly as possible, the same length as diameter. The resulting small fragments or cylinders are next well stirred with a mixture of sand and wood-ashes, in order to prevent the closure of the perforations and their adhering together during the subsequent part of the process. They are then placed in a revolving cylinder and gradually heated until they become sufficiently spherical. They are next sifted from the sand and ashes, sorted into sizes, first by means of sieves, and afterwards by hand, and are lastly, either put up in weighed parcels or strung by women and children for the market.

The manufacture of *coral, gems, jet,* and *minerals* generally, into *beads,* belongs to the lapidary.

Uses. Chiefly to form *necklaces, bracelets,* and other articles of personal ornament; by *milliners,* to decorate head-dresses, &c.; and for other like purposes. They are also employed among Catholic and Mohammedan nations for devotional purposes; and among savage tribes in lieu of money. They are still sometimes worn as amulets. See BUGLE, CORAL, GLASS, PASTE, PEARLS, &c. (also *below*).

Beads, Jum'ble (bēdz). The *dried seeds* of *a'brus precatōr'ius* (Linn.) or Jamaica wild liquorice. Hard and indigestible; accounted cephalic and ophthalmic by the vulgar.

Beads, Lo'vi's. *Syn.* SPECIF'IC-GRAV'ITY BEADS. Small 'hollow spheres of glass' carefully adjusted and numbered, in sets, intended to supersede the hydrometer in determining the density of fluids. They are used by dropping them into the liquid, in succession, until one is found that exhibits indifference as to buoyancy, and will float under the surface at any point at which it may be placed. The number on this ball indicates, in thousandths, the sp. gr. sought. They are particularly serviceable in the hurry of the commercial laboratory, and have the advantage of being applicable to very small quantities of liquid; but their use, of course, requires the same precautions, and the results obtained the same corrections for deviations from the normal temperature, as with other instruments. See HYDROMETER, SPECIFIC GRAVITY, &c.

Bead. *Syn.* BEAD'ING‡. In *architecture, cabinet-work,* &c., any small moulding or continued projection of which the vertical section is semicircular.

Bead (of Liquors). [Tech.] The small bright iridescent bubbles, possessing some slight degree of permanence, which form on the surface of alcoholic liquors of sufficient strength, when agitated. See ALCOHOLOMETRY, PROOF, &c. (also *below*).

BEAD'ING. In the *liquor-trade,* anything added to commercial spirits to cause them to carry a 'bead' and to hang in pearly drops about the sides of the glass or bottle when poured out or shaken. The popular notion being that spirit is strong in proportion as it 'beads,' the object is to impart this property to weak spirit, so that it may appear, to the eye, to be of the proper strength. Various formulæ are current among the 'knowing ones' of the trade, most of which are unscientific, and many of them absolutely ineffective. The following are those now usually employed:—

Prep. 1. *Oil of sweet almonds* and *oil of vitriol,* of each, 1 *oz.*; rub them together in a glass, porcelain, or wedgewood-ware mortar or basin, adding, by degrees, of *crushed lump-sugar,* 2 *oz.*; continue the trituration until the mixture becomes pasty, then add, gradually, sufficient *rectified spirit* (strongest) to render the whole perfectly liquid; pour it into a quart bottle, and wash out the mortar twice, or oftener, with a little fresh spirit, until about 1 pint of *rectified spirit* has been employed, adding the washings each time to the bottle; lastly, cautiously shake the bottle (loosely corked) until admixture appears complete, and then set it aside in a cool place. For use, this compound (after agitation) is thrown into a two-gallon can or measure, which is then filled, from a tap, with the spirit to be 'beaded,' when the whole is thrown into the cask, and the measure washed out by refilling it and returning it two or three times; after which the contents of the cask are well 'rummaged up.' *Gin* is usually 'fined' a few hours afterwards; but it is better not to add the 'finings' for two or three days. *Other spirits* are allowed to become 'fine' by simple repose.—According to Mr. Hartley, and others, this quantity is "sufficient for 100 *galls.* of any spirit;" but it is more commonly used for a puncheon of 80 to 85 gallons.

2. *Oil of vitriol,* 2 to 3 *oz.*; *rectified spirit* (strongest), 1 pint; cautiously agitate them together in a loosely corked quart bottle; in 2 or 3 hours add another pint of *rectified spirit,* and again agitate. It will be fit for *use* in a week; as before.

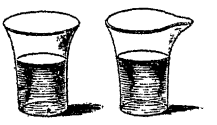
3. *Sulphuric ether,* ½ *lb.*; strongest *rectified spirit,* 1 quart; mix. May be used at once, as before; but if otherwise, should be kept, like the last, closely corked, and in a cool place.

4. *Soapwort-root* (saponaria officinalis), bruised or rasped small, 1 *lb.*; *rectified spirit* and *water,* of each, ½ *gal.*; macerate in a corked jar, with occasional agitation, for 8 or 10 days, strain with pressure, and, after a few days' repose, decant the clear portion. *Used* as before.

Obs. The above are not injurious when employed for 'beading,' since the quantity employed is much too small to injure the wholesomeness of the liquor. The fraud consists in their being used to disguise the presence of 10 to 12½ of water, which is thus sold at the price of spirit. Beyond a certain degree of dilution they fail, however, to produce the intended

effect, the bubbles becoming 'soapy,' and without the requisite permanence. The addition of a little powdered *white sugar* (½ *oz.* to 1½ *oz.* per *gal.*) increases the efficacy of all of them. This may be dissolved in the water, *if* any is added at the time; but its effect on the hydrometer must be recollected. See ALCOHOLOMETRY, GIN, SPIRIT (Management of), &c.

BEAK'ER (bēke'-). *Syn.* BEAK'ER-GLASS. In *chemistry*, a beaked cup or glass, more or less of the tumbler-pattern, used to collect precipitates and to heat liquids in.



BEAL (bēle). *Syn.* BOUTON, PUSTULE, Fr. A pimple or pustule; a small inflamed tumour.

BEAM (bēme). See BALANCE, SCALES, &c.

BEAM'-TREE. *Syn.* WHITE BEAM-TREE. The '*pyrus aria*' or wild pear. *Wood*, hard, compact, and tough; used for axle-trees, naves and cogs of wheels, &c.

BEAN (bēne). [Sax., Eng.] *Syn.* FA'BA, L.; FÈVE, Fr.; BOHNE, Ger. The general name of leguminous seeds, as also of the plants which produce them; appr., *fa'ba vulgā'ris* (Mönch.; *vi''cia faba*, Linn.) or common GAR'DEN-BEAN,[1] *phase'olus multiflōr'us* (Willd.) or SCARLET-RUNN'ER,[2] and *ph. vulgaris* (Sav.), FRENCH BEAN, KID'NEY-B., or HAR'ICOT (-ko),[3] with their varieties, all of which are annuals cultivated in our gardens—the first, chiefly for its seeds—the others, both for their green pods and ripe seed. The name is also often popularly applied, as an appellative, to the fruit or seeds of other plants which, in size and appearance, resemble common beans, as noticed below.

Those principally cultivated in our gardens are the SMALL LIS'BON, SAND'WICH, SPAN'ISH, TOKAY', WIND'SOR, and MAZ'AGAN (from north Africa), with almost innumerable sub-varieties of each. The exquisite perfume of beans in blossom is referred to by the poet Thomson:—

> "Arabia cannot boast a sweeter gale."

Preparations including their fragrant principle are highly prized in modern perfumery.

Qual., &c. The pods eaten in the green state, properly dressed, are regarded as anti-scorbutic and wholesome; but are apt to produce flatulence, unless combined with spices. In the dried or ripe state they are rather difficult of digestion, and very apt to distend the stomach and intestines with wind. This objection does not exist, to the same extent, to their use in the form of flour or meal. The amount of nutritious nitrogenous matter in beans rather exceeds that in wheat, and independently of a disposition to produce constipation in some habits, and being rather less easy of digestion, they must be considered nearly as wholesome as that cereal. The London millers and bakers use immense quantities of bean flour to adulterate their flour and bread.

Green beans (pods or legumes) are COOKED by simply throwing them into boiling water, and simmering them until quite tender; a 'pinch' of *salt of tartar*, or a little *common salt*, being usually added to preserve their green colour. Young and small ones take from 12 to 18 minutes—large or older ones, longer. The first are merely 'topped and tailed' with a knife, before being dressed; the others require also the side 'strings' to be drawn off, and to be cut obliquely into pieces of a lozenge form, or else to be split lengthwise into strips, and then divided once across. Old ones never boil tender. *Windsor beans*, and other 'shelled beans,' take 15 to 30 minutes according to age. These last are sometimes skinned after being dressed. All of them are commonly 'served up,' or eaten, with melted butter. See LÆGUMINOSÆ, PULSE, &c. (also *below*).

Bean, Algaro'ba. See ALGAROBA.

Bean, Earth. American earth-nut.

Bean, French; *Horse-bean*; *Kidney-bean*, &c. See BEAN (*antè*).

Composition. (Einhof.)

	Kidney beans.	Field beans.
Water	23·0	15·6
Albumenoid bodies	23·6	11·7
Starch, sugar, gum, &c.	44·7	58·3
Oil and fat	0·7	2·
Husk	7·0	10·0
Salts (ash)	1·0	4·4
	100·	100·

Bean, St. Ignatius's. The poisonous seed of the fruit of *Igna'tia amār'a* (Linn.; *strÿch'nos Igna'tii*, Berg.), a tree indigenous to the Philippine Islands.—*Prop., Uses, &c.* Similar to those of nux vomica. Contains strychnia (which *see*).

BEAR (bare). *Syn.* UR'SUS, L.; OURS, Fr.; BÄR, Ger.; BERA, Sax. In *zoology*, a Cuvierian genus of the 'plantigrade carnivora,' of several species, found both in the Old and New World. Those generally known under the name are omnivorous or frugivorous. The skin of the American black bear (*ursus Americā'nus*, Pallas) was formerly highly prized, and fetched an extravagant price. The brown bear (*u. arc'tos*, Linn.) supplies

[1] Var. β, HORSE'-BEAN (*fa'ba equi'na, f. mi'nor*, &c., L.).

[2] Var. α, *phase'olus coccin'eus* (red-flowered):—β, *ph. albiflōr'us* (white-flowered).

[3] Var. α, *ph. unic'olor* (seeds of one colour):—β, *ph. fascia'tus* (seeds striped) or ZE'BRA-STRIPED BEAN:—γ, *ph. variega'tus* or SPECK'LED BEAN:—δ, *ph. na'nus* or DWARF'-BEAN.

the Kamschatkans, and some other northern races, with many of the necessaries, and even the comforts of life. The fat or grease (BEAR'S GREASE; AD'EPS UR'SI, L.) of all the common species has long been highly esteemed for promoting the growth of the human hair; but apparently without sufficient reason. The mass of that sold under the name in England is simply hog's lard or veal fat, or a mixture of them, variously scented and slightly coloured. The quantity annually consumed in Great Britain, and exported, is estimated at many tons; being a larger quantity than all the bears at present procurable in Europe would supply, if slaughtered and stripped of their fat.

BEAR'BERRY, Bear's Bil'berry, &c. See UVA URSI.

BEAR'S GREASE. See BEAR (*above*), HAIR COSMETICS, MARROW, POMMADES, &c.

BEARD (bēerd). [Sax., Eng.] *Syn.* BAR'BA, L.; BARBE, Fr.; BART, Ger., Dan.; BAARD, Dut. The hair of the lips and chin; but *appr.*, only the last—that on each lip being distinguished, in toilet-nomenclature, by a separate name. In popular *botany* and *zoology*, any beard-like appendage; the 'awn' of corn or grass; the 'gills' or breathing organs of oysters and other bivalves, &c.

BEARD'ED. *Syn.* BARBA'TUS, L.; BARBU, Fr.; BARTIG, Ger. In *anatomy*, *botany*, and *zoology*, having a beard, or a beard-like appendage; prickly, barbed, jagged; awned.

BEA'VER (bē'-) *Syn.* CAS'TOR, L.; CASTOR, BIÈVRE, Fr.; BIBER, Ger. The *fi'ber cas'tor* (Linn.), an animal belonging to the *rodentia* of Cuvier, and remarkable for the great ingenuity which it exercises in the construction of its lodges or habitations. *Hab.* Europe and America. Those of the former are burrowers; those of the latter, builders. The fur has long been employed in the manufacture of the best quality of hats (BEAVER HATS). The fat was officinal in the Ph. L. 1618. *Castor* (CASTO''REUM) is obtained from this animal.

BE'BEERINE (bēbe'-ĕr-in‡). $C_{19}H_{21}NO_3$. [Eng., Fr.] *Syn.* BI'BIRINE (bē'-bĕr-in); BEBEERI'NA, BIBIRI'NA, &c., L. A peculiar alkaloid, discovered by Dr. Rodie, in the bark and seeds of the beeberu, bibiri, or green-heart tree (*nectan'dra Rodiæ'i*, Schomb.), of British Guiana; and since minutely examined by Maclagan and Tilley, and by Von Planta.

Prep. 1. That of commerce, which generally contains some sipirine (— ? altered bebeerine), and a little lime, is generally first obtained in the form of sulphate, by a process analogous to that employed in the preparation of sulphate of quinine; and from this salt it is precipitated by the addition of ammonia or an alkali.

2. (Pure.) By precipitating the sulphate with ammonia, washing the precipitate with very cold water, and triturating it, whilst still moist, with fresh hydrated oxide of lead: next drying the mixture by a gentle heat, exhausting the residuum with alcohol, distilling off the alcohol, and treating the last residuum with ether; the ethereal solution on evaporation leaves pure bebeerine, under the form of a white or yellowish-white, resinous-looking substance, which is pure white when powdered.

Prop., &c. Amorphous; uncrystallisable; non-volatile; bitter-tasted; inodorous; unalterable in the air; very slightly soluble in water; very soluble in alcohol; less so in ether; reaction, alkaline; when quite pure, melts at 355° Fahr., and on cooling forms a vitreous or semi-vitreous mass (Winckler); at a higher temperature it suffers decomposition; ignited on platinum-foil, it burns without leaving any carbonaceous residue; neutralises acids forming uncrystallisable salts, most of which are soluble in water.—*Prod.* From the *bark*, 1·5 to 1·75%; *dried seed*, 2·5% (nearly).

Use, &c. Bebeeru-bark has been proposed and occasionally employed as a substitute for cinchona bark, and bebeerine for quinine, in the usual cases; but whether as a tonic, febrifuge, or antiperiodic, they appear less powerful and certain than these last.—*Dose.* 2 to 12 grs. or more. (See *below*.)

Sul'phates of Bebeerine. Of these there are two, both of which are obtained in a similar manner to the Ph. E. formula for sulphate of quinine, and merely differ in the amount of acid finally left in combination with the alkali:—

1. **Sulphate.** *Syn.* NEU'TRAL SULPHATE OF BEBEERINE; BIBIRI'NÆ SUL'PHAS, &c., L. Easily soluble in water. Contains 86·4% of *bebeerine*, and 13·6% of *sulphuric acid*.

2. **Subsul'phate.** *Syn.* BAS'IC SULPHATE OF BEBEERINE, DISUL'PHATE OF B.; BIBERI'NÆ SUBSUL'PHAS, &c., L. Soluble in alcohol; sparingly soluble in water unless acidulated. Contains 90·8% of bebeerine, and 9·2% of sulphuric acid. This is the sulphate of bebeerine of commerce, and the one usually employed in medicine. It is generally met with in thin brownish-yellow scales, which are formed in a similar manner to those of ammoniocitrate of iron.—*Dose.* As a tonic, 1 to 3 grs.; as a febrifuge or antiperiodic, 5 to 20 grs.; in similar cases to those in which disulphate of quinine is employed.

BECH'AMEL (bĕsh'-ă-mĕl‡[1]). *Syn.* BÉCHAMEL, Fr. In *French cookery*, a fine white sauce, essentially consisting of concentrated veal gravy or veal consommé and cream, with or without flavouring. See SAUCES.

BE'CHIC* (-kĭk). *Syn.* BE'CHOUS†; BE'CHICUS (bĕk'-‡), L.; BÉCHIQUE, Fr.; HUSTEND, &c., Ger. In *medicine*, &c., of or for a cough; pectoral; also *subst.*, applied to remedies (BE'CHICS; BE'CHICA, L.) used to relieve cough.

BED. [Eng., D., Sax.] *Syn.* LIT, COUCHE,

[1] Thus an English

Fr.; BETT, &c., Ger.; CUBI'LE, LEC'TUS, LEC'TULUS, GRABA'TUS, &c., L. A couch; that in or on which we sleep; that on which anything is generated, deposited, or rests.

[On the connection of BEDS and BEDDING with comfort and health, see COTION, DAMP, FEATHERS, LINEN, SLEEP, VENTILATION, VERMIN, &c.; also *below*.]

Bed, Air. *Beds, pillows, cushions*, &c., when properly constructed and inflated with *air*, are clean, luxurious, and healthy substitutes for those in common use. For this purpose the air-proof part should be formed of separate cells or tubes, arranged in ridges (see *engr.*), or in any similar manner to admit of

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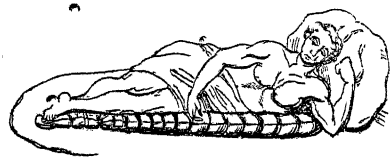

free ventilation; and in the case of beds, or of cushions for the sick, two or three folds of flannel or blanket, or of any loose porous fabric, should be placed between them and the under sheet or the person of the sleeper or patient. Without this precaution, discomfort and restlessness, excessive warmth and perspiration, and even bed-sores, are apt to follow their use by invalids, when badly constructed. To obviate these objections to articles of this class commonly sold, a new one has been produced under the name of the 'INCOM'PARABLE BED (Aycbourn's Patent), which is thoroughly applicable to all purposes —domestic, medical, naval, or military—and

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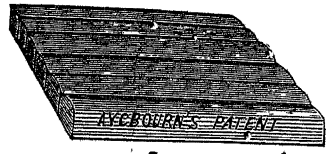


(Closed.)

superior to any feather, flock, or spring bed, however good or carefully made up. This bed consists of an outer case made of ordinary bed-ticking divided internally into numerous separate cells, into each of which is placed a suitably constructed bag, which may be either wholly or partially filled with *air* or *water*; the latter either hot or cold. (See *engr.* 2, 3.) It is incapable of bursting, and is very agreeable to lie on. It retains its shape, saves the time, trouble, and wear and tear ordinarily bestowed or produced by servants in daily tossing about one of down or feathers, is easily washed and kept clean, allows all the ventilation essential to health, and is so portable that it may be easily packed in a carpet-bag. In almost an instant it may be converted into six, or more, separate life-preservers; and what is equally important, it will stand any climate. Hitherto the use of air-beds and water-beds has been almost exclusively confined to the upper and wealthy classes, and to hospital practice; but the moderate prices[1] at which Aycbourn's beds, cushions, &c., are sold, place these luxuries, and in many cases—absolute necessities—within the reach of the masses of the people.

Bed, Water. *Water-beds, cushions*, &c., are chiefly employed for patients labouring under bed-sores, paralysis, spinal affections, &c., or who are the subjects of active surgical treatment in which equable support for the body or a limb is absolutely necessary. Their construction and use are similar to those previously noticed, except that, instead of being inflated with air, they are filled with water, either warm or tepid. For the bedridden and for long-continued use generally, they are much inferior to air-beds. See AIR-BED (*above*).

Bed. *Syn.* STRA'TUM, L.; STRATE, &c., Fr.; SCHICHT, &c., Ger. In *geology*, a mineral layer, seam, or stratum, thick or thin.

Bed. In *horticulture*, a small plot of land, usually raised a little above the general surface, in which flowers, or other plants, are raised or grown.

BED'EGUAR (-e-gahr). *Syn.* BÉDÉGUAR (*or* -GAR), Fr. Sweet-briar sponge (which *see*).

BEE (bē). *Syn.* HIVE-BEE, HON'EY-B. (hŭn'-), DOMES'TIC B.; A'PIS, L.; ABEILLE, A. MELLIFIQUE, &c., Fr.; BIENE, HONIGBIENE, &c., Ger. The *a'pis mellif'ica* (Linn.; Ph. L., E., & D.), one of the hymenop'tera best known and most useful to man.

[Those desirous of studying the *habits* and *economy* of *bees* are referred to the works of Huber and Latreille; and for their *management* to Mr. Cobbett's little book on the subject.] See APIARY, APIS, HIVE, HONEY, WAX, &c.

BEE'-BREAD. The pollen of flowers collected by bees as food for their young.

BEE'-GLUE. *Syn.* PROP'OLIS, L., Fr. The resinous matter with which bees cement the combs to the hives, and close up and repair the cells.

BEECH (bēche). *Syn.* BEECH'-TREE; FA'GUS, L.; HÊTRE, H. COMMUN, Fr.; BUCHE, GEMEINE B., Ger. The *fa'gus sylvat'ica* (Linn.), a magnificent English forest-tree, of the *nat.*

[1] These are *less* than those of feather beds of corresponding dimensions.

ord. Amentaceæ (DC.). *Fruit* (BEECH'-MAST, B.-NUTS), used to feed swine, and, sometimes, in obstinate headaches, and in gravel-complaints; yields oil by expression; inner bark, occasionally used in hectic fevers. Wood (BEECH, B.-WOOD), handsome and very hard, but brittle and perishable, and particularly liable to become worm-eaten; its durability is increased by steeping it, when fresh-hewn, for some time in water; chiefly *used* by cabinet-makers, coach-builders, millwrights, and turners; and, sometimes, by coopers; also burnt for charcoal.

BEEF (bēfe). *Syn.* CHAIRE DE BŒUF, DU BŒUF, Fr.; RINDFLEISCH, &c., Ger.; BU'BULA, CA''RO BO'VIS, &c., L. The flesh of bovine animals generally; but *appr.*, only that of the domestic ox, cow, or bull.

Qual. Good beef is highly wholesome and nutritious; and is well adapted to persons of good appetite, or that labour or take much exercise. For the delicate, especially those labouring under debility, partial anæmia, amenorrhœa, and similar ailments, it is, perhaps, superior to every other kind of animal food. If cooked so as to be left full of gravy, it sits lightly on the stomach, and its fat proves even more digestible than that of either veal or mutton.

Choice. OX-BEEF is known by having a fine smooth, open grain, a lively and agreeable red colour, and a tender texture, with the fat of a pleasing pale whitish-yellow or but slightly yellow, and the suet white and hard. When fine and well fed, the flesh is intergrained or marbled with fat.—COW-BEEF has a closer grain than ox-beef, and the lean is of a deeper red.—BULL-BEEF is closer still, the fat dark, hard, and skinny, the lean of a deep coarse red, and it has a strong smell and flavour.—HEIFER-BEEF resembles ox-beef, except in being smaller, often an advantage; but it lacks the rich flavour of the flesh of full-grown oxen.

Joints, Managem., &c. Beef is CURED, SALTED, and DRESSED, in *all* the ways common to the other meats; the only care necessary being in the selection of the appropriate joint or part. The *ribs, sirloin, rump*, and *veiny piece*, are the proper joints for ROASTING or BAKING. The *buttock* or *round, edge-bone, second round* or *mouse-buttock, brisket, flank, shoulder* or *leg-of-mutton piece*, and the *clod*, those generally BOILED, STEWED, or SALTED. The choicest STEAKS are cut from the middle of the rump; the next best from the veiny piece, or from the *chuck-rib*. In summer, excellent ones may also be cut from the *shoulder*. In France, steaks cut from the *sirloin* (without bone) are preferred to all others, and are exceedingly delicate and tender. The neck may be either stewed or boiled, and is much used to make soup and gravy. In the country, the *round*, when fine, and well hung, is also often roasted or baked.

According to Miss Acton, "the finest part of the *sirloin* is the chump-end, which contains the larger portion of the fillet; of the *ribs*, the middle ones."

Beef is in *season* during the whole year, but is finest—when it is most relished—during the winter months, when, owing to the temperature of the air, it may be 'hung' a long time, and thus increased in tenderness and flavour. See OX, BAKING, BOILING, ESSENCES, ROASTING, SALTING, TEA; &c. (also *below*).

Beef, Alamode'. *Syn.* BŒUF' À LA MODE, Fr. The *true* 'beef à la mode' is made as follows; and is not a mere kind of rich stew, such as is daily sold under the name in the 'cook-shops' of London:—

1. (M. Alexis Soyer.) *Rump, sirloin*, or *rib of beef*, (about) 12 *lbs.*; lard it through with 10 or 12 *long pieces* of *fat bacon*; put it into an earthen pan with a *calf's foot*, 4 *onions*, 2 *carrots* (sliced), a *bunch of parsley*, 2 *bay leaves*, 2 *sprigs of thyme*, 2 *cloves*, ½ *teaspoonful* of *pepper*, 1 *do.* of *salt*, 4 *wine-glassfuls* of *sherry*, 4 *do.* of *water*, and 1 *lb.* of *streaky bacon* (cut into small squares); place on the cover, make it air-tight round the edges with a little flour-paste, and expose it in a moderate oven for about 4 hours. *Dish up* with the vegetables and bacon placed tastefully round it, the gravy (skimmed) being poured over all. Or it may be eaten cold, in which case the pan should not be opened until the whole has thoroughly cooled.

2. (Mrs. Rundell.) *Rump of beef* (or any part of the beef which will stew well), 3 or 4 *lbs.*; trim it, and cut off the fat; add several sorts (according to taste) of *sweet herbs* chopped very fine, a little *shalot*, and a great deal of *spice* (cayenne, white pepper, allspice, cloves, and mace; *or* mixed spices), and put them, with *vinegar*, into a saucer that has been rubbed with *garlic*; add *fat bacon* cut into long slips; lard the beef regularly on both sides, and rub it over with the herbs and spices; next flour it, and add a small piece of butter, and a pint of water; bake it in an oven until thoroughly 'done,' then strain the gravy, and serve it up with pickles on the top. Excellent either hot or cold.

Obs. Miss Acton—a high authority in these matters—tells us, that 7 or 8 *lbs.* of *beef*, thus treated, takes 4 to 5 hours to dress it properly; and that if a stew-pan be used, it should be as nearly the size of the meat as possible, the whole being allowed to simmer very gently, and the meat turned when half done. She also states that "*veal* dressed in this way is even better than beef;" but, of course, it takes less time in cooking.

Beef, Col'lared. *Prep.* 1. (Miss Acton.) The piece of beef is rubbed with a little *coarse sugar*, and set aside for two or three days; it is then slightly salted (about 1 *oz.* of *salt*, containing a little saltpetre, to each *lb.* of meat); and allowed to rest 8 to 10 days; the bones and tougher skin are next removed, and the under side is sprinkled thickly with parsley and other savoury herbs (shred small), after

which it is very tightly rolled up, secured with a cloth, and bound as closely as possible with broad tape. A piece of 8 *lbs.* will require about 5 hours' gentle boiling, and should be placed, in the same state, whilst still hot, under a heavy weight, or in a press, for a few hours. The ribs, or (better) the thinnest part of the flank, is generally selected. The last should be 'hung' in a damp place for a day or two before curing it.

2. (Mrs. Rundell.) From stewed shin of beef and ox-tail, re-stewed with a glassful each of wine and ketchup, and some of the old broth, and then poured into moulds. Sweet herbs, sliced eggs, and pickles, may be added at will.

Beef, Dutch, Hung Beef. The *round, rump, veiny-piece,* or *thick flank,* cured, for 10 or 12 days, with dry salt to which a little saltpetre and some sugar and black pepper has been added; and afterwards 'hung' for use. It eats well if boiled tender with greens or carrots. If to be grated or shred, as Dutch, and eaten as a relish on bread and butter, then cut a lean bit, boil it till extremely tender, and while hot put it under a press. When cold, fold it in a sheet of paper, and hang it in a very dry place. It will then keep two or three months.

Beef, Pott'ed. See POTTED MEATS, &c.

Beef, Spiced (spīst'). Salted beef when spices (usually *black-pepper* and *allspice*) have been added to the salt, &c., used in curing it. See COLLARED BEEF (*above*).

BEER (bēre). *Syn.* BIÈRE, Fr.; BIER, D., Ger.; BIRRA, It.; CEREVI"SIA (-vĭzh'-'ă), CERVI"SIA (Pliny), C. LUPULA'TA* (*i. e.* hopp'd *or* modern b.), VI'NUM ANGLIC'ANUM*, V. HORDEA'CEUM* (-sh'ŭm), ZY'THUM* (*or* -THUS*; ζύθος, Gr.), &c., L.; BEERE, BEERE, Sax.; BIR, W. An aqueous infusion of malted grain which, after being boiled with hops, has undergone the vinous fermentation; malt-liquor. The word BEER is now the common generic term for all fermented malt-liquors, and, indeed, for all other beverages prepared by a process of brewing. Whenever the term is used in a special sense, it is with a descriptive prefix, as, for example, *spruce beer, ginger beer,* &c.

Hist. Ale and wine are fabled to have been invented by Bacchus; the former, in Egypt, where the soil and climate would not permit of the cultivation of the grape. Herodotus ascribes the origin of the art of brewing to Isis, the wife of Osiris, and notices *zythum* (ζῦθος), a beer obtained from barley. Malt-liquor was undoubtedly employed as a beverage in the fifth century before Christ; and, probably, very much earlier. Xenophon distinctly alludes to it in his famous retreat (B.C. 401). Aristotle speaks of 'beer-drunkenness;' and Theophrastus calls it 'barley-wine.' The Romans learned the art of brewing from the Egyptians, and gave the liquor thus made the appropriate name of *cerevisia* (quasi *Cererisia*), from its being the product of corn, the gift of Ceres. The most celebrated beer of ancient times was the '*Pelu'sian pota'tion,*' so named after a town at the mouth of the Nile where beer was prepared in great perfection. The use of beer was likewise known to the ancient Gauls and Germans, and probably also to most other ancient nations inhabiting the temperate zone. Pliny says "*Zythum* is made in Egypt, *ce"lia* and *ce"ria* in Spain, and many other sorts (of beer) in Gaul." In our own country, ale was early known and valued as a beverage. The art of its preparation appears to have been obtained either from the Romans or the Saxons. According to Verstegan, "This excellent and healthsome liquor, *beere,* antiently called *ale,* as of the Danes it yet is, was of the Germans invented and brought into use." *Alehouses* are mentioned in the laws of Ina, king of Wessex (A.D. 680). *Alebooths* were regulated by law, A.D. 728. By the beginning of the 13th century ale was drunk generally in England. By a statute of James III, of Scotland, it was made a capital offence to mix wine with beer (A.D. 1482). In 1492, a licence was granted to a brewer at Greenwich, to export 50 tons of that "*ale*" called "*beer*" or "*bere;*" the distinction between the two apparently being, that the latter was flavoured with wormwood or others bitters; whereas ale was not. Ale was originally made from barley-malt and yeast alone, and those who put in anything else, were held to sophisticate the liquor. Hops were introduced A.D. 1524; and to this date, modern, or hopp'd beer, may be traced.

By statute of James I the "ale" called "bere" was taxed, and "one quart of the best thereof," ordered to be sold for a penny (A.D. 1610). *Alehouses* were first licensed in 1621, and during the reign of Charles II were, together with all *malt-liquor,* placed under the control of the Excise (A.D. 1660). By the Statutes 1 & 4 Will. IV (1834), previous enactments respecting malt liquors and their sale, were reduced to their present form. Beer is now the common beverage in all European countries where the vine is not a subject of rustic husbandry.

Qual. Pure malt-liquor which has undergone sufficient fermentation, is perhaps, when taken in moderation, one of the most wholesome beverages that can be drunk. ALE is the most nutritious variety, and, when moderately mature, is the one best adapted to the debilitated and delicate; but good porter, owing to being less rich in extractive and gummy matter, and from being slightly astringent from high-dried or scorched malt being used in its preparation, occasionally agrees better with bilious constitutions and the dyspeptic. Much, however, depends on acquired taste and habit. The most wholesome, and perhaps the least exceptionable beverages obtained from malt, are those known as *East-India, Scotch,* and *Bavarian ales,* when honestly prepared and not highly 'bit-

tered' with the hop, as is, unfortunately, now so general. A late writer has described good beer as nutritious, from the sugar and mucilage which it contains; exhilarating, from its spirit; and strengthening and narcotic, from its hops. Pereira says, "Beer is a thirst-quenching, refreshing, intoxicating, and slightly nutritious beverage." Its effects, when taken injudiciously, or in excess, for the most part resemble those of other intoxicating liquors—disease, misery, and crime; and these in direct proportion as it deviates from the true standard of purity and excellence.

Var. The *numerous varieties* of malt-liquor met with in commerce, may be resolved into two great classes—ALE and PORTER. ALE of all kinds is brewed chiefly from pale malt, and is generally of a light amber colour. PALE ALE is manufactured from the finest and lightest dried malt, and the choicest hops, the latter in excess. MILD ALE differs from pale ale in being sweeter, stronger, and almost free from the flavour of the hop. BITTER ALE or BITTER BEER has, as a rule, less body than pale ale, and is more highly hopped. TABLE BEER is a weak liquor commonly containing three or four times the proportion of water usually present in ordinary beer or ale. PORTER differs from ale chiefly in its being artificially coloured by the use of roasted malt, which also imparts to it a peculiar bitter flavour. In point of strength, it stands about midway between light and strong ales, although frequently brewed of a strength very slightly above that of table beer. STOUT, BROWN STOUT, &c., are simply richer or stronger descriptions of *porter*, and may be said to have nearly the same relation to the higher qualities of mild ale that porter holds with regard to pale ale or bitter beer. In London, PORTER is called BEER; and, indeed, in all parts of the kingdom, the prevailing beverage of this kind consumed by the masses, of whatever class, commonly goes by the name of *beer*.

The two great classes of malt-liquor above referred to, are, independently of mere differences of strength, excellence, and commercial value, practically subdivided into an almost infinite number of varieties. Every county, every town, and almost every brewer, is distinguished by the production of a different-flavoured beer, readily perceived, and highly appreciated by their respective votaries. These differences may be traced to—variations in the quantity and quality of the materials employed in their manufacture—the temperature of the water used for mashing—the duration of the boiling—the temperature at which the fermentation is conducted, and the extent to which it is carried, together with numerous other circumstances, which, though usually of an accidental and uncertain character, are nevertheless sufficient to affect the flavour and quality of a brewing. Among these, those depending on the condition of the building, the locality, the apparatus, the water, mismanagement, &c., are not the least important. In general, however, when the same quantity and quality of materials are employed, and the *same* time allowed for the maturation of the liquor, the chief causes of this diversity will be found to depend on the water used in the brewing, and the method followed in the preparation of the malt. Thus, *Bavarian*, *Scotch*, and *Burton ales*, differ in style from other ales chiefly from being fermented at a lower temperature, and from the water employed in the brewing being that usually denominated 'hard;' whilst *porter* and *stout* differ from all these, because they are brewed from a mixture of pale and roasted malt. It is from causes like these, though apparently trivial, that the many varieties of malt liquor met with, at the present day, originate.

Materials, Manuf., &c. See MALT, HOPS, BREWING, &c.

Purity. The leading characteristics of good beer are transparency, a fine colour, an agreeable semi-vinous flavour, and the property of remaining for several hours exposed in a glass or cup without becoming 'flat' or insipid. If the materials used were good, if the brewing was skilfully conducted, if the liquor has been carefully stored in perfectly sweet casks or vessels, in a suitable cellar, for a sufficient time, and has not been tampered with, this will almost always be the case. Hence colour, transparency, and flavour, and the power of resisting exposure, are tests of the purity and quality of beer, which should not be lightly treated. There are none more simple and effectual; and, together with a good 'palate,' and a close observance of its effects on the head and on the stomach, will readily distinguish pure and wholesome beer from 'doctored' and inferior liquor. If, therefore, we find a sample of beer possessing the above qualities and in good condition, and on testing it for its alcohol and saccharine matter, find these substances in such quantities as fairly to represent the amount of malt which should have been used in the brewing of such a liquor, we may, in the absence of proof to the contrary, infer it to be pure; because the object for which adulteration is practised—the saving of malt and hops—did not exist in this case. To *demonstrate* the purity of beer, requires an elaborate and troublesome analysis, which can only be performed by those accustomed to chemical operations. Good and pure beer should contain nothing but what exists in the malt, the hops, and the water, from which it is brewed, or which is produced from them in the processes of 'masking,' 'fermentation,' and 'maturation.'

Adulteration. Until the year 1862, nothing was allowed to enter into the composition of beer but malt and hops; and the Act 56 Geo. III, cap. 58, imposes a penalty of £200 on any "brewer, dealer, or retailer of beer," who "shall receive, or have in his possession, or use, or mix with, or put into any worts or beer,

any molasses, honey, liquorice, vitriol, quassia, cocculus indicus, grains of paradise, Guinea-pepper, or opium, or any extract or preparation of these substances, for, or as a substitute for, malt or hops;" and a further penalty of £500 on any "druggist, or vendor of, or dealer in drugs, or chemist, or other person whatever," who shall "sell, send, or deliver to any licensed brewer," &c., any of the above materials. However, by the Act 25 Vic., cap. 22, s. 20, so much of the above is repealed as relates to hops. This Act provides that—

"On and after the 16th Sept., 1862, so much of an Act passed in the 56th year of the reign of King George the Third, cap. 58, and of an Act passed in the 7th and 8th years of the reign of King George the Fourth, cap. 52, and of any other Act relating to the revenue of excise, as imposes any excise penalty upon any brewer of, or dealer in, or retailer of beer, for receiving into, or having in his possession, or using or mixing with any worts or beer, any article for, or as a substitute for hops, or as prohibits the sale of any such article to the said persons, shall be, and is hereby repealed: provided always, that nothing herein contained shall be construed to extend to repeal any such penalty or prohibition so far as regards any article which may be used as a substitute for malt, notwithstanding that it may be also a substitute for hops."

Prior to this an Act (10 Vic., c. 5) had been passed allowing brewers to use sugar under certain restrictions.

As the law now stands, a brewer may use hops, quassia, wormwood, gentian, or any other simple bitter; but he is forbidden to use any substitute for malt, such as unmalted grain, sugar in a liquid state, molasses, or any substance which would give pungency or intoxicating properties to the beer, such as cocculus indicus, grains of paradise, tobacco, &c. It is a well-known and authenticated fact, that beer is commonly and sometimes dangerously adulterated. The cupidity of fraudulent brewers and publicans frequently induce them to introduce *other ingredients* than malt and bitters into their liquors, with a view of giving them a false appearance and strength. Thus, to give pungency—capsicum, grains of paradise, ginger, &c., have been added; to give intoxicating properties—opium, cocculus indicus, tobacco, &c.; as a substitute for malt—molasses, treacle, colouring, honey, &c.; to impart a false appearance of age—sulphuric acid, alum, green vitriol, glycerin, mustard, &c.; to remove acidity—pearlash, soda, chalk, &c.; and to impart a frothy head—alum, foots, table-salt, &c.

The publicans generally 'reduce' their strong beer with *water* (which they call 'liquor'), and add treacle, together with a mixture of *copperas*, *salt*, and *alum* (termed 'heading'), to make it bear a frothy head. The cheap beer sold in many of the low taverns of London is made by dividing the contents of two butts between three butts, filling them up with water, and adding a bladder of porter-extract (technically termed 'P. E.') to each. This 'P. E.' is a mixture of powdered cocculus, Spanish juice, caramel, capsicum, &c., boiled up with treacle and water to the consistence of a thin extract, and then put into bullocks' bladders.

Exam., Tests, &c. The analysis of beer, both qualitative and quantitative, as already noticed, is a matter of considerable difficulty. We shall therefore defer its consideration until we come to the article PORTER, as that description of beer, on account of its colour, is not only the one most difficult to examine, but also the one most frequently adulterated. See ALE, BREWING, HOPS, MALT, PORTER, &c.

Beer, Am'ber. *Syn.* AMBER. A liquor, formerly much drank in London, brewed from a mixture of 3 parts of *amber malt*, and 1 part of *pale malt*, with about 6 *lbs.* of *hops* to the quarter. It was generally 'tapped' within a few days after it had done 'working,' and was chiefly used *mixed with bitters*, or made into 'PURL.'

Beer, Wheat'en, *Wheat'-malt Beer.* See MUM.

*** Besides *malt liquor*, or BEER properly so-called, a somewhat similar beverage, though of inferior quality, may be prepared from any vegetable substance rich in starch and sugar, as noticed in our article on BREWING. Certain summer beverages also pass under the name; but in both the cases referred to, the name of the characteristic ingredient, or that of the vegetable employed, is always conjoined; as in *pea-shell beer*, *potato-beer*, *ginger-beer*, &c. Examples of some of these are given below:—

Beer, Gin'ger. *Syn.* CEREVIS'IA (-vĭzh'-) ZINGIB'ERIS, C. ZINGIBERA'TA*, C. CUM ZINGIB'ERE* (-ĕr-e), L. *Prep.* 1. *Lump-sugar*, 1 *lb.*; good *unbleached Jamaica ginger* (well-bruised), 1 *oz.*; *cream of tartar*, ½ *oz.* (or *tartaric acid*, ½ *oz.*); 2 or 3 *lemons* (sliced); *boiling water*, 1 gal.; macerate, with frequent stirring, in a *covered vessel*, until *barely luke-warm*, then add of *yeast*, 1½ or 2 *oz.* (about ½ a wine-glassful), and keep it in a moderately warm place, to excite a brisk fermentation; the next day rack or decant the liquor, and strain it through a jelly-bag or flannel; allow it to work for another day, or two, according to the weather; then skim it, again decant or strain, and put it into bottles, the corks of which should be 'wired' down.

2. Good *white sugar*, 18 to 24 *lbs.*; *lemon-juice* or *lime-juice*, 1 quart; finest *Narbonne honey*, 1 or 2 *lbs.*; *bruised Jamaica ginger*, 1½ *lb.*; pure *soft water* (that has been *boiled*, and then allowed to settle), q. s. Boil the ginger in 3 *galls.* of the water for half an hour; then add the sugar, the juice, and the honey, with sufficient water (see above) to make the whole measure 18½ *galls.*, and strain the mixture as before. When the liquor has become almost cold, add the *white of* 1 *egg*, and ½ *fl. oz.* of *essence of lemon*, and strongly agitate the cask or vessel for about half an hour. After standing

3 to 6 days, according to the state of the weather, bottle it, and place the bottles on their sides in a cellar, just as is done with wine or beer. It will be ready for use in about 3 weeks, and will keep good for several months. If wanted for immediate use, about ½ *pint* of *yeast* may be added, as in formula 1; but then it will not keep so well, or be quite so transparent and free from deposit. The lemon-juice and essence of lemon may be replaced, at will, by *cream of tartar* (in powder) or *tartaric acid*, 4 *oz.*; and *lemons* (sliced) 1½ to 2 *doz.*; added with the sugar, &c.; but the original formula is preferable.—*Prod.* 18 *galls.* = 24 *doz.* ½-pint bottles, or 30 *doz.* ordinary sized ones.

3. EXTEMPORANEOUS:—*a.* Into each bottle put *concentrated essence of ginger*, 1 drop; *simple syrup* or *capillaire*, ½ *oz.*; (or in lieu of them, *syrup of ginger* and *simple syrup*, of each, a dessert-spoonful;) and fill with *aerated soda-water* at the 'bottling machine,' in the usual way. Very superior.

b. Into each bottle put *two* or *three lumps* of *sugar*, fill them to the proper height with *pure water*, throw in (quickly) an *effervescing ginger-beer powder*, and instantly cork the bottle, and secure the cork with wire.

Use. As a cooling and refreshing drink in warm weather; and as a restorative after hard drinking, fatigue, &c.

Obs. The products of all the above formulæ, if well-managed, are excellent; those of *No.* 2, and 3*a.*, of the very finest description, much stronger and superior to nine tenths of that sold for the best in the shops. They are often called, by way of distinction, LIMO''NIATED GINGER-BEER, IMPERIAL G.-B., &c. Cheaper articles are made by omitting some of the ingredients, and particularly a portion of the sugar. The ginger-beer vended at 1*d.* and 2*d.* a bottle, with that known as GINGER POP, IMPE''RIAL POP, &c., are generally made with *moist sugar* (½ to ¾ *lb.* to the *gal.*), and merely flavoured with a little *coarse ginger*. No. 2, made with 2 *lbs.* of *sugar* to the *gal.* may be kept 2 years, if not bottled for six months, and well-stored; and with 3 *lbs.* to the *gal.*, for 4 years, when it forms a splendid article (GINGER-CHAMPAGNE).

Beer, Pine. See SPRUCE BEER.

Beer, Spruce. *Syn.* CEREVI'SIA (-vĭzh'-) ABI'ETIS, C. ABIETI'NA, C. ABIET'ICA*, L. *Prep.* 1. *Sugar*, 1 *lb.*; *essence of spruce*, ½ *oz.*; *boiling water*, 1 gal.; mix well, and when nearly cold, add of *yeast*, ½ a wine-glassful; and the next day *bottle* like ginger-beer.

2. *Essence of spruce*, ½ pint; *pimento* and *ginger* (bruised), of each, 5 *oz.*; *hops*, ½ *lb.*; *water*, 3 galls.; boil the whole for 10 minutes, then add of *moist sugar*, 12 *lbs.* (or good *treacle*, 14 *lbs.*); *warm water*, 11 galls.; mix well, and, when only lukewarm, further add of *yeast*, 1 pint; after the liquid has fermented for about 24 hours, bottle it.

Prop., Uses, &c. Diuretic and antiscorbutic. Regarded by some persons as an agreeable 'summer-drink,' and often found useful during long sea-voyages. When made with *lump-sugar* it is called WHITE SPRUCE-BEER; when with moist sugar or treacle, BROWN SPRUCE-BEER. An inferior sort is made by using less sugar, or more water. If made with 1¼ to 1½ *lb.* of *lump-sugar* per gal., and without yeast, in a similar manner to that described under GINGER-BEER (*No.* 2), it may be kept a twelvemonth, or longer, in a moderately cool place.

Beer, Sugar. *Syn.* CEREVI'SIA (-vĭzh'-) SAC'CHARI, L. From *moist sugar* (1 to 2 *lbs.* to the *gal.*) and a little *hops*; as treacle-beer.

Beer, Trea'cle (trē'kl-). *Syn.* CEREVI'SIA FÆ'CIS SAC'CHARI, &c., L. *Prep.* 1. From *treacle* or *molasses*, ¾ to 2 *lbs.* per gal. (according to the desired strength); *hops*, ¼ to ¾ *oz.*; *yeast*, a table-spoonful; *water*, q. s.; treated as *below*.

2. *Hops*, 1½ *lb.*; *corianders*, 1 *oz.*; *capsicum-pods* (cut small), ½ *oz.*; *water*, 8 galls.; boil for 10 or 15 minutes, and strain the 'liquor' through a coarse sieve into a barrel containing *treacle*, 28 *lbs.*; then throw back the hops, &c., into the copper, and reboil them, for 10 minutes, with a second 8 galls. of *water*, which must be strained into the barrel, as before; next 'rummage' the whole well with a stout stick, add of cold water 21 galls. (sufficient to make the whole measure 37 galls.), and, after again mixing, stir in ½ a pint of *good fresh yeast*; lastly, let it remain for 24 hours in a moderately warm place, after which it may be put into the cellar, and in two or three days 'bottled,' or 'tapped' on 'draught.' In a week it will be fit to drink. Very superior. —*Prod.* 1 barrel, or 36 gallons. For a *stronger beer*, 36 *lbs.*, or even ½ *cwt.* of *treacle*, may be used. It will then keep good for a twelvemonth.

Obs. A wholesome drink; but one apt to prove laxative when taken in large quantities. See BREWING, GINGER BEER, POWDERS, &c.

BEERS. (In *pharmacy.*) *Syn.* CEREVIS'IÆ (-vĭzh'-e-ē) MEDICA'TÆ, L. The general *nature* and *preparation* of these articles have been already noticed.[1] They are little employed in this country. The *ingredients* should be so proportioned that from ¼ to ½ a pint may form the *proper dose*. The following are examples:—

Beer, Antiscorbu'tic. *Syn.* CEREVIS'IA ANTISCORBU'TICA, L.; SAPINETTE', Fr. *Prep.* 1. (P. Cod. 1839.) *Scurvy-grass* and *buds of the spruce-fir*, of each, 1 oz.; *horse-radish root*, 2 oz.; (all fresh, and bruised or sliced;) *new ale* or *beer*, 3½ pints (say, ½ *gal.*); macerate 4 days, press, and strain for use.

2. (Ph. Castr. Ruth. 1840.) *Horse-radish* (fresh), 4 lbs.; *juniper berries*, 3 lbs.; *root of calamus aromaticus* and *buds of pinus abies*, of each, 1 lb.; *ginger*, 1 oz.; *syrup* (of brown sugar), 6 lbs.; *beer*, 120 lbs. (say, 12 *galls.*); macerate 4 days, or until it ferments, then

[1] See ALES (Medicated).

decant, strain, and add of *cream of tartar*, ½ lb.; *tincture of mustard*, (*flour of mustard* 2 oz., to *proof spirit* 12 oz.), 5 lbs. (say, ½ gal.). In scurvy, &c.

Beer, Cincho'na. *Syn.* A'GUE-BEER, BARK'-BEER; CEREVIS'IA CINCHO'NÆ, &c., L. *Prep.* 1. Bruised *cinchona-bark*, 1 oz.; *proof spirit* or *brandy*, 2 oz.; mix; the next day add of *new beer*, 1 quart, and in 3 days decant or filter.—*Dose.* 2 or 3 wine-glassfuls.

2. (Mutis.) *Cinchona*, 4 oz.; *sugar*, 2 lbs.; *boiling water*, 5 pints; when *lukewarm*, ferment with a little *yeast*, as for ginger-beer.—*Dose.* 1 or 2 wine-glassfuls.

3. (Ph. Ferrara.) *Bruised Peruvian bark*, 1½ oz.; *cinnamon*, 2 drs.; *nutmeg* (rasped), 7 drs.; *sugar*, 25 oz.; *yeast*, 2 oz.; *water*, 5 pints; mix, ferment, decant, and strain, as before.—*Dose.* 3 or 4 wine-glassfuls. They are all administered during the intermission of ague.

Beer, Pipsissewa. *Syn.* CERVIS'IA CHIMAPH'ILE, &c., L. *Prep.* (Dr. J. Parrish.) *Pipsissewa* (chimaphila umbellata), ½ lb.; *water*, 1 gal.; boil, strain, add of *sugar*, 1 lb.; *powdered ginger*, ½ oz.; *yeast*, q. s.; and ferment, strain, and bottle, as for ginger-beer. In scrofulous affections; especially of the joints. —*Dose.* Half a tumblerful. It is a favorite remedy with some American practitioners.

Beer, Sarsaparil'la. *Syn.* LIS'BON DI'ET-BEER, SPAN'ISH JARAVE; CEREVIS'IA SAR'ZÆ, C. SARSAPARIL'LÆ, INFU'SUM S. PARA'TUM FERMENTATIO'NE, &c., L. *Prep.* 1. *Compound extract of sarsaparilla*, 1½ oz.; *hot water*, 1 pint; dissolve, and when cold, add of good *pale* or *East-India ale*, 7 pints.

2. *Sarsaparilla* (sliced), 1 *lb.*; *guaiacum-bark* (bruised small), ¼ *lb.*; *guaiacum-wood*, (rasped), and *liquorice root* (sliced), of each, 2 *oz.*; *aniseed* (bruised), 1½ *oz.*; *mezereon root-bark*, 1 *oz.*; *cloves*, (cut small), ¼ *oz.*; *moist sugar*, 3½ *lbs.*; *hot water* (not boiling), 9 quarts; mix in a clean stone jar, and keep it in a moderately warm room (shaking it twice or thrice daily) until active fermentation sets in, then let it repose for about a week, when it will be fit for use.

Obs. It is said to be superior to the other preparations of sarsaparilla as an alterative or purifier of the blood, particularly in old affections. That usually made has generally only one half the above quantity of sugar, for which treacle is often substituted; but in either case it will not keep well; whereas, with proper caution, the products of the above formulæ may be kept for one, or even two years. No yeast must be used.—*Dose.* A small tumblerful 3 or 4 times a day, or oftener.

Beer, Stomach'ic. *Syn.* MED'ICATED PURL; CEREVIS'IA STOMACH'ICA, L. *Prep.* (Dr. Quincy.) *Centaury-tops* and *Roman wormwood*, of each, ½ handful; *gentian root* (bruised), 2 *oz.*; *the yellow peels* of 6 *Seville oranges*; *Spanish angelica-root* and *Winter's lard*, of each (bruised), 1 *oz.*; *new ale*, or *beer*, 3 quarts (say, 1 *gal.*); digest for a few days, as before. One or two wine-glassfuls early in the morning, and an hour before a meal.

Beer, Sulphu"ric Acid. *Syn.* SULPHURIC LEMONADE; CEREVISIA ACIDI SULPHU"RICI, C. ANTICOL'ICA, L. *Prep.* 1. *Treacle beer*, or other *weak mild beer* or *ale*, to which a little *concentrated sulphuric acid* has been added, in the proportion of about 1 dr. to every 8 or 10 pints; the whole being well agitated together, and allowed a few hours to settle.

2. *Treacle*, 14 *lbs.*; *bruised ginger*, ½ *lb.*; *coriander*, ½ *oz.*; *capsicum* and *cloves*, of each, ½ *oz.*; *water*, 12½ galls.; *yeast*, 1 pint; proceed as for ginger-beer, and when the fermentation is nearly over, add of *oil of vitriol*, 1½ *oz.* (diluted with 8 times its weight of water), and of *bicarbonate of soda*, 1½ *oz.* (dissolved in a little water). It is fit to drink in 3 or 4 days.

Uses, &c. It is taken with great benefit by workers in lead, especially by those employed in white lead works; also in cases of lead colic, poisoning by lead or its salts, &c. A tumblerful twice or thrice daily. It is both harmless and wholesome.

Beer, Tar. *Syn.* CEREVIS'IA PI'CIS, C. P. LIQ'UIDÆ, L. *Prep.* (Duhamel.) *Bran*, 2 pints; *tar*, 1 pint; *honey*, ½ pint; *water*, 6 pints; mix, and gently simmer together for 3 hours; when lukewarm add of *yeast*, ½ pint; let it ferment for 36 hours, and strain. Pectoral, anti-asthmatic, antiphthisic, &c.—*Dose.* One wine-glassful before each meal, in bronchial and chest diseases, and incipient consumption. See BEERS (In Pharmacy; *above*).

BEES'WING. The second or pseudo-crust so much admired in *port* and a few other wines, and which forms in them only when kept for some time after the first or true crust has formed. It consists of minute, glittering, floating particles or lamellæ of tartar, purer, and freer from astringent matter, than that deposited in the first crust. See CRUST, WINES, &c.

BEET (bēte). *Syn.* BE'TA, L.; BIET, D.; BETTE, Fr.; BEETE, MANGOLD, M.-KRAUT, Ger.; BIETOLA, It. The common name of plants of the *genus* 'beta,' and the *nat. ord.* Chenopodeæ (DC.). There are said to be only two distinct species cultivated—*beta vulgăris* and *b. hortensis*—each of which occurs in several varieties; those of the first, and which we have chiefly to consider, producing a large fleshy root (BEET'-ROOT, MAN'GOLD-R.; BA'DIX BE'TÆ, L.; BETTERAVE, Fr.; ROTHE RÜBE, &c., Ger.), which is both sweet and succulent; those of the other, only succulent leaves. The varieties most useful, and now the most extensively cultivated in England, are of comparatively recent introduction; field-beet, the *mangold-wurzel* of the Germans, having been only brought under the notice of our agriculturists towards the end of the last century.

Field Beet. See HYBRID BEET.

Hy'brid Beet. *Syn.* COMMON BEET, FIELD'-

B.; BE'TA HY'BRIDA, B. VULGAR"IS H., L.; BETTE COMMUNE, BETTERAVE C., RACINE D'ABONDANCE, R. DE DISETTE, &c., Fr.; MANGOLD, M.-WURZEL, MANGEL-W., &c., Ger. A variety of *beta vulgaris* (Linn.), and that usually cultivated by English farmers. Root, red on the outside, white inside; chiefly grown as winter-food for cattle, being vastly superior to turnips. It has been used, in Germany, as a substitute for bread in times of scarcity. Leaves, dressed and eaten like spinach.

Red Beet. *Syn.* CU'LINARY BEET, GARDEN B., BEET'-RADISH, BEET'-RAVE, &c.; BE'TA RU'BRA, B. VULGA"RIS R., L.; BETTERAVE, &c., Fr.; ROTHE RÜBE, &c., Ger. Root, tender, well-flavoured, and of a rich red colour throughout, and hence much used in salads, pickles, and cookery; also made into a conserve, jam, or confection. The kinds most esteemed for salads are the SMALL RED and the YELLOWISH-RED varieties of Castelnaudari.

Sea Beet. *Syn.* BE'TA MARIT'IMA, L. Said to be the best variety for dressing as spinach.

White Beet. *Syn.* BE'TA AL'BA, B. VULGA"RIS A., B. CI'CLA, L.; BETTE BLANCHE, POIRÉE, &c., Fr. A sub-variety of the red beet. Root, white, and hence preferred for making sugar; that with a purple crown being the most esteemed.

Obs. The preceding varieties of beet resemble each other in their general properties. They are all antiscorbutic, detergent, emollient, and nutritious; and their roots contain about 8% of sugar, which, by proper treatment, may be obtained from them of excellent quality. The grated root is sometimes used to dress blisters and foul ulcers. When sliced, and dried in a malt-kin, a very palatable beer may be brewed with it. The leaves of each variety are dressed and eaten like spinach. The roots, for the table, after being carefully washed, are dressed whole—neither scraped nor cut—and, according to their size and age, require from 1 to 4 hours' simmering or baking. They are mostly served in slices, cold, intermingled with other winter salad-vegetables. See BREWING, CATTLE, SALADS, SUGAR, &c. (also *antè*).

BEET ROOT. See BEET.

BEE'TLE (bē'tl). *Syn.* SCAR'AB†*, SCAR'ABEE†* (-bē); SCARABÆ'US, L.; ESCARBOT, SCARABÉE, Fr.; KÄFER, Ger.; BETEL, Sax. In *zoology*, the common name of an extensive genus of insects (*scarabæ'us*, Linn.), of numerous species. It is also popularly applied to all coleopterous insects, or such as have hard or shelly wing-cases, especially to those of a dark or obscure colour. The common pests of our kitchens and basement floors which pass familiarly under the name of beetles, black beetles, or cockroaches, belong to the order orthoptera, and not to the coleoptera or beetle tribe, as the name implies. See COLEOPTERA, INSECTS, &c.

Black Beetle; *Domes'tic Beetle.* See BLATTA, COCKROACH, &c.

Blis'tering Beetle. See CANTHARIS.

BELL. *Syn.* CAMPA'NA,[1] CAMPANU'LA,[2] NO'LA*,[3] TINTINNAB'ULUM,[4] L.; CLOCHE, CLOCHETTE,[5] GRELOT,[6] Fr.; GLOCKE, SCHELLE, &c., Ger.; BELL, BELLA, BELLE, Sax. A hollow vessel or body, usually of cast metal, with a wide cup-like mouth expanding outwards, so formed as to emit sound when suspended and struck with a hard substance. The word is also applied, either alone or in composition, to substances having the figure of a bell; as *bells* (of flowers), *bell-animal*, *b.-flower*, *b.-glass*, &c.

Form, Manuf., &c. Bells of "the common and well-known shape, with a thick lip or sound-bow, are the most effective known instruments for producing a loud and musical sound, such as you want when you erect a large public clock, or put up a peal of church bells." "After trying a number of experiments, at Messrs. Warner's, I am quite satisfied that there is nothing to be gained by deviating materially from the established proportions of the best old bells."[7] This view is borne out by the researches of the Government commissioners[8] who visited the Paris Exhibition, who report, that among the 'founders' of France and Belgium, there are no traditions of the art, nor any discoveries or appliances of modern science, tending to the improvement of bells, or to provide efficient substitutes for them; nor is there any known improvement on the established mode and usual material (BRONZE or BELL-METAL) for casting them. Sir C. Barry, indeed, according to Mr. Dennison, "seemed rather impressed with the merits of cast-steel bells;" but both Prof. Wheatstone and Mr. Dennison differ from him in opinion. Undoubtedly some cast-steel bells, of small size, have been produced, capable of yielding sounds of extraordinary clearness and richness; but, in most cases, owing to the difficulty in giving the peculiar molecular condition to the metal essential to a high degree of sonorousness, their tones are comparatively harsh and disagreeable. Well-annealed glass offers a cheaper and better material than steel for large bells up to a certain size, whilst its tones are exquisite. As the depth of the tone of a bell depends chiefly upon the dimensions and weight of the sound-bow, it appears likely that by directing our experiments to the increase of these, and the diminishing of the thickness of the metal in the other parts, the quantity of metal required to produce large bells might be very greatly reduced. The

[1] Appropriately, a large bell suspended or adapted for suspension; as that of a church, &c.
[2] A small bell.
[3] Id.
[4] Id.; *appr.*, one suspended as a door-bell, servants' bell, &c.
[5] A little bell, a hand-bell.
[6] A little round-bell.
[7] Lecture on the "*Form of Bells*," deliv. at the Royal Institution, by Mr. B. Dennison, to whom the Government intrusted the construction of the 'great bells' for the New Houses of Parliament.
[8] Prof. Wheatstone and Sir Charles Barry.

sound of an Indian gong that may be easily held suspended by the hand, is always rich and usually as loud and deep as a bell of ordinary construction which it would take several men to lift. The Chinese often use bells made of porcelain. Small hand-bells for the toilet and boudoir are often made of silver, and then yield tones which are remarkably soft, clear, and pleasing. The tongue, clapper, or hammer, of bronze bells should be of iron; and steel bells, of bronze. Glass and porcelain bells require the striking part of the tongue to be of box-wood, the proper weight being given by a ball of iron cast on the rod immediately above it, and a similar one screwed on the end of the rod immediately below it. In all cases the hammer-head, preferably globular, should strike the bell near the verge, and should be free from projections or asperities.

The casting, &c., of bells is essentially similar to that of other articles in bronze, of corresponding size, and particularly of cannon. See BELL-METAL, BRONZE, &c.

BELL'-METAL. *Syn.* ÆS CAMPANA''RUM, L.; MÉTAL DE CLOCHE, Fr.; GLÖCKENGUT, GLOCKENSPEISE, Ger. The alloy, usually *bronze*, of which bells, &c., are made.

The composition of BELL-METAL varies considerably, as may be seen below:—

1. (Standard.) *Copper*, 78 parts; *tin*, 22 parts;[1] fused together and cast in the manner described under BRONZE. The most sonorous of all the alloys of copper and tin. It is easily fusible, and has a fine compact grain, and a vitreous-conchoidal and yellowish-red fracture. According to Klaproth, the finest-toned Indian gongs have this composition.

2. (Founder's Standard.) *Copper*, 77 parts; *tin*, 21 parts; *antimony*, 2 parts.[2] Slightly paler and inferior to No. 1.

3. *Copper*, 80 parts; *tin*, 20 parts.[3] Very deep-toned and sonorous. *Used* in China and India for the larger gongs, tam-tams, &c.

4. *Copper*, 78 to 80 parts; *tin*, 22 to 20 parts. Usual composition of Chinese cymbals, tam-tams, &c.

5. *Copper*, 75 (= 3) parts; *tin*, 25 (= 1) parts.[4] Somewhat brittle. In fracture, semi-vitreous and bluish-red. Used for church and other large bells.

6. *Copper*, 80 parts; *tin*, 10¼ parts; *zinc*, 5½ parts; *lead*, 4¼ parts. English bell-metal, according to Thomson. Inferior to the last; the lead being apt to form isolated drops, to the injury of the uniformity of the alloy.

7. *Copper*, 68 parts; *tin*, 32 parts.[5] Brittle; fracture conchoidal and ash-gray. Best proportions for house-bells, hand-bells, &c.; for which, however, 2 of *copper*, and 1 of *tin*, is commonly substituted by the founders.

8. *Copper*, 72 parts; *tin*, 26½ parts; *iron*, 1½ part. Used by the Paris houses for the bells of small clocks or pendules.

9. *Copper*, 72 parts; *tin*, 26 parts; *zinc*, 2 parts. Used, like the last, for very small bells.

10. *Copper*, 70 parts; *tin*, 26 parts; *zinc*, 2 parts. Used for the bells of repeating watches.

Concluding remarks. Castings in bell-metal are all more or less brittle; and, when recent, have a colour varying from a dark ash-gray to grayish-white, which is darkest in the more cupreous varieties, in which it turns somewhat on the yellowish-red or bluish-red. The larger the proportion of copper in the alloy, the deeper and graver the tone of the bells formed of it. The addition of tin, iron, or zinc, causes them to give out their tones sharper. Bismuth and lead are also often added to modify the tone, which each metal affects differently. The addition of antimony and bismuth is frequently made by the founder to give a more crystalline grain to the alloy. All these additions are, however, prejudicial to the sonorousness of bells, and of very doubtful utility. Rapid refrigeration increases the sonorousness of all these alloys. Hence M. D'Arcet recommends the 'pieces' to be heated to a cherry-red after they are cast, and after having been suddenly plunged into cold water, to be submitted to well-regulated pressure by skilful hammering, until they assume their proper form; after which they are to be again heated and allowed to cool slowly in the air. This is the method adopted by the Chinese with their gongs, &c., a casing of sheet-iron being employed by them to support and protect the pieces during the exposure to heat. In a general way, however, bells are formed and completed by simple casting. This is necessarily the case with all very large bells. Where the quality of their tones is the chief object sought after, the greatest care should be taken to use commercially pure copper. The presence of a very little lead or any similar metal, greatly lessens the sonorousness of this alloy; whilst that of silver increases it. This last metal has been detected in many old church bells remarkable for the richness of their tones—articles of silver plate having been cast into the crucibles of the founders, as votive offerings, by the pious Christians of former ages.

The specific gravity of a large bell is seldom uniform throughout its whole substance; nor can the *sp. gr.* from any given proportion of its constituent metals be exactly calculated, owing to the many interfering circumstances. The nearer this uniformity is approached, or in other words, chemical combination is complete, the more durable and finer-toned will be the bell.

In general it is found necessary to take

[1] The resulting alloy probably contains 7 Cu + Sn.
[2] More antimony, or some other metal, is often added, as subsequently noticed; but always to the injury of the alloy as bell-metal.
[3] Equal to about 8 Cu + Sn. In some gongs the proportion of tin is so low as 22, or even 20 parts, to 100 parts of copper.
[4] Nearly equal to 6 Cu + Sn.
[5] Equal to about 4 Cu + Sn.

about 1-10th more metal than the weight of the intended bell, or bells, in order to allow for waste and scorification during the operations of fusing and casting. See BELL (*above*), BRONZE, COPPER, &c.

BELLADONN'A (-dŏn'-ă). [It., Sp., Port.; Eng., L., Ger.;[1] B. P.] *Syn.* DEAD'LY NIGHT'-SHADE, DWALE; BELLEDAME, BELLADONNE, &c., Fr.; TÖDTLICHER NACHTSCHATTEN, TOLLKERSCHE, TOLLKRAUT, WOLFSKIRSCHE, &c., Ger.; AT'ROPA LETHA'LIS*, SOLA'NUM FURIO'SUM*, S. LETHA'LE*, S. MANI'ACUM*, S. MELANOCER'ASUS†, &c., L., Bot. var. *Literally*, fair lady; in *materia medica, botany*, &c., the usual name (adopted from the Ital.) of *at'ropa belladonn'a* (Linn.), an indigenous, poisonous perennial, herbaceous plant, of the *nat. ord.* Solaneæ (DC.; Solanaceæ, Endl., Lind.). It flowers in June and July, and its drooping, purple blossoms are common ornaments of our hedges and wastes where the soil is calcareous. It is supposed to be the '*insane root*' of Shakespeare.[2]

The parts of this plant used in medicine and pharmacy are the "fresh leaves and branches to which they are attached; also the leaves separate from the branches, carefully dried, of *atropa belladonna;* gathered, when the fruit has begun to form, from wild or cultivated plants in Britain" (B. P.).

Prop., Uses, &c. Every part of this plant contains ATRO'PIA, and is consequently highly poisonous. Every part, except the berries, is fœtid when bruised, and of "a dark and lurid aspect, indicative of its deadly narcotic quality."[3] Its berries, which are of a glossy violet-black, and of the size of a small cherry, are sweet-tasted, and not at all nauseous. Children and tired travellers and soldiers, allured by their beauty and the absence of disagreeable flavour, have frequently been induced to eat them; but in all cases poisoning, often fatal, has followed the indulgence.[4] Belladonna is, however, in qualified hands, a safe and most valuable medicine. Its chief *use* is as an anodyne, antispasmodic, sedative, and discutient, and particularly to diminish sensibility and allay pain and nervous irritation in a variety of diseases—neuralgia, arthritic and migratory rheumatic pains, painful ulcers, cancer, spasmodic rigidity, strictures, and contractions (especially of the bladder and uterus), angina pectoris, iritis, epilepsy, chorea, hooping-cough, hysteria, mania, fevers, phthisis, asthma, &c.; also as a prophylactic of scarlet-fever,[5] hydrophobia, and salivation, as a resolvent in enlarged and indurated glands (particularly when painful), as an agent to produce dilation of the pupil during surgical examinations and operations, &c. &c. It is employed both internally and externally, and in various forms, as is noticed under its 'preparations' elsewhere. — *Dose.* (Of the *powder*) ½ to 1 gr., twice a day, gradually and cautiously increased until dryness of the throat, or dilation of the pupil occurs, or the head is affected.

Pois., &c. Belladonna, and its preparations, are *poisonous* to *all* animals, but very much more so to the carnivora than to the herbivora. It also acts as a poison on vegetables.

Treatm., Ant., &c. These may be the same as those employed in poisoning by aconite, atropia, and opium. The stomach must be cleared as soon as possible, followed by active purgation. Unfortunately emetics have scarcely any action, and, therefore, must be given in large doses, assisted by tickling the fauces, &c. If copious vomiting does not rapidly follow, the stomach-pump may be had recourse to. When the poison has been removed from the stomach, copious and continued draughts of astringent vegetable solutions (weak decoction of galls or oak-bark, or strong coffee or green-tea), should be persisted in for some time; followed by like draughts of water soured with any mild vegetable acid (as vinegar, lemon-juice, citric or tartaric acid, &c.—*Detec.* The contents of the stomach or vomited matter may be searched for the berries, leaves, seed, or portions of the root; all of which are easily recognisable. The usual physiological and chemical tests of atropia may also be applied to these, and to the organic liquids supposed to contain the poison. See ALKALOID, ATROPIA, EXTRACTS, OINTMENTS, TINCTURES, VEGETABLE JUICES, &c.

BELL'Y (-e). The abdomen (which *see*).

BELTS. In their connection with health and disease, *see* BANDAGE, DRESS, STAYS, &c.

BENGAL' (-gawl'). A thin fabric of silk and hair interwoven, originally from Bengal'.

Ben'gal Light. A firework used as signals. See FIRES (Coloured).

Ben'gal Stripes. Cotton cloth, woven with coloured stripes, orig. from Bengal; gingham.

BEN'JAMIN†*. Benzoin.

BEN'ZENE. See BENZOL.

BEN'ZINE (-zĭn). Benzol.

BEN'ZOATE (-zo-āte). [Eng., Fr.] *Syn.* BEN'ZOÄS, L. A salt in which one atom of benzoic acid is replaced by a metal or other basic radical. The benzoates may, in general, be easily prepared by either neutralising the acid with the base, or by double decomposition. Most of them are more or less soluble in water, and crystallisable. Those of the alkalies and ammonia are very soluble, and rather difficult to crystallise. See BENZOIC ACID and the *respective bases.*

BEN'ZOENE*. See TOLUOL.

[1] As a borrowed word.

[2] "*Macbeth*," a. i, s. 3.

[3] Pereira, 4th ed., ii, 545.

[4] One hundred and fifty French soldiers were thus poisoned at Pirna, near Dresden. (Orfila, "*Tox. Gén.*")

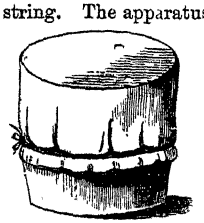
[5] Of 2027 persons who took it, and were exposed to the contagion of scarlet fever, 1948 escaped. Bayle, "*Bibl. Thérap.*," t. ii, p. 504.) Of 1200 soldiers who took it only 12 became affected. (Oppenheim, "*Lond. Med. Gaz.*," xiii, 814.) In this country, however, except among homœopaths, it has not found much favour as a prophylactic.

BENZO'IC ACID (-zō'-ĭk). $HC_7H_5O_2$. *Syn.* FLOWERS OF BENZOIN'; HY'DRATED BEN'ZOYL; ACIDUM BENZOI'CUM (B.P.); ACIDE BENZOÏQUE, FLEURS DE BENJOIN, &c., Fr.; BENZOESÄURE, &c., Ger. A substance which is commonly stated to be the characteristic constituent of the true balsams. Pure oil of bitter-almonds suffers gradual conversion into this acid by exposure to the air.

Prep. The acid of commerce is principally obtained from gum-benzoin, either by sublimation (dry way), or by dissolving it out by means of an alkali, or an alkaline earth, in the form of a salt (moist way); but chiefly by the first method.

1. By SUBLIMATION:—

a. Good benzoin, crushed small or in the state of coarse powder, is placed in a cylindrical iron pot with a flat bottom, and from 8 to 9 inches in diameter, so as to form a layer of from 1 to 2 inches deep. The open end of the pot is next covered with a sheet of soft and loose blotting-paper,[1] which is attached to the rim with paste. A cone, cap, or cylinder, formed of strong thick paper (cartridge paper), open at its lower end, is then placed over the top of the pot, including the blotting-paper; and this is also attached with paste and string. The apparatus, thus prepared, is then placed on a sand bath,[2] and exposed for 4 to 6 hours to a gentle and uniform heat. It is next removed from the sand bath, and, when it has sufficiently cooled, inverted, and the string detached, when crystals of benzoic acid are found in the paper cone. If, owing to want of care in manipulating, the product is either coloured or empyreumatic, it must be enveloped in several folds of bibulous paper, then submitted to powerful pressure, and afterwards resublimed. The simple form of apparatus figured in the *engr.* answers well on the small scale, and is that recommended by Dr. Mohr.



b. (Ph. D. 1850.) The subliming pot is ordered to be of sheet-iron. It is to be fitted into a circular hole in a sheet of pasteboard, and a collar of tow interposed between it and the flange, so as to produce a nearly air-tight junction. The paper receiver or cap is to be cylindrical, open at one end and about 18 inches high, with a diameter at least twice that of the pot; and it is to be secured, in an inverted position, on the pasteboard, and fastened to it by slips of paper and flour-paste. A couple of inches of the pot is to be passed through a corresponding hole in a plate of sheet-tin, which is to be kept from contact with the pasteboard by the interposition of a few corks; and a heat[3] only just sufficient to melt the benzoin is to be applied for at least six hours.

c. (Process adopted at *Apothecaries' Hall*, London.) The best gum-benzoin is put into an *iron pot*, set in brickwork over a suitable small fire-place (or flue),[4] and communicating by a conical metal neck, with a wooden box (technically termed a 'house') lined with white blotting-paper, as a receiver for the flowers. A piece of fine muslin, or of bibulous paper, is interposed between the top of the subliming-pot and the receiver, to prevent the sublimate falling back into the former. The sublimation is conducted rather rapidly, and the acid condenses in beautiful white, soft, flexible crystals, which are at once ready for the market. When the process is conducted more slowly, the product is proportionately scaly.

Obs. Good samples of benzoin yield from 10 to 12½, or even 12⅔ %, of 'flowers' or 'acid of the first sublimation.' This, after being pressed in blotting-paper and again sublimed, gives 8½ to 10% of nearly pure benzoic acid. The loss arising from a second sublimation is thus so great, that the utmost care should be taken to avoid its necessity.

2. In the MOIST WAY:—

a. (Ph. D. 1826; Scheele's Process.) Equal parts of *benzoin* and *hydrate of lime*, in fine powder, are intimately mixed together, and boiled for about an hour, with 40 parts of *water;* the liquor, after filtration, is evaporated to ⅓th, and the lime saturated with *hydrochloric acid;* the benzoic acid crystallises out as the liquor cools, and is then either washed with very cold water, and dried by a gentle heat, or it is dried and sublimed in the manner already explained. The product of the sublimation is extremely white and pure.

Obs. An economical and productive process; but, to ensure success, a perfect mixture of the dry ingredients must be first made; as otherwise the benzoin runs into a solid mass in the boiling water, and the operation fails.—*Prod.* "1 lb. of (gum) benjamin yields 1 oz. 6 drs. 2 scr. of flowers." (Gray.)[5]

b. (Process of Stoltze.) The benzoin is dissolved in 3 times its weight of alcohol, the solution introduced into a retort, and a solution of carbonate of soda in weak spirit-and-water, is gradually added, until all the free acid present is neutralised; water, equal to about twice the weight of the benzoin employed, is next poured in, and the alcohol removed by distillation. The floating resin is now skimmed off the residual liquid, and washed with a little water, and the washings added to the contents of the retort, which will deposit crystals of benzoate of soda on cooling, and more by subsequent evaporation. From this salt the

[1] Felt—*Liebig.*

[2] On an iron plate on which sand has been spread—Ph. Bor.

[3] That of a gas-flame is recommended. A ring of very small gas-jets answers better.

[4] A pan with a steam-jacket answers well, and is very manageable.

[5] A quantity which, in our own experiments, we were never able to obtain.

benzoic acid is obtained by saturating the alkali with an acid (as the hydrochloric), and by subsequent sublimation of the crude precipitated crystals.

3. Other Methods:—

a. Ordinary hippuric acid is very gently boiled, for about 15 minutes, in nitric acid[1] (sp. gr. 1·42); water is then added, and the solution allowed to cool and crystallise. The crystals are collected on a filter, washed with a little very cold water, dried by pressure in bibulous paper, and lastly, purified by sublimation, as before.

b. From the urine of horses, cows, and other graminivorous animals, in a similar way to that by which hippuric acid is obtained, only allowing the urine to acquire a slight degree of putridity before evaporation, which last should be effected by a heat slightly under that of ebullition. The crude acid thus obtained is purified as previously directed.

Obs. Large quantities of benzoic acid are said to be obtained in this way on the Continent; but, owing to the process being clumsily conducted, it is generally of inferior quality, and hence unsaleable. It may, however, by skilful purification, be rendered quite equal to that obtained from gum benzoin.[2]

Prop. When obtained by sublimation benzoic acid forms soft, light, feathery, white, flexible crystals, which are transparent or semi-transparent, with more or less of a mother-of-pearl lustre; when by slowly cooling its aqueous solution, or by precipitation from a solution of a benzoate, it forms either thin plates or scales, or a dazzling white crystalline powder. It is inodorous when cold,[3] but acquires a faint balsamic odour when gently warmed; fuses at about 212° Fahr., and begins to sublime freely at a temperature a little above it, but does not boil until heated to about 460°, burns with a bright yellow flame; is very soluble in alcohol, dissolves in about 200 parts of cold water, and about 25 parts of boiling water; resists the action of ordinary nitric acid even when boiling; and forms salts (BENZOATES) with the bases. Sp. gr. 0·667. Its vapour, which is very suffocating and irritating, has a density of 4·27. Added to fat and fatty substances it either prevents, or greatly retards, the accession of rancidity.

Tests, &c. It may be recognised—1. By its physical properties (appearance, fusibility, volatility, odour, &c.) already enumerated:—2. By its ready solubility in solutions of the alkalies; and by being precipitated from these solutions, on the addition of one of the stronger acids, under the form of a dazzling white powder, which is only sparingly soluble in cold water:—3. By its neutral salts with the alkalies, or its neutral solution in an alkali, giving a bulky, flesh-coloured precipitate with perchloride of iron, which is insoluble in water:—4. By its solution not being precipitated by acetate of lead until after neutralisation with a fixed alkali, when the acetate produces a white, flocculent precipitate:—5. By a mixture of alcohol, ammonia, and solution of chloride of barium, neither disturbing a solution of the free acid, nor that of one of its salts with the alkalies.

It is chemically distinguished from cinnamic acid by not yielding essential oil of almonds when it is distilled with oxidising agents, as chromic acid or a mixture of bichromate of potassium and sulphuric acid; and from succinic acid, by its different deportment with sesquichloride of iron (*Test* 3, antè), and with a mixture of alcohol, ammonia, and solution of chloride of barium (*T.* 5, antè).

Estim.—1. By weighing it as benzoic acid, obtained either by precipitation, or by very careful sublimation in a glass apparatus:—2. By neutralising its alcoholic or aqueous solution, by the usual method of acidimetry:—3. By precipitating its neutral solution with acetate of lead, or with sesquichloride of iron, and weighing the carefully washed and dried precipitate either as benzoate of lead, or as ferric benzoate.

Pur. &c. White crystalline silky plates and needles, having an aromatic odour. Solubility in cold water, 1 in 300; in boiling water, 1 in 12; in spirit, 1 in 4. Also soluble in caustic alkalies and lime. Borax considerably increases its solubility in water; 1 of benzoic acid and 1 of borax are soluble in 100 of water. It sublimes without residue when heated. It is sometimes met with adulterated with hippuric acid, which may be easily detected by its altered form, by its diminishing solubility in cold water, and by its exhaling an odour of tonquin-beans, and afterwards of hydrocyanic acid, when sublimed. The presence of succinic acid may be readily detected by its greatly increased solubility in cold water; that of sugar, not only by its increased solubility, and partial volatility, but also by the odour of caramel being evolved on the application of sufficient heat, and the residuum being black and carbonaceous; that of camphor, by its peculiar odour when gently heated. Spermaceti, specially prepared for the purpose, is also an occasional adulterant, easily detected by its insolubility and other well-known properties. All these substances either destroy or lack the proper crystalline form of benzoic acid, which is one of the best proofs of its purity. They also greatly increase its sp. gr.

Uses, &c. Its chief use in *medicine* is as a stimulant and expectorant. It is an ingredient in the compound tincture of camphor (*paregoric elixir*) of the pharmacopœia.—*Dose.* 10 to 30 grs., dissolved in water by the

[1] Hydrochloric acid as well as sulphuric acid also convert hippuric acid into benzoic acid; as does likewise a sufficient degree of heat. See HIPPURIC ACID.

[2] "A manufactory of sal-ammoniac, near Magdeburgh, which uses urine, is able to supply flowers of benjamin by the cwt." (Gray.)

[3] That of the shops usually smells slightly of benzoin, owing to the presence of a trace of volatile oil.

aid of a little ammonia or potassa; in old coughs, &c.

BENZO'IC AL'COHOL. A peculiar oily fluid, discovered by M. Cannizzaro, and obtained by the action of an alcoholic solution of potassa on pure oil of bitter almonds.

BENZOIN', B. P. (-zoyn'; -zō'-in). *Syn.* GUM-BENZOIN*‡, BEN'JAMIN†*, GUM-B.†*; BENZŌI'NUM, L., B. P.; BENJOIN, Fr.; BENZÖE, Ger. The balsamic resin exuded from incisions made in the stem of the *styrax benzoin*, a native of Sumatra, Java, Borneo, Laos, and Siam. Several varieties of benzoin are in the market; two only, however, are chiefly used in medicine, one in agglutinated masses, the other (from Siam), in tears, being the purer and having the stronger odour.

Prop., &c. Odour agreeable, and somewhat like that of vanilla, but more balsamic; fracture conchoidal; lustre greasy; sp. gr. 1·063 to 1·092. It fuses at a gentle heat, and exhales white fumes, which, on condensation, are found to be benzoic acid contaminated with a little volatile oil. Alcohol dissolves the larger portion of it, ether much less, and the volatile and fixed oils only a little. It contains from 9% to 18, or (occasionally) nearly 20%, of benzoic acid, according to the quality. It burns with an agreeable odour. The resin and its alcoholic solution strike a bright red colour with oil of vitriol, and a green colour with chloride of iron.

Uses, &c. It is chiefly employed in perfumery, and as an ingredient in incense, fumigating pastilles, &c.; also in court-plaster, in certain cosmetics, and to scent the varnish used for snuff-boxes, walking-sticks, &c. As a medicine, its general effects resemble those of the other true balsams, and of benzoic acid. —*Dose.* 5 or 6 to 20, or even 30 grs., in powder, and usually in combination with some other remedy; chiefly in chronic pulmonary and bronchial affections, when occurring in torpid habits, and unaccompanied by inflammatory symptoms or gastric irritation. Also as a fumigation in the same diseases, hooping-cough, &c. Like benzoic acid, it is used to prevent rancidity in ointments, pommades, and other fatty preparations.

BENZOINUM. See BENZOIN.

BEN'ZOL (-zōle). C_6H_6. [*benz*(oin)-*oleum*.] *Syn.* BEN'ZENE*, BEN'ZĪNE, BEN'ZŌLE*, HYDRIDE OF PHE'NYL*, PHE'NE†, &c.; BENZO'LEUM, L.; BENZINE, Fr.; BENZÖL, Ger. A peculiar ethereal hydrocarbon discovered, by Faraday, among the products of the destructive distillation of whale oil and other organic substances (A.D. 1825); and subsequently shown, by Mitscherlich, to form the principal ingredient in the distillate procured by the action of heat on a mixture of benzoic acid and hydrate of lime. In 1849, Mr. C. B. Mansfield[1] discovered its presence in coal-tar naphtha, from which the benzol of commerce is now chiefly, if not wholly, obtained.

Prep. 1. PURE:—*a.* A mixture of *benzoic acid*, 1 part; *fresh-slaked lime*, 3 parts; is submitted, in a coated glass or earthenware retort, to a heat slowly raised to redness; the oily portion of the resulting distillate is then separated from the water, and carefully rectified, with the proper precautions, at a temperature not exceeding 190° Fahr. The product is usually stated to be pure benzol; but to ensure this it may be submitted to one refrigeration and rectification, in the manner and at the temperature noticed below.

b. From good commercial benzol, agitated with 1-4th or 1-5th of its weight of concentrated sulphuric acid, and, after repose and decantation, rectified at a temperature under 195° Fahr.; the resulting distillate is exposed to a temperature below[2] 32° Fahr., and the mass of crystals that form are thrown on a funnel, kept at the same temperature, to drain, after which they are pressed between folds of bibulous paper,[3] and then allowed to liquefy by simple exposure, in a close vessel, to the ordinary temperature of the atmosphere. The product, after rectification at a temperature not exceeding 190°, is nearly pure benzol. It may be rendered absolutely pure by repeating the refrigeration a second and a third time, followed by a final rectification at 180-185° Fahr.

2. COMMERCIAL:—By submitting light coal-tar naphtha to distillation, either at once, or after it has been agitated with a little oil of vitriol, and decanted, care being taken that the temperature does not exceed 200° Fahr.

Prop. Pure benzol is a clear, colourless, very mobile liquid, having a strong, characteristic, and rather agreeable ethereal odour. It is neutral to test-paper; exceedingly volatile at all temperatures; insoluble in water; miscible with alcohol and with ether; highly inflammable; burns with a brilliant flame, emitting clouds of smoke, which rapidly condense and fall as a shower of fine sooty, carbonaceous matter; boils at 176° Fahr.;[4] solidifies, at 32°, to a snowy white camphor-like mass, or, when very slowly refrigerated, to beautiful transparent cruciform leaflets, which aggregate together into forms resembling fern-fronds; remelts at 40-1° Fahr.; and when solidifies burns, like camphor, without previous fusion. Sp. gr. ·850;[5]

[1] This unfortunate chemist lost his life (Feb. 25, 1855), in consequence of being severely burned whilst experimenting on benzol.

[2] Preferably considerably below. If the distillate be not rich in benzol, a temperature so low as 8 or 10°, or even 4-5°, Fahr. may be necessary or, at all events, advantageous.

[3] Filtration under pressure is thought by some chemists to be preferable. For this purpose a '*Beart's Coffee-pot*' (or a similarly constructed apparatus), was often employed by Mansfield, and is recommended by Prof. Muspratt.

[4] Fownes, Mansfield, Muspratt, and others; 186°—Mitscherlich; 187°—Mr. C. G. Williams (in Ure's "*Dict. of A., M., & M.*," 5th ed.). See *Note* 5 (below).

[5] Williams, Ure, Muspratt; ·885—Fownes, Mitscherlich. The different sp. gr. and boiling-points assigned to benzol, by authors, can only be accounted for by samples of different degrees of purity having probably been ex-

sp. gr. of vapour, 2·770.[1] It is unaffected by the ordinary hydrated acids, and has no action on the alkaline metals. Highly concentrated nitric acid readily dissolves it, and from this solution nitrobenzol is precipitated on the addition of water. Its vapour is dangerously inflammable, and, when mixed with the air, is highly explosive. Its solvent power extends over a numerous list of substances. Commercial benzol has a less agreeable odour, and not unfrequently a slight colour, with other modifications of the properties just enumerated, depending on the relative amount of impurities contained in it.

Pur.—1. It should be colourless, without action on either litmus or turmeric paper, and have the boiling-point, sp. gr.,[2] &c., already indicated:—2. A few drops thrown on a slip of glass, or a piece of white paper, should rapidly and entirely evaporate by simple exposure to the air, without leaving a stain behind, or evolving any disagreeable or foreign odour:—3. Agitation with a little sulphuric acid should not discolour it:—4. It should not perceptibly lose weight or volume by agitation with a little cold water.

Detec.—1. From the physical and other properties already enumerated:—2. By converting it into aniline and then testing it accordingly. For this purpose a little of it is dissolved in concentrated nitric acid, and the nitrobenzol thus formed is precipitated by the addition of water. The fluid is then agitated with ether, to dissolve out the nitrobenzol, and the resulting ethereal solution is mixed with an equal bulk of alcohol and hydrochloric acid, and a little granulated zinc at once added. Hydrogen is evolved, and by its action the nitro-compound is converted into aniline. The liquid is next alkalised with potassa in excess, and the alkaline fluid agitated with ether. The ethereal solution, on evaporation, leaves a residue (aniline), which, after the addition of a little water, may be tested with a few drops of solution of chloride of lime, when a characteristic purple colour will be developed, provided the original liquor was benzole, or contained it. In this way very minute traces of benzol may be detected.

Uses, &c. In its impure or commercial form, chiefly as a solvent for gutta percha, and india-rubber; but it leaves the first in a spongy, friable state, and the latter glutinous or sticky, unless heat is applied to it for some time; also as a solvent in the manufacture of varnishes, as a diluent, in lieu of oil of turpentine, for oil-paints, as a material for the production of artificial light, &c. &c. In the pure, or nearly pure form, it is largely employed in the laboratory and in chemical analysis as a solvent of many resins,[3] mastic, wax, camphor, fat, the fixed and essential oils, sulphur, phosphorus, iodine, several of the alkaloids,[4] &c. &c. Under the name of BENZINE and BENZINE-COLLAS it has been recently extensively vended for the removal of spots of grease, paint, &c., from woven fabrics, which it does most readily and completely, without detriment to the material. As a source of artificial light it has been the subject of innumerable applications and patents. It may be burned in a 'wickless' lamp, provided a proper cap-burner be employed. Alcohol or pyroxilic spirit containing 1-3rd, or even 1-4th of it, burns with a rich white flame. Air driven through it becomes sufficiently inflammable to serve as illuminating gas; whilst ordinary coal-gas by merely passing over it yields a flame of greatly increased brilliancy; but in all these applications the greatest possible care is necessary to prevent accidents.[5] See NAPHTHA (Coal-tar).

BENZOYL. C_7H_5O. The radical of an extensive series of compounds, of which the hydride, C_7H_5OH (essential oil of bitter almonds), and benzoic acid, $HC_7H_5O_2$, are the most important members.

Benzoyl, Hydride of. C_7H_5OH. *Syn.* ESSENCE OF BITTER ALMONDS, ESSENTIAL OIL OF BITTER ALMONDS, VOLATILE OIL OF BITTER ALMONDS.

Prep. 1. The crude oil of bitter almonds is agitated with a moderately dilute solution of protochloride of iron which has been previously mixed with fresh hydrate of lime in excess, and the whole, after having been placed in a retort connected with a suitable receiver, is subjected to distillation. The hydride passes over mixed with water, from which it is easily separated after repose. By subjecting it to a second agitation and distillation with a fresh mixture of the protochloride and hydrate, and, after careful separation from the water which distils over with it, allowing it to remain for some hours in contact with a few fragments of fused chloride of calcium, to free it from all traces of adhering water, the product will be nearly chemically pure, provided the whole process has been conducted with as little access of air as possible.

examined. The numbers given in the text are those now usually adopted; but we are not prepared to say, that they are definitely settled. On the contrary, we think it not unlikely that further investigations may show that the apparently greater levity of the benzole obtained from naphtha may arise from the presence of some other hydrocarbon which has hitherto escaped detection.

[1] Theoretically, 2·738.

[2] If it has a less sp. gr. than ·850, it is probably adulterated with the naphtha obtained from the Torbane-hill mineral or Boghead-coal, of which the sp. gr. is only ·750.

[3] Anime and copal are scarcely affected by it in the fluid state, but readily dissolve in its vapour at the point of condensation.

[4] Particularly quinine, which it dissolves readily, but not cinchonine. Hence it is invaluable for the separation of them. It may be economically and conveniently substituted for ether in the preparation of many alkaloids, with the advantage of being applicable in many cases in which ether cannot be employed.

[5] Workmen constantly exposed to the vapour of benzol are very subject to nervous irritability, and, where the apartment is ill-ventilated, even fits of nervous prostration and trembling, of a truly alarming character. In two or three cases which we have seen, the symptoms, to the inexperienced eye, closely resembled those occasionally resulting from the long-continued use of very minute doses of strychnia, or of the alcoholic extract of nux vomica.

2. (Liebig.) Agitate the crude oil of bitter almonds with mercuric oxide, in slight excess, and, after a few days' contact, rectify the oil from a little fresh oxide of mercury. The product is quite pure, when the process is properly managed. The bicyanide of mercury thus formed may be either employed as such, or reconverted into oxide of mercury and hydrocyanic acid.

Prop., &c. A rather thin, colourless liquid, of great refractive power, and characteristic and agreeable odour; soluble in 35 parts of water; miscible in all proportions with alcohol and ether; it boils at 356° Fahr.; on exposure to the air it rapidly absorbs oxygen, and becomes converted into a mass of crystallised benzoic acid; heated with solid hydrate of potassa, hydrogen is evolved, and benzoate of potassium formed; with the alkaline bisulphites it forms beautiful crystalline compounds. Its flame, and that of its vapour, is bright but very smoky. Sp. gr. 1·043. It differs from the crude or common oil of bitter almonds chiefly in the absence of hydrocyanic acid, and consequently in not being poisonous. It has hence been proposed as a substitute for the crude oil as a flavouring ingredient in cookery, confectionery, liqueurs, &c.; but is unfitted for the purpose owing to the rapid deterioration it suffers unless it be kept absolutely excluded from the air.

Formiate of Hydride of Benzoyle. See FORMOBENZOIC ACID.

BER'BERINE (-een).[1] $C_{20}H_{17}NO_4$. [Eng., Fr.] *Syn.* BAR'BERINE*, BER'BERITE* (of Thomson); BERBERI'NA, L. A substance discovered by Buchner and Herberger in the *root* of the common barberry shrub (*ber'beris vulgăr'is*, Linn.); and subsequently, by Bödecker, in calumba-root; and more recently, by Mr. Perrins, in the calumba-wood (*menispermum fenestratum*) of Ceylon, which contains a considerable quantity of it.

Prep. 1. A soft watery extract of the root, or of the wood, is digested in rectified spirit, with trituration, as long as anything is taken up; the resulting tincture, after repose, is filtered, and the alcohol gradually distilled off until the residuum has the consistence of a thin syrup. The crystals which form as the liquid cools are drained in a funnel, washed with a few drops of ice-cold water, pressed dry in bibulous paper, and then purified by solution and crystallisation, first in rectified spirit, and next in distilled water.

2. By digesting the root, or the wood, (coarsely powdered,) in rectified spirit, and then proceeding as before.

Prop. Berberine may be classed with the azotised colouring substances; or, from its composition and its possessing feeble basic properties, with the alkaloids. It crystallises in fine needles, or in stellated prisms, which are yellow, odourless, very bitter-tasted, neutral to test-paper, and contain 12 equiv. of water. At 212° Fahr. it acquires a red colour; but recovers its normal yellow on cooling. A much higher temperature decomposes it, yellow vapours being evolved. It is freely soluble in boiling water, and in alcohol, from either of which solutions it may be readily obtained in crystals. It requires 500 parts of water at 60° to dissolve it, and very much more at lower temperatures. Its solutions are yellow; that in alcohol appears green, by reflected light. The concentrated mineral acids destroy it. Its salts are more or less soluble.

Uses, &c. Chiefly in medicine, in similar cases to those in which the use of calumba-root is indicated. It has been highly recommended in dyspepsia and heartburn, in disturbed action of the liver, and, combined with iron (lactate, phosphate, or hyposulphite), in chlorosis, anæmia, &c. According to M. Altin, it is an effectual remedy for the mucal, colourless diarrhœa, and the derangement of the urinary secretion, which commonly follow cholera.—*Dose.* 3 to 10 grs.; in larger doses it proves laxative. See CALUMBA, &c.

BERG'AMOT. *Syn.* BERGAMO'TA, L.; BERGAMOTE, Fr.; BERGAMOTTE, Fr., Ger. The bergamot-lemon, or fruit of *cit'rus berga'mia*; also sometimes, colloquially, the fragrant oil obtained from its rind. See OILS (Volatile).

BER'RY (bĕr'-re). *Syn.* BAC'CA (pl. *bac'cæ*, -sē), L.; BAIE, Fr.; BEERE, Ger. Any small succulent or pulpy fruit containing several naked seeds or granules. In *botany*, an indehiscent pericarp or seed-vessel, pulpy, many-celled, and many-seeded; the seeds being naked, and for a time connected by a slender membrane, from which they become detached at maturity, and then remain dispersed through the pulp. It is distinguished by its figure, &c., into several varieties.

The leading berries employed in domestic economy and the arts are noticed in their alphabetical places (which *see*).

BER'YL (bĕr'-rĭl). *Syn.* AQUAMARINE' (-rēne'); A'QUA-MARI'NA, BERYL'LUS, L.; AIGUE-MARINE, BÉRIL, Fr.; BERYLL, &c., Ger.; SMARAGD, It. A beautiful mineral, which, in its richer forms, is classed with the gems. It is usually of a green colour of various shades, passing into honey-yellow and sky-blue. It is allied in composition to the emerald; but occurs in much larger crystals than that gem, and owes its colour to oxide of iron, instead of oxide of chromium. According to Gmelin its composition is—Silica, 68·7%; alumina, 17·6%; glucina, 13·4%; red oxide of iron, ·24%. Other (previous) authorities state that it contains fully 14% of glucina, 2% of lime, and 1% of oxide of iron.

The finest beryls come from Dauria on the frontiers of China, from Siberia, and from Brazil. Some of gigantic size have been found in the U. S., at Ackworth and Grantham, New Hampshire, and at Royalston,

[1] This substance must not be confounded with BEBERINE or BIBERINE (which *see*).

Mass. One of these measured 32 × 22 × 15 inches, and weighed 2900 *lbs.*; another, 12 × 24 × 45 inches, and weighed 1076 *lbs.*

Apatite or Saxony beryl, chrysolite or pierre d'asperge, coloured fluor-spar, and even natural crystals of phosphate of iron, are often worked up by the lapidaries and passed off as beryls, or false beryls, emeralds, topazes, &c. See GEMS, PASTES, &c.

BERYL'LA*. See GLUCINA.

BERYL'LIUM*. See GLUCINIUM.

BE'TEL (bē'tl). [Eng., Ger.] *Syn.* BE'TLE, BE'TEL-TREE, B. PEPPER-TREE; BÉTEL, Fr.; WASSERPFEFFER, &c., Ger.; PI'PER BE'TEL (Linn.), CHAVICA BETLE (Miquel), L. A climbing plant of the *nat. ord.* Piperaceæ, common in India and the East. Its leaves, which somewhat resemble those of the citron, are bitter, stomachic, tonic, stimulant, and sialogogue.

Betel. A common masticatory in the East, where it is chewed in the same way as tobacco is by Europeans and Americans, but much more generally, being regarded by the Malays, Sumatrans, &c., as an absolute necessary of life. It is commonly formed by dividing *areca-nuts*[1] into four or six equal parts or slices, one of which is rolled up, with a little *chunam*,[2] in a *sirih* or *leaf* of the *piper-betel*,[3] and then constitutes a 'quid' ready for use.

Prop., &c. Betel, in those accustomed to its use, produces a species of pleasing excitement or intoxication, stimulates the action of the salivary glands, stomach, and kidneys, corrects acidity, diminishes cutaneous perspiration, restrains excessive discharges, increases the power of physical exertion and endurance, moderates the effects of climate, and appears to act as a general tonic on the system. It darkens the teeth, and tinges the saliva, as well as the mouth and lips of a bright red colour. In those unhabituated to its use, it causes giddiness, astringes and excoriates the mouth and fauces, and temporarily deadens the sense of taste. The Indians conceive that it preserves and fastens the teeth, cleanses and strengthens the gums, sweetens the breath, cools the mouth, assists respiration, and acts as a general aphrodisiac on both sexes. Peron states that he preserved his health during a long and very trying voyage by the habitual use of betel, whilst his companions, who did not use it, died mostly of dysentery.[4]

BE'TEL-NUT. *Syn.* ARE'CA-NUT; NUX ARE'CÆ CAT'ECHU, N.-BE'TEL, &c., L. The *seed* of the catechu-palm (*are'ca cat'echu*, Linn.), divested of the husk or fibrous pericarp. The whole fruit (ARECA-NUT of commerce) is about the size of a small egg; the husked nut is of the size of a large nutmeg. The whole fruit is remarkable for its narcotic or intoxicating power. It has, however, been thought doubtful whether its intoxicating effect is not owing to the piper-leaf in which it is wrapped when eaten (chewed), rather than to any special property of its own. See ARECA CATECHU.

BET'ULINE (-ū-līn; bē'-tū). [Eng., Fr.] *Syn.* BETULI'NA, L. A crystalline substance obtained from the bark of the white birch (*be'tŭla al'ba*, Linn.).

BE'ZOAR (-zōre). [Eng., L. indecl.; *prim.* Pers.[5]] *Syn.* BE'ZOAR-STONE; BEZOA'DUS, LA'PIS BEZOA'DICUS, &c., L.; BÉZOAR, BÉZOARD, Fr.; BEZOARSTEIN, Ger. The name of preternatural concretions found in the stomach, intestines, &c., of certain animals, and formerly supposed to possess the most extraordinary antidotal power and medicinal virtues. So far, indeed, did this belief extend, that other substances regarded as antidotes were called BEZOA'DICS†, or otherwise named after them; whilst the adj. BEZOA'DIC† (bĕz-) and BEZOA'TICAL† (*bézoardique*, Fr.; *bezoar'dicus*, L.), came to be synonymous with antidotal. Certain bezoars were once valued at even ten times their weight in gold. They were not only taken internally, but also worn as amulets. They have, however, long since fallen into disuse in this country.

Among the leading bezoars of old medicine are—

Bezoar, Ger'man. *Syn.* BE'ZOAR GERMAN'ICUM, B. CAPRI'NUM, L. From the Alpine goat.

Bezoar, Hu'man. *Syn.* B. HOM'INIS, L. Falsely stated to be found occasionally in man.

Bezoar, Microcos'mic. *Syn.* B. MICROCOS'MICUM, L. Human urinary calculi.

Bezoar, Mon'key. *Syn.* B. SIM'IÆ, LA'PIS S., L. From certain species of ape or monkey, obtained by giving an emetic.

Bezoar, Occiden'tal. *Syn.* WEST'ERN, B.; B. OCCIDENTA'LE, L. Found in the fourth stomach of the chamois or wild goat of Peru, &c.; or, according to others, of a species of antelope.

Bezoar, Orien'tal. *Syn.* EAST'ERN B.; B. ORIENTA'LE, LAPIS B. ORIENTA'LIS, L. From the fourth stomach of *ca'pra æga'grus*, a species of goat inhabiting the mountains of Persia, &c.

Bezoar, Ox. *Syn.* B. BOVI'NUM, L. From the ox, and other bovine animals.

Bezoar, Por'cupine. *Syn.* B. HYS'TRICIS, B. HYS'TRICUS, LA'PIS H., L. PORCI'NUS, &c., L. Said to be found in the gall-bladder of the Indian porcupine. Chiefly from Malacca. Has an intensely bitter taste, which it imparts to water.

Bezoar, West'ern. See OCCIDENTAL BEZOAR (*antè*).

[1] In many cases suitable pieces of the whole fruit, including the husk, are used; and in others, only the husk (PINANG); there being different strengths and qualities of 'betel' employed.

[2] *Lime* made by burning shells.

[3] In some cases, the leaf of *chavica siriboa* (Miq.), which possesses similar properties, is employed.

[4] "*Voyage aux Terres Australes.*"

[5] Some authorities derive this word from *badzahr* or *pazahar*, Persian compounds implying 'antidote to poison;' others, from *paseng*, or *pasahr*, the name of the goat in Persia. Mayné's notation—*bez'oar*, is unusual; and several of his analogues, synonymes, &c., are incorrectly given (? misprinted).

Of the preceding, those from the stomach of ruminants vary in size from that of a bean to that of a hen's egg, and have a composition and appearance closely imitated by the following formula, the product of which is commonly sold for them:—

Bezoar, Facti″tious. *Prep.* From pipe-clay, or clay and chalk, equal parts, made into a stiff paste with ox-gall; a little hair or wool being added, and the resulting mixture pressed by the hands into small masses of a flattened spheroidal or egg-like form. These give a yellow tint to paper rubbed with chalk, and a green one to quick-lime, which tests are used for genuine bezoars. Like the latter, they are antacid or absorbent, which is probably the only virtue they possess.

Amongst '*chemical bezoars*' now obsolete, even on the Continent, were—

Bezoar, Ar'gentine†; B. LUNA″RE, L. Made by distilling butter of antimony with a solution of nitrate of silver. Once highly esteemed in epilepsy and head diseases.

Bezoar, Min'eral; B. MINERA'LE, L. Powder of algaroth deflagrated with nitre in a red hot crucible, and then well washed with water. Once used as a diaphoretic. Other similar preparations were B. JOVIA'LE (from *tin*), and B. MARTIALE (from *iron*).

Bezoar, Sat'urnine, B. OF LEAD; B. SATUR'NI, L. Made by distilling a mixture of oxide of lead, butter of antimony, and nitric acid. Once highly esteemed in diseases of the spleen.

BHAURTA. In Indian cookery, a dish made of mashed potatoes and onions, strongly spiced with capsicum, and sometimes also with curry-powder, shaped in a mould, and then slightly baked.

BIBAS'IC. *Syn.* BIBAS'ICUS, L.; BIBASIQUE, Fr. In *chemistry*, having two bases, or two atoms of the base or basic radical in its composition. See ACID, NOMENCLATURE, SALT, &c.

BIB'ERON (bĭb'-rōng). [Fr.] A sucking-bottle or 'artificial mother.' See BOTTLES.

BI'BIRINE (bē'-). See BEBEERINE.

BIB'ULOUS (-ū-). *Syn.* BIB'ŬLUS, L.; SPONGIEUX, Fr. Absorptive; spongy.

BICAR'BONATE. A salt in which only half the hydrogen in (hypothetical) carbonic acid (H_2CO_3) is replaced by a metal, *e. g.* bicarbonate of sodium, $NaHCO_3$.

BICE (bīse). *Syn.* BLUE BICE. See BLUE PIGMENTS.

Bice, Green. See GREEN PIGMENTS.

BI'DERY (bē'-). *Syn.* VIDERY. An alloy of which the chief seat of the manufacture is the city of Bider', near Hyderabad, India. It was first brought under the notice of the British public at the International Exhibition of 1851, where many articles made of it were greatly admired for the elegance of their forms, and the gracefulness of their engraved and enchased patterns.

Prep. 1. *Zinc*, 31 parts; *copper* and *lead*, of each, 2 parts; melted together, with the usual precautions, under a mixture of *resin* and *bees'-wax*, to prevent oxidation.[1]

2. (Dr. Heyne.) *Copper*, 8 parts; *lead*, 2 parts; *tin*, 1 part; melted together, as before. For use, the resulting alloy is remelted, and to every 3 parts of it, 26 parts of *zinc* are added.

Prop., &c. Colour, between that of pewter and zinc; does not corrode by exposure to air or damp; yields little to the hammer, and can only be broken by extreme violence. It possesses a convenient degree of fusibility, above that of zinc and tin, but much lower than that of copper. For the turner it is usually cast in moulds of baked clay; but otherwise in moulds of iron or other hard metal. The beautiful black colour, which the finished articles possess, is imparted by dipping them into a solution of sal-ammoniac, saltpetre, sea-salt, and blue vitriol. See BRASS, BRONZE, PEWTER, &c.

BIDET' (bĭd-ĕt'; -ā'—Fr.). An article of bedroom furniture conveniently formed for laving the lower part of the body. Besides the value of its use as an instrument of personal cleanliness and health, it offers a ready means of medicating the parts, often highly serviceable in piles, prolapsus, affections of the scrotum and prostate gland, strangury, ischuria, suppressed or difficult menstruation, &c. See ABLUTION, BATHS, &c.

BIEN'NIAL (bī-ĕn'-y'ăl). *Syn.* BIEN'NIS, L.; BIENNAL, BISANNUEL, DE DEUX ANS, Fr.; ZWEIJÄHRIG, Ger. Occurring once in, or lasting, two years. In *botany* and *gardening*, applied to plants that do not produce flowers and seed until the second year or season of their growth, and which then die; *subst.*, a biennial plant.

The existence of the biennials, like that of the annuals, may be prolonged by art; indeed, many of them, by carefully removing the flowers ere the seed-vessels begin to form, may be made to bloom a second season, and even for several seasons following, like perennials. See ANNUALS, FLOWERS, PLANTS, &c.

BIFF'IN. A baked apple, flattened by pressure.

Prep. The *apples* are placed in a cool oven, 6 or 7 times in succession, and flattened each time by gentle pressure, gradually applied, as soon as they are soft enough to bear it; after which they are taken out, and as soon as cold put on clean dishes or glass plates. The sour or tart variety of apples is the best for baking. If the process be well managed, the appearance of the prepared fruit is very rich, and the flavour delicious.

BIL'BERRY. The whortleberry.

Bilberry, Bear's. Uva ursi.

BILE. *Syn.* BI'LIS,[2] CHO'LE,[3] FEL,[4] L.;

[1] These are very nearly the proportions which Dr. Hamilton says he saw used in India.

[2] Properly, the 'gall' after it leaves the 'gall-bladder'—a sense retained in its English analogue. [3] Χολή, Gr.

[4] Strictly, the gall-bladder with the gall.

BILE, FIEL, GALLE, Fr.; GALLE, &c., Ger. A bitter fluid secreted by the liver, from venous blood; in part flowing from the intestines, and in part regurgitating into the gall-bladder. Its composition is of a very complex character; and its uses in the animal economy appear to be—to separate the chyle from the chyme, to promote the digestion and assimilation of oleaginous substances, and to assist in exciting the peristaltic action of the intestines. The fæces appear to owe their colour chiefly to the presence of bile; as, without it, they possess a dirty pipe-clay colour. Several of the substances which enter into its composition, or which are formed from those which do so, are noticed elsewhere, under their respective names. Its analysis, detection, and uses in the arts, are given under GALL.

Bile (of Animals). See GALL.

BILE, Bil'iousness. Under these terms are popularly included all those slight affections of the stomach, usually accompanied with derangement of the head and bowels, apparently arising from excess of bile. Persons subject to attacks of this description should be particularly careful to avoid excess in both eating and drinking, and should more especially shun those articles of food, and those liquors, which, from experience, they find are apt to disagree with them. A mutton chop, slightly underdressed, is an excellent article for the breakfast, or the lunch, of bilious patients; and good beef or mutton, either broiled or roasted, so that the gravy be retained, is better for dinner than many dishes apparently more delicate. These, with fresh game and venison, form a good variety from which to choose a bill of fare. New beer and porter should be particularly avoided, as well as boiled meat, stews, soups, greasy or rich puddings, much butter or fat, and most articles of pastry, as they are very indigestible, and, by overtasking the powers of the stomach, very apt to derange it. Strong cheese,[1] salads (particularly cucumbers), over-ripe or unripe fruit, new bread and rolls, cabbages and green vegetables, and especially peas, beans, nuts, almonds, and the like, are also objectionable for parties with delicate stomachs or a bilious tendency. The bread eaten by such persons should be perfectly free from alum, and preferably prepared with meal retaining the whole of the bran in it; and should be two days, or at the least, one day old. The quantity of animal food per day, except for the laborious, should be limited to from 6 or 8 to 12 *oz.*; and warm slops of all kinds, except moderately strong tea and coffee, should be taken as seldom as possible, and, in general, avoided altogether. Even cocoa and chocolate prove injurious to the delicate and bilious. Out-door exercise and plenty of fresh air are essential to the health of such persons. Those who indulge in them freely are never attacked with affections of this kind, unless it be after gluttonising or heavy drinking. Above all things heavy and late suppers should be abandoned; indeed, the better plan is to take nothing more than a hard biscuit, or dry crust, after tea.

In general, attacks of bile may be prevented by the exercise of moderate judgment and temperance in living; and, in those hitherto subject to them, by the occasional use of an aloetic, mercurial, or saline aperient; and they may be generally rapidly removed by an emetic, followed by a dose of castor oil, Epsom salts, or Seidlitz powder. A tumbler of pure cold water taken on retiring to rest, and another (or even two) on rising in the morning, will often remove both the tendency and the fit, when all the usual remedies have failed. See ABERNETHY MEDICINES, ANTIBILIOUS, DYSPEPSIA, STOMACH AFFECTIONS, &c.

BIL'IARY AFFECTIONS (-yăr-e). See BILE (*antè*), CALCULI, JAUNDICE, LIVER, &c.

BI'LINE (-lĭn). *Syn.* BILI'NA, L. This name has been loosely applied to two substances:—1. Bile, or pure bile, freed from the mucus of the gall-bladder, and gently evaporated to dryness. A gummy pale yellow mass, white when powdered:—2. Tauro-cholalic or choleic acid. See GALL, &c.

BIL'IOUS (-yŭs). *Syn.* BILIO'SUS, L.; BILIEUX, Fr.; GALLIG, GALLICHT, &c., Ger. Pertaining to, caused by, full of, or having excess of bile. See BILE, BILIOUSNESS.

BILIPH'EINE (-ē-ĭn). Cholepyrrhine.

BILIV'ERDINE (-dĭn). A green colouring matter, identical with chlorophyll, found in bile, and in the green dejections of children.

BILL OF FARE. In *cookery, domestic economy*, &c., a list of things ready dressed or prepared for the table (CARTE, C. D'UN RESTAURANT, MENU, &c., Fr.); also a list of articles of food in season. For *Tables* of the latter, see FOOD.

BI'NARY. *Syn.* BINA"RIUS, L.; BINAIRE, Fr. Consisting of two parts. In *chemistry*, compounded of two elements, or of two bodies performing the function of elements.

BINOC'ULAR (-ū-). Having two eyes. In *optics*, of or with two eyes, as *binoc'ular vi"sion;* or formed with two eye-pieces or tubes, so as to be used with two eyes, as a *b. mi'croscope, b. tel'escope*, &c.

BIRCH. *Syn.* BE'TULA, L.; BOULEAU, Fr.; BIRKE, Ger. The common name of trees of the genus *be'tula;* appr., *b. al'ba* (Linn.), or white birch; also its wood. See BETULINE, and *below*.

Black Birch. *Syn.* CHEE'RY B., SWEET B., MOUNT'AIN MAHOG'ANY; BETULEN'TA, L. A forest tree of No. America. Wood, used for cabinet-work: bark yields a volatile oil similar in odour and taste to that of gualtheria; juice, obtained by tapping, saccharine, and yields BIRCH-SUGAR.

White Birch. *Syn.* BIRCH, (*or*) COMMON B.; BE'TULA, L. A tree found in the woods of England. Wood, neither very hard nor durable; leaves formerly used in itch and dropsy;

[1] Rotten cheese is absolute poison to the bilious.

bark febrifuge, yields a pyroligneous oil by distillation. See OILS (and *above*).

BIRD.[1] [Eng., Sax.] *Syn.* A'VIS, L.; OISEAU, Fr.; VOGEL, Ger. Any fowl, or animal of the feathered kind. In fashionable and gourmandic cant, *appr.* a partridge. See BIRDS (*below*).

BIRD'LIME. *Syn.* VIS'CUS, L.; GLU, Fr.; VOGELLEIM, Ger. *Prep.* The middle bark of the holly (gathered in June or July), is boiled for 6 to 8 hours in water, or until it becomes quite soft and tender; the water is then drained off, and it is placed in a heap, in a pit underground (commonly on layers of fern), and covered with stones. Here it is left to ferment for 2 or 3 weeks, and watered, if necessary, until it assumes a mucilaginous state. It is next pounded in a mortar until reduced to a uniform mass, which is then well kneaded with the hands, in running water, until all the refuse matter is worked out. It is, lastly, placed in an earthen vessel, and covered with a little water; in which state it may be preserved from season to season. In about a week it is fit for use.

Prop. Greenish coloured; very gluey, stringy, and tenacious; when air-dried, brittle and pulverisable, but capable of gradually assuming its previous viscosity when moistened.

Uses. To cover twigs to catch birds, and other small animals. It is said to be discutient, but is now never employed in medicine.

Obs. Birdlime may also be made from misletoe-berries, the young shoots of the elder, the bark of the wayfaring-tree, and some other vegetables, by a similar process to that above described. Should any of it stick to the hands, it may be removed by means of a little oil of turpentine.

A kind of FACTITIOUS BIRDLIME is made by boiling linseed oil either with, or without, a little yellow resin, until it forms a viscid, stringy paste when cold. This is chiefly used, spread on paper or cloth, to catch insects. See FLY-PAPERS, &c.

BIRDS. *Syn.* A'VES, L. Birds, besides their value as food, play an important part in the economy of organic nature, and particularly in that of the vegetable kingdom. They are the best friends of the agriculturist and the gardener; and their presence, in numbers, appears essential to keep down the innumerable races of insects that prey upon our cereals, fruits, and culinary vegetables. M. Florent Prevost, who has for fifty years presided over the Natural History Museum of Paris, and who has, like the ancient Roman augurs, examined the entrails and stomach of fowls with scientific curiosity, avers, as the result of his long experience, that birds, of whatever sort, are an unmitigated blessing to the farmer, and that the detritus and organic particles found by inspection of them in whole hecatombs, which, by the assistance of the Royal Forest Rangers, he has sacrificed on the altar of utility, show an immense preponderance of insect corpuscula in their digestive organs, whilst the traces of cereal or other valuable products are infinitesimal in comparison. It is found that even sparrows, rooks, and owls—three of the feathered tribe the most persecuted by the farmer—are, in reality, the faithful and vigilant conservators of his fruits and crops. In one of the smaller states of Germany, where, owing to public rewards being given to their destroyers, the whole race of sparrows were exterminated, the crops failed to such an alarming extent, that it became necessary to offer large premiums for the re-introduction of these useful birds from other parts. In some of the agricultural districts of France, where the destruction of small birds has been carried on with relentless activity for years, insects have so prodigiously multiplied as to attack everything green around them. Even the forest-trees are, in many cases, denuded of leaves by them, and are rapidly perishing. Venomous species of caterpillars, previously scarcely known except to entomologists, have now become common; and cases of children losing their lives from attacks of them whilst bird-nesting, have recently been published in the newspapers.[2] In our own country, the extension of sparrow-clubs—associations disgraceful to the boasted intelligence of the nineteenth century—threatens similar results. Already the gardener finds his fruit-crops lessening year by year; and that many of them, particularly of the smaller and sweeter fruits, have become so precarious, that they now scarcely pay for cultivation. In our own neighbourhood, where small birds have for some years been destroyed by bushels at a time, it is almost impossible to raise a currant, gooseberry, cherry, or plum; whilst seedling flowers and culinary vegetables often entirely disappear on the first night after being planted, or are so completely deprived of the succulent portion of their leaves and stems, that the remaining skeleton of network, in a few days withers and dies. But this is not all—the columns of our diurnals bring us continual reports of failing grain-crops in the neighbourhoods in which these bird-clubs have existed for any length of time, and that even on land previously remarkable for its fertility.[3] Did this loss fall only on the benighted beings who so wilfully cast back the blessings of an all-wise, protecting Providence, it would be a just retribution; but, unfortunately, it affects the whole nation, and threatens, ere long, unless arrested by

[1] *Properly*, a 'chicken' or 'young flying animal.'—It is remarkable, as observed by Webster, that a nation should lay aside the proper generic name of flying animals—'fowl' (*fugel, fugl*, Sax; *vogel*, Ger., Dut.; *fugl*, Dan.; *fogel*, Sw.; from the root of the Lat., *fugio, fugo*), and substitute the name of the young of those animals, as the generic term.

[2] A striking fatal case of this description is given in the "Times" of June 12, 1862.

[3] See the "Times" and other leading 'journals' for 1862.

legislation, to prove a national calamity. The only apparent remedy for the evil, at present, is the diffusion of information tending to show that the farmer and the gardener, in destroying small birds, destroy their best friends.

[For further information respecting *birds*, see AVES, AVIARY, BIRD (*antè*), GAME, GERMAN PASTE, NESTS (Edible), POULTRY, PUTREFACTION, TAXIDERMY, TRUSSING, &c.]

BIS'COTIN. [Fr.] A small biscuit. In *cookery*, &c., a species of confection made of eggs, flour, marmalade, and sugar, variously compounded and flavoured according to the taste of the operator.

BIS'CUIT (-kĭt). [Eng., Fr.] *Syn.* BUCCELLA'TUM, PA'NIS BIS COC'TUS, L.; SWIEBACK Ger.; BISCOTTO, It.; BIZCOCHO, Sp. *Literally*, 'twice-baked;' *appr.*, a well-known variety of hard, dry, unleavened bread, made in thin flat pieces. Those prepared for seamen (SEA'-BISCUITS, CAP'TAIN'S B.[1]) are composed of flour and water only. When made of fine flour, and a few caraway seeds are added, they are commonly called AB'ERNE'THY BISCUITS. Fancy biscuits generally contain a little sugar and butter, to which almonds, caraways, mace, ginger, lemon, and other articles, technically called 'flavourings,' are frequently added.

Prep. On the small scale, biscuits are made by forming the flour and water into a dough by the common process of hand-kneading, occasionally assisted with a lever, as in making ordinary bread. The dough is then rolled into a sheet, and cut into pieces of the desired size and form. These, after being stamped, are exposed to the heat of a moderately quick oven, when a few minutes (12 to 18, according to their size) are sufficient to bake them.

On the large scale, the whole manual process, from preparing the dough to the point at which the newly made biscuits are ready for baking, is now generally performed by machinery. The articles so prepared are commonly known in trade as 'MACHINE-MADE BISCUITS,' and are not only much cheaper, but of fully equal quality to those 'made by hand.' In the bakehouses of her Majesty's Victualling Yards at Deptford, Gosport, and Plymouth, the ingenious machinery invented by Mr. T. T. Grant, is employed. These establishments are said to be capable of producing annually above 8000 tons of sea-biscuits, at a saving of upwards of 12,000*l.* a year, from the cost that would have been incurred for the purpose on the old system. Under the latter, it is stated, that wages, and wear and tear of utensils, cost about 1*s.* 6*d.* per cwt. of biscuit; whilst under the new system, the cost is only 5*d.*

The allowance of biscuit to each seaman in the royal navy is 1 *lb.* per day; or, on the average, six biscuits.

Biscuits, Fan'cy. The varieties of these are almost innumerable. In a printed list now before us, we observe the names of upwards of one hundred different kinds. These are produced by varying the number and proportions of the ingredients used in their composition, and the form and size in which they are turned out of hand. They are further modified by the relative heat of the oven, as well as the length of time they are allowed to remain in it. It would, therefore, be waste of space to give particular directions for the preparation of each. The proportions of butter and sugar, or either of them, may be from 1 *oz.* and upwards, to flour, 1 *lb.*; according to the degree of richness desired. In a few cases, milk, or eggs, or both, are introduced. The 'flavourings' embrace a wide range of substances—bitter-almonds, caraways, cassia, cinnamon, ginger, mace, nutmeg, lemon, orange-peel, orange-flower water, essence of peach kernels, vanilla, &c. &c.; many of which give their name to the biscuit.—AR'ROW-ROOT BISCUITS are usually made of equal parts of arrow-root and flour; MEAT'-BISCUITS, from about 1 part of lean meat (minced small and pulped) beaten to a dough with about 2 parts of flour, and a little seasoning, no water being added;[2] SODA BISCUITS, by adding 1 to 2 *drs.* of carbonate of soda to each *lb.* of flour. In most other cases the mere inspection of the biscuit will convey to the experienced biscuit-baker and cook sufficient information to enable him to produce an exactly similar one, or at least a very close imitation. The richest kind of SPONGE-BISCUITS, as we are informed, are made as follows:—Add the whites and yelks of 12 eggs, previously well beaten, to 1½ *lb.* of finely powdered sugar, and whisk it until it rises in bubbles, then add 1 *lb.* of the finest pastry-flour, and the grated rind of 2 lemons. Put it into 'shapes,' sift a little sugar over them, and bake them in buttered tin moulds, in a moderately quick oven, for nearly half an hour.[3]

BISCUITS, DEV'ILED, in *cookery*, are captain's biscuits (or any similar kind) buttered on both sides, peppered well, and then covered on one side with a slice of good cheese formed into a paste with made mustard; the whole being seasoned with a little cayenne pepper, is, lastly, grilled. Chopped anchovies, or essence of anchovies, is a good addition.

BISMUTH. Bi. BISMUTH, ETAIN DE GLACE, Fr.; BISMUTH, WISMUTH, W.-METALL, Ger. One of the metals.

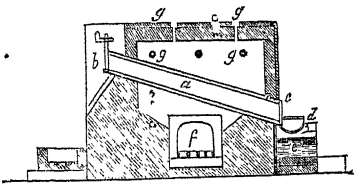
Sources. Bismuth occurs in the mineral kingdom in the metallic state (NA'TIVE BISMUTH), and in combination with sulphur (BIS'MŪTHĬNE), and with oxygen (B. O'CHRE, &c.). That of commerce is mostly imported from Saxony, where it is chiefly obtained from native bismuth, by the simple process of eliquation. The ore, sorted by hand from the

[1] A *captain's biscuit* differs from a common 'sea-biscuit' in being made of finer flour.

[2] For the MEAT-BISCUITS used in the navy, and by travellers, see MEAT.

[3] A few *fancy biscuits* will be found noticed in their alphabetical places. See CRACKNELS, MACAROONS, &c.

gangue, and broken into pieces of about the size of nuts, is introduced into the ignited iron pipes of the furnace (see *engr.*), until



Bismuth-furnace in Section.

(*a.*) Eliquation-tube.[1]
(*b.*) End at which it is charged.
(*c.*) End from which the metal flows.
(*d.*) Receiving-pan.
(*e.*) Water-trough.
(*f.*) Grate, &c.[2]
(*g.g.*) Draught-holes.

these latter are filled to about one half their diameter, and to three fourths of their length. From these the liquefied metal is allowed to flow into iron pans containing some coal-dust, and from these into a trough of water, in which it is granulated and cooled. It is subsequently remelted and cast into moulds so as to form 'bars' varying in weight from 25 to 56 *lbs.* each. In this state it usually contains a small admixture of arsenic, iron, lead, and sulphur; from the first of which it may be freed by exposure, for some time, under charcoal, at a dull red heat. It is best obtained in a pure condition by heating to redness, in a covered crucible, a mixture of oxide, or subnitrate of bismuth, with half its weight of charcoal.

Prop. Colour, grayish-white with a reddish tint; crystalline; very brittle (may be powdered); melts at about 480° Fahr., and does not re-solidify until cooled to 6 or 7° below this point; it volatilises at a strong heat, and, in close vessels, the fumes condense unchanged, in crystalline laminæ; little acted on by the air, but when exposed to it at a high temperature burns with a faint blue flame, emitting yellow fumes which condense into a yellow pulverulent oxide; when slowly cooled, in large masses, it forms large cubic crystals, or octahedrons, of great beauty; nitric acid, somewhat dilute, dissolves it freely. It is highly diamagnetic. Sp. gr. 9·8 to 9·83, which, by careful hammering, may be increased to 9·8827. A bar of bismuth, when heated from 32° to 212°, expands exactly $\frac{1}{770}$ in length.

Uses, &c. Bismuth enters into the composition of STEREOTYPE-METAL, SOLDER, PEWTER, FUSIBLE METALS, and several other alloys. Added to other metals it renders them more fusible. An alloy of *tin, nickel, bismuth,* and *silver,* is said to hinder iron from rusting. A mixture of *bismuth, lead,* and *tin,* is much employed for taking impressions from dies, forming moulds, and for other purposes.

Bismuth salts are usually insoluble, or decomposed by any quantity of water into free acid, and a basic salt. They are nearly all colourless, and, except the chloride, more volatile. They are easily recognised by the following reactions:—

Their saturated or concentrated solutions giving a white precipitate on dilution with water:—Sulphuretted hydrogen blackens them, or gives a black precipitate:—The nitric solution is unaffected by the addition of sulphuric acid:—Chromate of potassium gives a yellow precipitate, which differs from that from lead, by being soluble in nitric acid, and insoluble in potassa.

Bismuth, Chlorides of:—

Basic Chlo″ride. Bi_3Cl_8. *Syn.* SUBCHLO″RIDE OF BISMUTH, PEARL-POWDER; BISMU′THI SUBCHLORI′DUM, L. *Prep.* A dilute solution of hydrochloric acid, is dropped into another of bismuth (prepared by dissolving that metal in nitric acid); and the resulting precipitate, after being well washed in pure water, is dried in the shade.—*Prop., Uses, &c.* Similar to those of the subnitrate.

Chlo″ride. $BiCl_3$. *Syn.* TERCHLO″RIDE OF BISMUTH. *Prep.* A mixture of corrosive sublimate, 2 parts; bismuth, 1 part; (both in powder,) is exposed to heat until all the 'mercury' present is expelled, after which it is at once put into bottles. A grayish-white, granular substance.

Bismuth, Nitrates of:—

Basic Nitrate. $BiONO_3$. *Syn.* PEARL-WHITE, BISMUTH SUBNITRATE; BISMUTHI SUBNITRAS, BISMUTHI NITRAS, L.; BLANC DE FARD, B. D'ESPAGNE*, &c., Fr.; PERLWEISS, SCHMINKWEISS, &c., Ger. *Prep. Bismuth,* 1 oz.; *nitric acid,* 1½ fl. oz.; *distilled water,* 3 pints; mix 1 fl. oz. of the water with the acid, and dissolve the bismuth in the mixture; throw the solution into the remainder of the water, and, after repose, pour off the supernatant liquor, drain the powder that has subsided on a linen cloth, wash it with distilled water, and dry it with a gentle heat.

Prop. A pearly white, inodorous powder, insoluble in water, but freely soluble in nitric acid; long exposure to a strong light turns it grayish. When prepared from a neutral solution, it consists of very fine microscopic crystalline laminæ; but when prepared from acid solutions, with less water, the crystals are acicular, and more silky and lustrous. When moistened it exhibits an acid reaction with litmus paper.

Pois., &c. Like the other salts of bismuth, it causes vomiting, purging, giddiness, cramp, insensibility, &c. No certain antidote is known. The treatment may consist of an emetic, followed by the copious use of emollient drinks, as weak broth, barley-water, milk-and-water, &c.; and subsequently, when necessary to

[1] Several of these tubes are usually set side by side together.
[2] Usually one to each eliquation-tube.

prevent inflammation, by a low diet and aperients.

Uses, &c. In *medicine*, as a sedative, an astringent, or tonic, and an antispasmodic, in chronic affections of the stomach unaccompanied by organic disease of that organ, and apparently of a nervous character; particularly in gastrodynia, troublesome sickness and vomiting, pyrosis or waterbrash, and generally in gastro-intestinal affections attended with fluxes; also in intermittent fever, spasmodic asthma, &c.—*Dose.* 5 to 10, or even 20 grs.

Externally, made into an ointment with 4 parts of lard, it has long been employed in certain chronic skin-diseases. Under the name of PEARL-WHITE it is commonly used by ladies as a cosmetic; but it is stated, that it injures the skin, producing, after a time, paralysis of its minute vessels, rendering it yellow and leather-like—an effect which, unfortunately, it is usually attempted to conceal by its freer and more frequent application. In very large doses it is poisonous.

Both the basic nitrate and the basic chloride of bismuth pass under the names of PEARL-WHITE and PEARL-POWDER, owing to their extreme whiteness and beauty. That of the druggists, however, is usually the former; that of the perfumers, usually the latter, but not unfrequently both.

Nitrate. $Bi(NO_3)_3$. *Syn.* NEUTRAL NITRATE, TERNITRATE. *Purified bismuth* (in small fragments), 2 oz.; *nitric acid*, 6 oz.; dissolve with heat, adding more acid, if necessary, to effect entire solution of the metal; to the resulting solution add half its volume of distilled water, filter through powdered glass, and evaporate until crystals form.

Use. Chiefly in chemistry, and as a source of the pure oxide and the subnitrate.

Bismuth Oxides:—

Bismuthous Oxide. Bi_2O_3. *Syn.* TER-OXIDE OF BISMUTH, PROTOXIDE OF BISMUTH. From either the neutral or the basic nitrate, by exposure, in a crucible, to gentle ignition. Pure. A straw-yellow powder, of rather difficult solubility.

HY'DRATED:—By gradually dropping an acid solution of bismuthous nitrate into a concentrated solution of potassium hydrate perfectly free from carbonic acid, and washing and drying the resulting precipitate. Pure. A rich-looking white powder.

Prop., &c. Fuses at a high temperature, and then acts as a powerful flux on siliceous matter without itself imparting colour, a property of which the enameller and gilder has long availed himself. Like the basic nitrate, it has been *used* as an antispasmodic, and as a cosmetic. Sp. gr. 8·211 to 8·355.

Bismuthic Oxide. Bi_2O_5. *Syn.* BISMUTHIC ANHYDRIDE, BISMUTHIC ACID. Suspend teroxide of bismuth in a strong solution of potassa, and pass chlorine through the mixture until decomposition is complete; treat the powder with dilute nitric acid (to remove any undecomposed teroxide), after which wash it in cold water, and dry it.

Prop., &c. A reddish powder, insoluble in water. Its salts, of which little are known, are called BIS'MUTHATES. When heated it loses oxygen, and a bismuthate of bismuth is formed.

Bismuthous Sulphide. Bi_2S_3. This compound occurs native (BIS'MŬTHIN), and may be easily prepared artificially by either fusing its elements together, or by passing sulphuretted hydrogen through a solution of nitrate of bismuth.

Bismuthous Valerianate. *Syn.* BISMU'THI VALERIA'NAS, L. *Prep.* An acid solution of nitrate of bismuth is decomposed with a solution of valerianate of soda in water containing a little free valerianic acid; the precipitate is carefully washed in distilled water, and dried in the shade. Recommended as superior to the subnitrate in some forms of gastrodynia, dyspepsia, intermittents, &c.—*Dose.* 2 to 6 grs., or more.

BIS'TRE (-ter). [Eng., Fr.] *Syn.* BISTER, Ger. *Prep.* 1. The most compact, best coloured, and well-burnt portions of the soot of beechwood, or of peat,[1] are selected, reduced to powder, and sifted through a very fine lawn sieve. It is then digested in clear warm water for several hours, with frequent stirring; after which it is allowed to settle, when the liquid portion is decanted from the sediment. This process is repeated a second, and even a third time. The paste is next poured into a tall narrow vessel, which is then filled with pure cold water, and well agitated. The grosser parts only are now allowed to subside,[2] and the supernatant liquor, containing the finer portion of the BISTRE in suspension, is poured off into another vessel, where it is left to deposit its contents. The deposit is next collected, and carefully dried and powdered; or it is only partially dried, and at once made into cakes with gum-water, or isinglass-size, and then allowed to dry and harden for sale.

2. (Dr. MacCulloch.) The tar-like liquid obtained from the dry distillation of wood, is again carefully distilled until all volatile matter has passed over, and a brittle, pitch-like residuum is obtained, which is either brown or black according to the time and temperature employed; after which the heat is still further prolonged, but with increased care, until the brittle substance becomes pulverulent, and carbonaceous. It is then ground and elutriated with pure cold water, as before.

Uses, &c. As a water colour to tint drawings, in the same way as Indian ink, to which it is esteemed superior when the subjects are intended to be afterwards tinted with other colours. It occupies the same place among water colours that brown-pink does in oil.

According to Dr. MacCulloch, bistre from wood-tar, when carefully prepared, has great depth and beauty of colour, with all the fine

[1] The first is usually employed in England.

[2] Two or three minutes suffice for this purpose.

properties of sepia; but that if the whole of the oils and acids have not been removed by the process, it is apt to collect in little flocks, which interfere with its use.

BITES and STINGS. *Syn.* MOR'SUS (-SŬS, *sing.*) ET IC'TUS (-TŬS, *s.*), L. The treatment of the bites of non-venomous and non-rabid animals is the same as that of ordinary lacerated or punctured wounds, as the case may be; that of the bites and stings of venomous and rabid animals, serpents, insects, &c., often require, in addition, the use of special antidotes to destroy the virus, or to prevent its absorption, or to neutralise its effects when absorbed and to promote its elimination from the system.

The bites and stings of ANTS, BEES, WASPS, HORNETS, and similar insects common to this climate, may be treated by washing the part with spirit of hartshorn or dilute liquor of ammonia, or eau de luce, or a weak solution of chloride of lime. Should considerable inflammation ensue, and the part become much swollen, a thing that rarely occurs, leeches may be applied, and a cooling purgative given. The stings of venomous reptiles may be similarly treated, excepting that the strength of the solutions of ammonia, chloride of lime, &c., should be stronger than in the former case, so as to produce some pain and smarting. In cases where the venom is of a very poisonous description, the wound should be first well washed with water of ammonia, and afterwards seared with lunar caustic in every part, including the interior and deep-seated portions. In extreme cases, the surface of the wound, both internal and external, may be removed with the knife; or, in the case of a small joint, as a finger, the injured portion may be amputated. Prior to the use of the washes or caustic, dry-cupping or suction with the mouth may be had recourse to with great advantage. A ligature placed on the limb, above the wound, as soon as possible after the accident, will impede the absorption of the poison whilst the other treatment is in progress. A similar plan may be followed after the bite of a dog supposed to be mad. It has, indeed, been lately asserted by one of our most celebrated veterinarians, that he and his colleagues have been repeatedly bitten by dogs that have afterwards been proved to be mad, but from having fearlessly applied caustic to the parts, they have escaped uninjured.

The poison inserted by the stings and bites of several venomous reptiles is so rapidly absorbed, and of so fatal a description, as frequently to occasion death within a very short space of time, and before any remedy or antidote, under ordinary circumstances, can be applied. But even in these extreme cases it is probable that absorption, and consequently the rapidity of the action of the poison, might be considerably impeded or lessened by the immediate application of a ligature above the part, as before described, the patient accompanying the treatment by swallowing a large quantity of liquid, by which partial plethora would be produced, and the functions of the absorbents for a time nearly suspended. A few minutes, thus gained, would permit of the application of appropriate antidotes, by which the poison might be neutralised before it would become necessary to remove the ligature, whilst the kidneys would be in full action. Unfortunately, these wounds are generally inflicted in parts of the world where precautionary measures are seldom thought of, and generally at times when people are least prepared to meet them, as well as so suddenly and unexpectedly as to stagger even those observers who may be in no absolute danger themselves. Such is the bite of the East Indian CO'BRA DI CAPEL'LO, against which two *Asiatic* (arsenical) *pills* are often prescribed by the Hindoos; but which are generally scarcely swallowed before the poison of the serpent has rendered the patient a stiffened corpse. *Eau de luce*, a favorite remedy in India, when liberally employed both internally and externally, is said to prove sometimes successful. The bite of the PUFF-ADDER is well similar, or even a more fatal description made.—Bat of the cobra. When the venom of these animals, or of a rabid dog, is once actually absorbed into the system, there appears to be no treatment that can save the patient. A bottle of Madeira wine, or ½ a pint of brandy or rum diluted with twice its weight of water, drank in two doses, about 3 or 4 minutes apart, is a popular remedy in India in such cases. Its effect is to impede absorption.

The secret antidote so long successfully employed by Mr. Underwood, the 'snake-king' of Australia, for the bites of the WHIP-SNAKE and the DIAMOND-SNAKE, two of the most venomous of that region, is now positively asserted to be the common male fern (*polypo'dium fi'lix mas*, Linn.). Of the powdered root, or preferably, of the green leaves of this plant nearest the root, he prepares a sort of decoction, or broth, which he takes or administers liberally. A more convenient preparation would, perhaps, be a tincture prepared by digesting 1 *oz.* of the *dried*, or 3 *oz.* of the *fresh leaves*, (bruised,) in a pint of proof spirit or strong brandy or rum, for a fortnight; as in this state it could be kept for any length of time, if well-corked, without deterioration.

[See HYDROPHOBIA, POISONS, SNAKE-BITES, STINGS, VENOM, WOUNDS, &c.][1]

BITTER. [Eng., Ger.] *Syn.* AMA'RUS, L.; AMER, Fr. Tasting like wormwood, quassia, or other similar vegetables; *subst.*, a bitter plant, bark, or root (= AMA'RUM, L.; see *below*).

Bitter App'le‡. Colocynth.

Bitter Cup. A cup or tumbler formed by

[1] Notices of several chemical and neurotic antidotes, of great promise, will also be found in different parts of this volume. The names of the respective animals may likewise be referred to.

the turner out of *quassia wood*. Liquor, by standing in it a short time, becomes bitter and stomachic. They are now common in the shops.

Bitter Earth*. Magnesia.

Bitter Herbs. See BITTERS (*infrà*) and SPECIES (Bitter).

Bitter Salt†, *Bitter Pur"ging-salt*. Sulphate of magnesia.

Bitt'er-sweet. Woody nightshade.

Bitt'er-wort‡ (-wŭrt). Gentian.

BITT'ERN. The 'mother-water' or 'bitter liquor' of salt-works from which the chloride of sodium (sea-salt) has been separated by crystallisation.

Bittern. An intoxicating poisonous mixture sold by the brewers' druggists, composed of 1 part each of *extract of quassia* and *powdered sulphate of iron*, with 2 parts of *extract of cocculus indicus*, 4 parts of *Spanish liquorice*, and about 8 parts of *treacle;* the liquorice being first boiled with a little water until dissolved, and the solution evaporated to a proper consistence before adding the other ingredients. *Used* by fraudulent brewers and publicans to impart a false bitter and apparent strength to their liquors.

BITT'ERS (-ĕrz). *Syn.* AMA"RA, &c., L. Vegetable bitters are commonly regarded as tonic and stomachic, and to improve the appetite when taken occasionally, and in moderation. The best time is early in the morning, or half an hour or an hour before a meal. An excessive, or a too prolonged use of them, tends to weaken the stomach, and to induce nervousness. They should not be taken for a longer period than about 8 or 10 days at a time, allowing a similar period to elapse before again having recourse to them.

Among the most useful and generally employed bitters are—*calumba, cascarilla, chamomiles, gentian, hops, orange peel, quassia*, and *wormwood*.

Bitters. In the liquor-trade, a compound prepared by steeping vegetable bitters, and some aromatics as flavouring, in weak spirit, for some 8 or 10 days; a little sugar or syrup being subsequently added to the strained or decanted tincture. In that of the taverns and gin-shops the menstruum is usually gin, or plain spirit reduced to a corresponding strength. BRAN'DY-BITTERS and WINE'-BITTERS are prepared in a similar way with common British brandy, or some cheap white wine (Cape or raisin), as the case may be. Each maker has usually his own formulæ, which he modifies to suit the price, and the palate of his customer.—This class of liquors has been justly charged with being the fertile cause of habitual intemperance, of disease, and even of death! Their occasional use as tonics or stomachics is also objectionable, owing to the trash, and even deleterious substances, which so frequently enter into their composition. See LIQUEURS.

BITU'MEN. [Eng., L.] *Syn.* BITUME, Fr.; ERDPECH, ERDTHEER, &c., Ger. A term of a very comprehensive character, and, in general, very loosely applied, including a variety of inflammable mineral substances, of which *asphaltum, naphtha*, and *petroleum*, may be mentioned as examples. The solid bitumens are now extensively employed in the manufacture of *bituminous mastic* or *cement* and similar compositions, which are used for the lining of water-cisterns, and for various other hydraulic purposes; as also for roofs, floors, pavements, &c. For the last purpose, the native varieties of 'asphaltic rock,' consisting of a mixture of bitumen and calcareous earth, when tempered with a proper quantity of crushed granite, or calcareous sand or gravel, is found to be the most substantial and durable. The plan followed in laying down such pavements in Paris, where they have been the most extensively adopted, is—The ground having been made uniformly smooth, is edged, in the usual manner, with curb-stones rising about 4 inches above its level, and then covered, to the depth of 3 inches, with concrete (made with about 1-6th part of good hydraulic lime), which is well pressed upon its bed, the surface being subsequently smoothed over with a very thin coating of hydraulic mortar. On this, when perfectly dry,[1] the 'bituminous mastic,' rendered semi-fluid by being cautiously heated in a suitable iron cauldron,[2] is evenly spread over so as to form a layer three quarters of an inch, or for less solid work, half an inch thick. Some coarse sand is lastly sifted over and pressed down on the surface, when the work is complete; and in a few days the pavement becomes sufficiently compact and solid to be thrown open to foot passengers.

The asphalto-bitumen mine of the Val de Travers, in the Canton of Neufchâtel, is said to be the richest and most extensive in the world of its particular class. The calcareous bitumen which it yields contains 20% of nearly pure bitumen, and 80% of carbonate of lime; and it has a sp. gr. (2·115) approaching that of ordinary bricks.

The 'Val de Travers Company,' and the 'Bastenne and Gaujac Company,' are those who have hitherto been the most successful in laying down asphalto-pavements. See ASPHALTUM, PETROLEUM, &c.

Bitumen, Elastic. *Syn.* MIN'ERAL CAOU'TCHOUC (kōō'-chŏŏk), ELA'TERITE. A rather rare species of bitumen, differing chiefly from the other solid varieties in being elastic.

Bitumen, Liq'uid. Petroleum.

[1] On this point depends the success of the work. Absolute dryness is a sine quâ non in the process. The mastic must also be laid down in dry weather. If laid in wet, damp, or even foggy weather, it will be liable to separate from its bed, and gradually to break up. This is why so much of the asphalt and bituminous pavement laid down in London, has proved a failure.

[2] It is here that the mixture of the bitumen (previously crushed sufficiently small to pass through meshes 10 to the inch) is made with the sand or gravel; a small portion of mineral tar or coal-tar (3 to 7 or 8%) being commonly added to promote their fusion and complete union.

BITU'MINOUS. *Syn.* BITUMI'NO'SUS, L.; BITUMINEUX, Fr.; ERDPECHIG, Ger. Of bitumen, or resembling or containing it.

BIX'EINE (-e-ĭn). The red colouring-principle of annotta. It is obtained by treating bixine with liquid ammonia, with subsequent free contact of air.

Prop., &c. When pure, a rich deep-red powder, soluble in alcohol and in alkalies, and turned blue by sulphuric acid. It appears to be oxidised bixine.

BIX'INE (-ĭn). The yellow colouring-principle of annotta.

Prep. A solution of annotta is precipitated with a solution of acetate of lead; the precipitate, after having been washed in cold water, is decomposed by sulphuretted hydrogen; the decanted liquor or filtrate yields crystals by cautious evaporation.

Prop., &c. Yellowish white, turning full yellow by exposure to air; soluble in water, and freely so in alcohol and in alkaline solutions; by oxidation it is converted into *bixeine*. For a correct knowledge of both of these substances we are indebted to M. Preisser.

BLACK. *Syn.* A'TER,[1] NI'GER, L.; NOIR, Fr.; SCHWARZ, Ger.; BLAC, BLÆC, Sax. In *dyeing*, &c., of the colour of lamp-soot, or of night; *subst.*, a black colour.

Black Ash. The waste lye of the soapmakers is evaporated in large iron boilers, the salt separated as it falls down, and then heated in a reverberatory furnace until it is partially decomposed and fused, when it is run into iron pots to cool. It is used in the manufacture of alum and common soap.

Black Col'ours (kŭl'-). See BLACK PIGMENTS.

Black Draught. See SENNA MIXTURE (Compound).

Black Drop. See DROPS, PATENT MEDICINES, &c.

BLACK DYE. *Syn.* TEINTE NOIRE, Fr.; SCHWARZE FARBE, Ger. The following are the processes and materials now commonly employed in dyeing black:—

a. For COTTON:—

1. The goods, previously dyed blue, are steeped for about 24 hours in a decoction of gall-nuts or sumach, then drained, rinsed in water, and passed through a bath of acetate of iron for a quarter of an hour; they are next again rinsed in *water*, and exposed for some time to the air; after which they are passed a second time through the bath, to which a little more iron-liquor is previously added. The whole process is repeated, if necessary, according to the intensity of the shade of black desired.

2. The goods are steeped in a mordant of acetate of iron, worked well, and then passed through a bath of madder and logwood for 2 hours. Less permanent than No. 1.

[1] Black, deep black; as opposed to *albus*, white.

Obs. About 2 *oz.* of coarsely powdered galls, or 4 *oz.* of sumach, are required for every pound of cotton, in the process of galling. The first should be boiled in the water, in the proportion of about ½ gal. of water to every lb. of cotton. The sumach-bath is better made by mere infusion of that dye-stuff in very hot water.

3. (For 10 lbs. of cloth.) The goods are put into a boiling bath made of 3 lbs. of sumach, and allowed to steep, with occasional 'working,' until the liquor is perfectly cold; they are next passed through lime water, and, after having drained for a few minutes, immediately transferred to and worked for an hour in a warm solution of 2 lbs. of copperas; after free exposure to the air, for about an hour, they are again passed through lime water, and, after draining, 'worked' for an hour in a bath made with 3 lbs. of logwood, and 1 lb. of fustic; they are then 'lifted,' and ¼ lb. of copperas being added, they are returned to the bath, 'worked' well for about 30 minutes, and finished. Good and deep.

Obs. Instead of copperas iron-liquor may be used, observing to take 1½ pint of the latter (of the ordinary strength) for every lb. of the former ordered above.

b. For FLAX and LINEN:—

This, for the most part, closely resembles that employed for cotton; but, in some cases, a mordant of iron-liquor, or of copperas, followed by passing the goods through lime-water, and exposure to the air, precedes the dye-bath.

c. For SILK:—

Silk goods are dyed much in the same way as woollens, but the process is conducted with less heat:—

1. A bath of nut-galls is given for 12 to 36 hours, occasionally working the goods therein; they are next taken out, rinsed, and well aired, after which they are passed for a few minutes through a bath containing sulphate of iron, and are then again drained, rinsed, and aired. The steep in the nut-gall bath may be repeated, if necessary, followed, as before, by the iron-bath previously replenished with a little fresh copperas. The whole quantity of galls to be taken for 1 lb. of silk, varies with their quality from ½ to ¾ lb., that of the copperas (for the first bath), from 3 to 4 *oz.*

2. (For 1 cwt. of silk.) Boil 22 *lbs.* of bruised Aleppo-galls, for 2 hours, in 90 to 100 galls. of water, observing to add boiling water from time to time, to compensate for that lost by evaporation; to the clear bath add 32 lbs. of copperas, 7 lbs. of iron-filings, and 21 lbs. of gum; digest with agitation, for 1 hour, and when the ingredients are dissolved, pass the silk (previously prepared ['galled'] with ⅓rd of its weight of gall-nuts) through the bath for about an hour; then rinse and air it well; next leave it in the dye-bath for 6 to 12 hours; and this immersion or steep may be repeated, if

necessary, at will. This is said to be the process commonly adopted for velvet at Genoa and Tours.

3. (For 5 lbs. of silk.) Turn the goods for an hour through a mordant formed of 1 lb. of copperas and 2 oz. of nitrate of iron (dyer's), with sufficient water; after rinsing in cold water, and airing them, 'work' them, for an hour, in a decoction made of 5 lbs. of logwood and 1 lb. of fustic; then lift them from the bath, add 2 oz. of copperas, re-immerse, and 'work' them well for 10 or 15 minutes longer; lastly, rinse, air, and finish. A full deep black.

4. (For 5 lbs.) For the mordant use ½ lb. of copperas; rinse, and air; for the 'dye-bath,' a decoction of 4 lbs. of logwood to which ½ pint of stale urine has been added; after 'lifting' the goods add 2 *oz.* more of copperas to the bath, and work for 15 minutes, as before. A good black. By adding 2 *oz.* of dyer's nitrate of iron to the mordant the same ingredients will give a deep black; and by substituting a little white soap for the urine, and omitting the addition of copperas to the logwood-bath, it will give a blue-black. The last may also be produced by first dyeing the goods deep blue as with 'prussiate,' and omitting the urine and soap, in which case one half only of the logwood will be required.

d. For WOOL:—

To produce a good permanent black on wool, or woollen goods, they must be first dyed of a deep blue in the indigo-vat, or, more cheaply, by the Prussian-blue process. When the goods are coarse or common, and price is an object, they are generally 'rooted' instead of being 'blued.' This consists in giving them a dun or brown colour with the husks of walnuts, or the roots of the walnut-tree, or with other like cheap astringent substances.

1. (For 1 *cwt.* of wool.) Good logwood-chips, 20 *lbs.*, and Aleppo-galls, 18 *lbs.*; are inclosed in a coarse bag, and boiled with water, q. s., for 5 or 6 hours; ⅓rd of this decoction is then transferred into another copper, with verdigris, 2 *lbs.*, and a sufficient quantity of water having been added, the goods (previously dyed dark blue) are passed through the liquor for two hours, at a heat slightly below the boiling-point. The goods are next lifted and drained, another ⅓rd of the decoction of logwood and galls, with copperas, 9 *lbs.*, added to the boiler, after which the fire is lowered, and as soon as the copperas is dissolved, the cloth is returned to the bath, and again well 'worked' for at least an hour. It is then taken out, thoroughly aired, and the remaining ⅓rd of the decoction added, with sumach, 20 *lbs.* The whole is then brought to a boil, and sulphate of iron, 2 *lbs.*, together with a pailful of cold water, thrown in; after which the goods are put in a third time, and 'worked' for one hour; they are then taken out, rinsed, aired, and again passed through the bath for another hour. After being thoroughly rinsed, the goods are at once either 'fulled,' dried, and folded, or are further softened and beautified by passing them for 15 minutes through a hot weld-bath (not boiling), when they are rinsed, &c. (but not 'fulled'), as before. A beautiful though expensive dye. With management, the above quantities of the ingredients will dye 1¼ or even 1½ *cwt.* of wool.

2. (For 1 *cwt.*) The cloth (previously dyed blue) is 'galled' with 5 *lbs.* of nut-galls, and then dyed in a bath made with 30 *lbs.* of logwood, to which about 5 *lbs.* of copperas has been added; after which it is rinsed, aired, and 'fulled,' as before. This is said, by Lewis, to be the usual proportions and plan adopted by the English dyers.

3. (For 1 *cwt.*) Make a bath, as before, with fustic, 2 *lbs.*; logwood, 5 *lbs.*; and sumach, 10 *lbs.*; work the (blued) cloth for 3 hours at the boiling heat, or near it; lift it out, add sulphate of iron, 10½ *lbs.*, and when dissolved, pass the cloth through it for 2 hours; rinse, air well, and again pass the goods through the bath for an hour; lastly, rinse until the water runs clear. Inferior to the last, but less expensive.

4. (For 1 *cwt.*, without previous blueing or 'rooting.')—*a.* Work the goods, at about 200° Fahr., for 1 hour, in a bath made with 6 to 7 *lbs.* of cam-wood; lift, add 6½ *lbs.* of copperas, and again work the goods for an hour, after which withdraw the fire, and allow them to steep for 10 or 12 hours; next drain and rinse them, and work them in a second bath made with 60 *lbs.* of logwood for 1½ hour; lift, add 3 *lbs.* of copperas, and again work for an hour; lastly, rinse, air, and finish:—*b.* The goods are first worked, for about two hours, in a bath of 3 *lbs.* of fustic, in which 5 *lbs.* of bichromate of potash and 4 *lbs.* of alum have been dissolved; after exposure to the air for about an hour, and thorough rinsing, they are worked for a second two hours in a bath made with 45 *lbs.* of logwood, 3½ *lbs.* of barwood or cam-wood, and 3 *lbs.* of fustic; they are then lifted, and 3 *lbs.* of copperas having been added to the bath, are again immersed and worked for half an hour to an hour.

5. (For 10 *lbs.* of wool or w.-cloth.) Work the goods for ½ an hour in a bath of ½ *lb.* of cam-wood; lift, add 7 or 8 *oz.* of copperas, and after working them for 20 minutes, withdraw the fire, and leave them in the liquor for 10 or 12 hours; next rinse them in cold water, drain, and then work them for an hour in a bath made with 5 *lbs.* of logwood, to which 1 pint of urine has been added; lift, add 4 *oz.* of copperas, work them for half an hour longer, and, lastly, wash and dry them.

6. (For 7 *lbs.*) Take of galls (bruised), ½ *lb.*; logwood chips, 1½ *lb.*; for the bath; boil or work the goods for 2 hours, take them out, add of copperas, ½ *lb.*; and when it is dissolved, work the goods through the liquor for at least 2 hours, keeping the bath nearly boiling; again take them out, wash, and air; then add 1 *oz.* more of copperas to the bath, and pass

the cloth through it for another hour; lastly air, rinse, and finish.

7. (For 5 *lbs.*) For the first bath—bichromate of potash, 8 *oz.*; alum, 6 *oz.*; fustic, 4 *oz.*; for the second bath—logwood, 4 *lbs.*; barwood and fustic, of each, 4 *oz.*; to which add, after the lift, copperas, 4 *oz.*; the process being conducted as in 4, *b*. This, as well as the two formulæ immediately preceding it, is particularly suited to articles of dress dyed in the small way, at home. When the articles are only re-dipped, as it is called, a proportionately smaller quantity of the ingredients may be taken.

Concluding remarks. In dyeing black, particularly on wool, it is absolutely necessary to take the goods out of the dye-bath several times, and to expose them to the air. This is called "airing" them, and is done to allow the oxygen of the atmosphere to act upon the ingredients of the dye, and especially on the iron; as without this action of the air a good colour cannot be produced. The usual proportions employed by the dyers of England are 5 *lbs.* each of galls and copperas, and 30 *lbs.* of logwood, for every *cwt.* of cloth; but these weights are frequently increased for choice goods, just as they are always lessened for common ones. The other astringent substances used as substitutes for galls in dyeing black, are taken in quantities proportionate to their respective strengths, that of good Aleppo gall-nuts being referred to as a standard.

The German wool-dyers usually commence their process with a mordant of Salzburgh vitriol (3 parts) and argol (1 part); and after exposure of the goods, in a cool place, for 24 hours, work them in a bath of logwood (5 to 6 p.) and fustic (2 p.); after which the bath is restored by the addition of verdigris (¼ p.) dissolved in vinegar and the goods again worked through it for about ½ an hour. This is for 20 parts weight of wool or cloth.

Black marinos are usually mordanted (hot) with about $\frac{1}{10}th$ of their weight of copperas, and then aired for 24 hours; after which they are dyed in a boiling bath made with about ½ their weight of logwood with the addition of about 2% of argol or tartar.

As black is the shade most commonly attempted by amateur dyers, it may be here necessary to call their attention to what is said on mixed fabrics in our article on DYEING; since an inattention to this point will inevitably cause the failure of their efforts.

According to Muspratt, a mixed fabric of silk and woollen may be dyed black, by one process, as follows:—Work the goods an hour in a solution of 8 *oz.* each of tartar and copperas, and wash out; work for 15 minutes in a decoction of 4 *lbs.* of logwood; lift, add 1 *oz.* of bichromate of potash, work for ½ an hour, and dry. And a mixed fabric of cotton, silk, and woollen:—Steep for six hours in a bath made of 2 *lbs.* of sumach; then work for an hour in a solution of 6 *oz.* each of tartar, sulphate of copper, and copperas; wash, and work ½ an hour in a decoction of 4 *lbs.* of logwood; lift, add to the bath 1 *oz.* of copperas; work ten minutes, wash, and dry. If a very deep black be required, 1 *lb.* of bark is to be added with the logwood. See DYEING, MORDANTS, &c.

BLACK LEAD (lĕd). See PLUMBAGO.

BLACK PIG'MENTS. *Syn.* PIGMEN'TA NI'GRA, L. The principal black pigments of commerce are obtained by carbonising organic substances (particularly bones), by exposure to a dull red heat, in covered vessels out of contact with the air; or by collecting the soot formed during the combustion of unctuous, resinous, and bituminous matters. Artists and amateurs also prepare, on the small scale, a variety of blacks, many of which are not procurable at the colour-shops. This they effect either by the carbonisation of substances not usually employed for the purpose, or by simply reducing to powder certain mineral productions selected on account of the peculiar shades of colour which they respectively possess. Some of the last might, however, be more appropriately classed with browns. The following list embraces most of these articles:—

An'imal-Black. Bone-black.

Beech'-Black. Carbonised beech-wood.

Blue'-Black. Vine-twigs dried and then carefully carbonised, in covered vessels, until of the proper shade. That of the ancients was made of wine-lees. Pit-coal, carefully burnt at a white heat, then quenched in water, dried, and well ground, forms a cheap, good, and durable blue-black, fit for most ordinary purposes. See FRANKFORT-BLACK.

Bone'-Black. *Syn.* I'VORY-BLACK (of *commerce*); CAR'BO OS'SIS, OS US'TUM NI'GRUM, E'BUR U. N. (yena'le), &c., L.; NOIR D'OS, &c., Fr.; KNOCHENSCHWARTZ, &c., Ger. Carbonised bones reduced to powder. That of commerce is usually the residuum of the distillation of bone-spirit. Inferior to true ivory-black; having a slight, but peculiar reddish tinge, from which the latter is quite free. Besides its use as a pigment, it is extensively employed in making blacking, as a material for the moulds of founders, as a clarifier and bleacher of liquids, &c. See IVORY-BLACK and ANIMAL CHARCOAL.

Cas'sel-Black, Cologne'-Black. Ivory-black.

Coal'-Black. See BLUE-BLACK and NEWCASTLE-BLACK.

Composi''tion-Black (-zĭsh'-ŭn-). The selected portion of the residuum of the process of making prussiate of potash from blood and hoofs.—Used both as a pigment, and to decolour organic solutions, which it does better than bone-black.

Cork'-Black. Spanish-black.

Flo''rey-Black, FLORÉE D'INDE. The dried scum of the dyer's wood-bath. A superior blue-black.

Frank'fort-Black, NOIR DE FRANCFORT. From vine-twigs dried, carbonised to a full

black, and then ground very fine. An excellent black pigment; also used by the copper-plate printers to make their ink. See BLUE-BLACK.

Harts'horn-Black. Resembles ivory-black, which is now usually sold for it. It was formerly prepared by carbonising the residuum of the distillation of spirit of hartshorn.

I'vory-Black. *Syn.* CAR'BO EB'ORIS, E'BUR US'TUM NI'GRUM, L.; NOIR D'IVOIRE, &c., Fr.; ELFENBEINSCHWARTZ, KOHLE VON ELFENBEIN, Ger. From waste fragments and turnings of ivory, by careful exposure in covered crucibles, avoiding excess of heat or over-burning. The whole having been allowed to become quite cold, the crucibles are opened and their contents reduced to fine powder. For the first quality only the richest coloured portion of the charcoal is selected, and this, after being powdered, is ground with water on porphyry, washed on a filter with warm water, and then dried. A very rich and beautiful black. It is brighter than even peach-stone black, and is quite free from the reddish tinge of bone-black. With white-lead it forms a rich pearl-gray. See BONE-BLACK.

Jamai'ca-Black (-mā'-). Sugar-black.

Lamp'-Black. *Syn.* FULI'GO LUCER'NÆ, F. PI'NEA, &c., L.; NOIR DE FUMÉE, &c., Fr.; KIENRUSS, &c., Ger. *Prep.* 1. (On the small scale.) A conical funnel of tin-plate furnished with a small pipe to convey the fumes from the apartment, is suspended over a lamp fed with oil, tallow, coal-tar, or crude naphtha, the wick being large and so arranged as to burn with a full smoky flame. Large spongy, mushroom-like concretions of an exceedingly light, very black, carbonaceous matter, gradually form at the summit of the cone, and must be collected from time to time. The funnel should be united to the smoke-pipe by means of wire, and no solder should be used for the joints of either.

2. (*Commercial.*) On the large scale, lamp-black is now generally made by burning bone-oil (previously freed from its ammonia), or common coal-tar, and receiving the smoke in a suitable chamber. In the patented process of Messrs. Martin and Grafton, the coal-tar is violently agitated with lime-water until the two are well mixed, after which it is allowed to subside, and the lime-water having been drawn off, the tar is washed several times with hot water. After subsidence and decantation, it is put into stills, and rectified. The crude naphtha in the receiver is then put into a long cast-iron tube furnished with numerous large burners, underneath which is a furnace to heat the pipe to nearly the boiling-point. Over each burner is a sort of funnel which goes into a cast-iron pipe or main, which thus receives the smoke from all the burners. From this main the smoke is conveyed by large pipes to a succession of boxes or chambers, and thence into a series of large canvas bags arranged side by side, and connected together at top and bottom alternately. Fifty to eighty of these 'bags' are employed; the last one being left open to admit of the escape of the smoke, which has thus been made to traverse a space of about 400 yards. As soon as the bags contain any considerable quantity of black, they are removed and emptied. The black deposited in the last bag is the finest and best, and it becomes progressively coarse as it approaches the furnace.

Obs. The state of minute division in which the carbon exists in good lamp-black is such as cannot be given to any other matter, not even by grinding it on porphyry, or by 'elutriation' or 'washing over' with water. On this account it goes a great way in every kind of painting. It may be rendered drier and less oily by gentle calcination in close vessels, when it is called burnt lamp-black, and may then be used as a water-colour; or its greasiness may be removed by the alkali-treatment, noticed under Indian ink. It is the basis of Indian ink, printer's ink, and most black paints.

Russian Lamp-black is the soot produced by burning the chips of resinous deal. It is objectionable chiefly from being liable to take fire spontaneously when left for some time moistened with oil.

Manganese'-Black (-nēze'-). Native *binoxide of manganese.* Durable and dries well.

New'castle-Black. From the richer-looking varieties of pit-coal by grinding and elutriation. Brown black or, in thin layers, deep brown. It is, perhaps, "the most useful brown the artist can place on his palette; being remarkably clear, not so warm as Vandyke-brown, and serving as a shadow for blues, reds, and yellows, when glazed over them. It seems almost certain that Titian made large use of this material." See BLUE-BLACK (*antè*).

Opor'to-Black. Carbonised wine-lees.

Par'is-Black, NOIR DE PARIS. From turner's bone-dust, treated as for ivory-black. Works well both in oil and water. It is commonly sold for real ivory-black, and for burnt lamp-black.

Peach-stone Black. From the stones or kernels of peaches, cherries, and other similar fruits, treated as for ivory-black. A bright, rich black; works well with oil; with white-lead and oil it makes old gray.

Pit'coal Black. Newcastle-black.

Prus''sian-Black. (prŭsh'-ăn). Composition-black.

Rice'-Black. Rice-charcoal. Inferior.

Rus''sian Black. See LAMP-BLACK.

Soot'-Black (sŏŏt'-). The soot of coal-fires, ground, and sifted. Used in common paint, and to colour whitewash; with Venetian-red and oil, it makes chocolate-colour; also used to make gray mortar.

Span'ish Black. From cork-cuttings carbonised, as bone-black. Resembles Frankfort-black, but works softer.

Sug'ar-Black (shŏŏg'-). Carbonised moist sugar. Has little body, but for washing

drawings is equal in mellowness to Indian ink and Bistre.

Sun'derland Black. Newcastle-black.

Turn'er's Black. Paris-black.

Vine'-twig Black. Frankfort-black.

Wheat'-Black (hwēte'-). Carbonised wheat. It has a good colour, a full body, and dries hard and quickly with oil.

BLACK'BERRY. The popular name of *ru'bus fructico'sus* (Linn.) or the common 'bramble.' *Fruit* (BLACK'BERRIES; MÛRES DE RONCE, Fr.), antiscorbutic and wholesome, but in excess apt to sicken; twigs, used in dyeing black; root, astringent, formerly used in hooping-cough.

Amer'ican Blackberry. The *ru'bus villo'sus* (Ait.). Root, astringent and tonic; officinal in the Ph. U. S.

BLACK'ING. *Syn.* CIRAGE (des bottes), NOIR (pour les souliers), Fr.; SCHWÄRZE, SCHUHSCHWÄRZE, Ger. An article too well known to require description.

Hist., &c. Blacking, and other polishes for leather, were undoubtedly in common use among the ancients; but the compound to which we now more particularly apply the name is of comparatively modern invention. The latter appears to have been first introduced into England from Paris, during the reign of Chas. II, but was not in common use among the masses of our population much before the middle of the 18th century.

The general and still increasing use of blacking as a polish for boots and shoes by all classes of the inhabitants of civilised countries, has given an extent and importance to its manufacture which a stranger to the subject would scarcely be led to suspect. The princely establishments of some of the firms who compound this sable article, cannot fail to have arrested the attention of the passenger through the streets of this great metropolis; whilst the enormous fortune acquired by one of their late members, and, for the most part, bequeathed by him for purposes of charity and philanthropy, has invested both the donor and his craft with an interest and notoriety which they did not previously possess. At the present time, the consumption of blacking is greater than at any former period; and of this, as of many other articles, England is the principal manufactory for the world, alike distinguished for the extent of her trade and the excellent quality of this product of her industry. In truth, England excels all other nations in the manufacture of common shoe-blacking; and, perhaps, in no other country is an equal attention paid to the cleanliness and appearance of the external clothing of the feet.

Prep. I. LIQUID BLACKING:—

1. Take of bone-black, 16 parts; treacle, 12 parts; oil of vitriol, 3 parts; sperm oil,[1] 2 parts; gum-arabic, 1 part; strong vinegar, or sour beer, 48 to 50 parts;[2] (all by weight;) place the bone-black in a capacious wooden, stone-ware, or enamelled iron vessel,[3] add the oil, and rub them well together; next gradually add the treacle, and actively and patiently grind or rub the mass, after each addition, until the oil is perfectly killed, and finally for some time afterwards, to ensure complete admixture; then cautiously dilute the vitriol with about three times its bulk of water, and add it, in separate portions, to the former mixture, observing to stir the whole together, as rapidly as possible, on each addition of the acid, and for some minutes after the whole is added, so as to render the mass thoroughly smooth and homogeneous; let it stand, covered over, for two or three days, or longer, stirring it, in the mean time, for 15 or 20 minutes daily; lastly, having dissolved the gum in the vinegar, add the solution gradually to the rest, and stir the whole together briskly for some time, and again daily for 3 or 4 days. It may be further diluted, at will, with a little more vinegar or beer, or with water; but unnecessary or excessive dilution should be avoided, as the richness and quality of the blacking become proportionately reduced. If all the ingredients (except the vitriol) be made hot before admixture, the shining quality of the product will be greatly improved, and the process may be shortened.[4]

2. Ivory-black, 16 parts; treacle, 8 parts; oil of vitriol, 4 parts; (diluted with) water, 2 parts; oil, 2 parts; gum-arabic, 1 part; soft water (for the final dilution, instead of vinegar), 64 parts; mixed, &c., as before. Excellent.

3. As the last; but taking only 6 parts of treacle, 1 part of oil, and omitting the gum-arabic. Good. A commoner article of liquid blacking does not sell.

4. (Bryant and James's INDIA-RUBBER LIQUID BLACKING.—*Patent* dated 1836.) Take of India rubber (in small pieces), 18 *oz.*; hot rape oil, 9 *lbs.* (say 1 *gal.*); dissolve; to the solution add of ivory-black (in very fine powder), 60 *lbs.*; treacle, 45 *lbs.*; mix thoroughly; further add of gum-arabic, 1 *lb.*, dissolved in vinegar (No. 24), 20 galls.; reduce the whole to a perfect state of smoothness and admixture by trituration in a paint-mill; throw the compound into a wooden vessel, and add, very gradually, of sulphuric acid, 12 *lbs.*; continue the stirring for ½ an hour, repeating it daily for 14 days; then add of gum-arabic (in fine

[1] *Sperm oil* is commonly regarded as the *best* for *blacking*; but *pale seal oil* is thought by some to be quite as good. The *cod-liver oil* of the curriers, if clear, is less expensive, and probably better than either of them. Common *olive oil*, and *refined rape oil*, are, however, those most generally used by the blacking-makers.

[2] That is, 3 to 3½ times the *weight* of the *ivory-black*.

[3] Metallic vessels must be avoided.

[4] By taking the 'parts' ordered in this and the other formulæ as so many ½ *lbs.*, *lbs.*, ½ *cwts.*, or *cwts.*, the proportions of each ingredient for any quantity of blacking, from a ½ of a *lb.*, or a ½ *pint*, up to 2 *tons*, or nearly 450 *galls.*, will be at once seen; and so on of even larger quantities. See Concluding Remarks (*infrà*).

powder), 3 *lbs.*;[1] again mix well, and repeat the stirring for ½ an hour daily for 14 days longer, when the liquid blacking will be ready for use, or for bottling. The quality is very excellent; but this, probably, does not depend on the presence of the India rubber, but on the general correctness of the proportions, and the care and completeness with which they are mixed.

5. (*Without Vitriol.*) Take of ivory-black (in very fine powder), 2 *lbs.*; treacle, 1½ *lb.*; sperm oil, ¼ pint; mix, as before; then add of gum-arabic, 1 *oz.*; (dissolved in) strong vinegar, ½ pint; mix well; the next day further add of good vinegar, or strong sour beer, 3 to 4 pints (or *q. s.*); stir briskly for a ¼ of an hour, and again once a day for a week. Excellent. A cheaper, but inferior article, may be made by the reductions and omissions noticed above.

6. From paste-blacking (see *below*), by reducing it with sufficient vinegar, sour beer, or water, to give it the liquid form.[2]

II. PASTE BLACKING:—

1. Qualities from good to super-excellent may be made from any of the preceding formulæ, by simply omitting the final dilution with the vinegar, sour beer, or water, therein ordered at the end of the process.

2. (Bryant and James's INDIA-RUBBER PASTE BLACKING.—*Patent* dated 1836.) Of India-rubber oil, ivory-black, treacle, and gum-arabic, the same as for their liquid blacking (see I, 4, *above*), but dissolving the last in only 12 *lbs.* (say 5 quarts), instead of 20 galls. of vinegar; grinding to a smooth paste in a colour-mill, and then adding of oil of vitriol, 12 lbs., as before. The mass is to be stirred daily for a week, when it will be fit for use, or potting.[3] Excellent.

3. Ivory-black, 1 cwt.; treacle, 28 lbs.; rape oil (or other cheap oil), 1 gal.; mix, as before; then add of oil of vitriol, 21 *lbs.*; (diluted with) water, 2 *galls.*; mix them quickly and thoroughly by forcible stirring with a strong wooden spatula, and as soon as admixture is complete, but whilst still fuming, put the cover on the tub, and leave it till the next day, when (without further stirring) it will be fit for use or sale.[4] Good ordinary. Used for packets and tins.

4. As the last; but adding with the ivory-black, &c., 14 to 28 *lbs.* of coal-soot[5] (sifted); omitting one half of the oil, and diluting it; vitriol with an extra gal. of water. Inferus, Chiefly used for 1*d.* and ½*d.* packets.[6]

5. (GERMAN BLACKING.) Ivory-black part; treacle, ½ part; sweet oil, ½ part; ting as before; then stir in a mixture of hd to chloric acid, ½ part; oil of vitriol, ¼ part solu- separately diluted with twice its weig clear water before mixing them. This formitted ordinary paste-blacking of Germany, acc the ing to Liebig. r;

6. (*Without Vitriol.*) As I, 5 (*antè*); but with the omission of the last ½ gal. of 'vine gar.' and

Concluding remarks. To produce a Used rate article of blacking it is absolutely neces- sary that the ingredients be of the best qualit and used in the proper proportions; and that the order of their admixture, and the general manipulations, be conducted, under ordinary circumstances, in the manner described in the first of the above formulæ. The proportions of the treacle and the oil (the most expensive of the ingredients) should not be stinted; and, indeed, that of the latter may be safely increased in quantity, without materially affecting the polish, and with manifest advantage as far as the softness and durability of the leather to which it is applied, is concerned. The manipulations required in the manufacture of both paste-blacking and liquid blacking, are essentially the same; the difference between the two articles, when the same materials are used, depending entirely on the quantity of liquid added. Thus, as noticed before, by diluting paste-blacking with water, vinegar, or beer-bottoms, it may be converted into liquid blacking of a nearly similar quality; and, by using less fluid matter, the ingredients of liquid blacking will produce paste-blacking. One thing must, however, be observed, and that is, that the ivory-black used for liquid blacking should be reduced to a much finer powder than for paste-blacking; as, if this is not attended to, it is apt to settle at the bottom, and to be with difficulty again diffused through the liquid. Persons who object to the use of blacking containing oil of vitriol, may employ formula I, 5, or II, 6 (*above*). The vitriol, however, greatly contributes to promote the shining properties of the blacking; and in small quantities, or in the proper proportion, is not so injurious to the leather as some persons have represented; as it wholly unites itself to the lime of the bone-phosphate contained in the ivory-black, and is thus neutralised, insoluble sulphate of lime, and an acid phosphate or superphosphate, being formed. It is the latter that gives the acidity to a well-made sample of blacking, and not the sul-

[1] This should be gently rubbed through a sieve, held over the blacking by one person, whilst another stirs the mass assiduously with the spatula.

[2] It is sometimes convenient to prepare liquid blacking in this way from a stock of 'paste-blacking' already on hand.

[3] The final addition of the 3 *lbs.* of powdered gum, ordered in the formula of their liquid blacking, is not mentioned by the patentees; and we, therefore, presume they do not intend it to be made. If made, it should be at the end of the week, and the daily stirring must then be continued for another week. This addition, or omission, enables us to produce two qualities from the same formula.

[4] The object here is to make the product as spongy and light as possible, so that the purchaser may fancy he has a great deal for his money.

[5] This is also to give bulk.

[6] A still more common article is vended in the north of England, and in Scotland, in which the oil is omitted altogether. The sale of such blackings (?) is disreputable, when it is remembered that a really good article may be made for 2*d.* to 2½*d.* per *lb.*

phuric acid originally added to it. In this any, the larger portion of the ivory-black is duced to a state of extremely minute divi- T; and with the other ingredients forms a ngly adhesive paste, which clings to the face of the leather, and is susceptible of It having a high polish by friction when in a hard ely dry state. This is the reason why BL black should never be employed for *ru'bv.* ing to the exclusion of the necessary pro- 'br-ion of bone-black, as it has no earthy base D' absorb or neutralise the acid, which, if left in a free state, would prove very hurtful to the leather. Oil of vitriol is now employed in the in nufacture of all the more celebrated and Ansive blackings, and that, simply because (Ai ether substance is known so efficient, and in little injurious to the leather. In the common blackings of Germany, hydrochloric acid is often used to the entire exclusion of oil of vitriol; but blacking so prepared possesses several disadvantages from which that of England is free. In the best German blackings only a small portion of this acid is used, as may be seen by reference to formula II, 5 (*above*). The addition of white-of-egg, isinglass, and similar articles[1] to blacking, always proves injurious, as they tend to stiffen the leather, and to make it crack, without at all improving its polishing properties. Even gum-arabic, in quantity, is on this account, objectionable. Oil has an opposite tendency, and, as already stated, the quantity commonly used may be increased with advantage. Resin oil should be particularly avoided.

Dr. Ure has recommended the use of a little copperas[2] in blacking; with the object, we presume, of striking a black with the tan in the leather; but except with new, or nearly new leather, this effect would not occur, whilst its presence, if not objectionable, would otherwise be useless.

The only *improvement* that has been introduced in the manufacture of blacking since the early days of the celebrated Day & Martin is, a few hours after the conclusion of the mixture of the ingredients, (but before adding the vinegar, if any) to simmer the whole very gently, for about 8 or 10 minutes, observing to stir it assiduously all the time. The fire must then be withdrawn, and the pan covered over until it is quite cold, when half an hour's lusty stirring will finish the process.[3] In this way a degree of maturity and brilliancy will be imparted to the product, which, without the application of heat, it would take months to acquire, if, indeed, it ever reached it.

As it is generally more convenient to measure than to weigh liquids, it may be useful to remind the reader that, in round numbers,

1 gal. of *oil*	weighs	9¼	*lbs.*
1 „ *sour beer*	„	10¼	„
1 „ *vinegar* }	„	10	„
1 „ *water* }			

We may here further remark that the blackings of different houses vary considerably in some of their properties; as also do those of even the same maker by age. Some blackings dry off rapidly, and give a very brilliant polish with very little labour; whilst others take a little longer to 'dry off,' and somewhat more labour to polish them. The former are best adapted to hasty use, and when a very brilliant surface is desired; the latter when depth of polish, without extreme brilliancy, satisfies the wearer. The first best meets the requirements of fashionable life; the last, those of the middle classes and pedestrians exposed to dirt, mud, and the various vicissitudes of travelling and weather. To the one belong the 'blackings' of Everett, Day & Martin, &c.; to the other, those of Warren, Bryant & James, and most of the smaller manufacturers, with nearly all the paste-blacking of the more respectable shops. Time, however, equalises the qualities of these two classes. Blackings which are crude, moist, and oily, lose these properties, and become drier and more brilliant by age. The practice of several of the first-class West-end boot and shoe makers is never to use a blacking which they have not had in their stock at least a twelvemonth.

Blacking, both liquid and paste, should be stored in a cool and moderately dry cellar; and when in use should be kept corked or otherwise excluded from the air. Exposure or desiccation destroys most of its best qualities.

The present annual value of the blacking consumed in the United Kingdom is estimated at 562,500*l.*, or about 4½*d.* per head for the whole population; while the collective yearly value of that exported is about 35,000*l.*

[See BLACKING BALLS, BONE-BLACK, BOOTS AND SHOES, LEATHER, SULPHURIC ACID, &c.; also *below*.]

Blacking, Automat'ic. *Syn.* SELF-SHI''NING BLACKING, SPAN'ISH JAPAN, &c. *Prep.* 1. Gum-arabic, 4 *oz.*; treacle or coarse moist sugar, 1½ *oz.*; good black ink, ½ pint; strong vinegar, 2 *oz.*; rectified spirit of wine and sweet oil, of each 1 *oz.*; dissolve the gum in the ink, add the oil, and rub them in a mortar, or shake them together for some time, until they are thoroughly united; then add the vinegar, and lastly, the spirit.

[1] In Scotland, flour-paste soured by keeping, is often substituted for part of the treacle in the common blackings; with the effect, however, of greatly impairing their polishing qualities, and causing the leather to rapidly become stiff, and to crack. Further, such blacking will not keep, often growing mouldy and hard in two or three weeks.

[2] The proportion recommended by Dr. Ure is ½ *oz.* to each *lb.* of bone-black, dissolved in 10 parts of water, and to be added with the vitriol.

[3] A capacious enamelled cast-iron boiler, with a concave bottom, should be used for this purpose; in which case the ingredients can be mixed in it, and thus the trouble of removal avoided. If a common copper or cast-iron boiler be employed, the blacking must not be allowed to remain in it longer than necessary to give it the 'simmer,' at the conclusion of which it should be turned out into a wooden tub or vat to cool.

2. Lamp-black, ¾ *oz.*; indigo (in fine powder), 1 *dr.*; put them in a mortar, or basin, and rub them with sufficient mucilage (made by dissolving 4 *oz.* of gum in ¼ pint of strong vinegar) to form a thin paste; add very gradually, of sweet oil, 1 *oz.*; and triturate until their union is complete, adding toward the end the rest of the mucilage; then further add of treacle, 1½ *oz.*; and afterwards, successively, of strong vinegar, 2 *oz.*; rectified spirit, 1 *oz.*; lastly, bottle for use.

3. Mix the whites of 2 eggs with a tablespoonful of spirit of wine, 2 large lumps of sugar (crushed), and sufficient finely powdered ivory-black to give the required colour and thickness, avoiding excess.

Obs. The above are chiefly used for dress boots and shoes. The first two are applied to the leather with the tip of the finger, or a sponge, and then allowed to dry out of the dust. The third is commonly laid on with a sponge or soft brush, and when almost dry or hard may have its polish heightened with a brush or soft rubber, after which it is left for a few hours to harden. It may also be used to revive the faded black leather seats and backs of old chairs. They all possess great brilliancy for a time; but are only adapted to clean, dry weather, or indoor use. They should all be applied to the leather as thinly as possible, as otherwise they soon crack off.

Blacking, Har'ness. Good glue or gelatine, 4 *oz.*; gum-arabic, 3 *oz.*; water, ¾ pint; dissolve by heat; add of treacle, 6 *oz.*; ivory-black (in very fine powder), 5 *oz.*; and gently evaporate, with constant trituration, until of a proper consistence when cold; when nearly cold put it into bottles, and cork them down. For use, the bottle may be warmed a little to thin it, if necessary. Does not resist the wet.

2. Mutton-suet, 2 *oz.*; bees-wax (pure), 6 *oz.*; melt, add of sugar candy (in fine powder), 6 *oz.*; soft soap, 2 *oz.*; lamp-black, 2½ *oz.*; indigo (in fine powder), ½ *oz.*; when thoroughly incorporated, further add of oil of turpentine, ½ pint; and pour it into pots or tins.

3. Bees'-wax, 1 *lb.*; soft soap, 6 *oz.*; ivory-black, ¼ *lb.*; Prussian blue, 1 *oz.*; (ground in) linseed oil, 2 *oz.*; oil of turpentine, ½ pint; to be mixed, &c., as before.

Obs. The above are used by laying a very little of them on the leather, evenly spreading it over the surface, and then polishing it by gentle friction with a brush, or a soft rubber. The last two are waterproof. Numerous compositions of the class are vended by the sadlers and oilmen, but the mass of them are unchemical mixtures, badly prepared, and cause disappointment to those who use them. Such is not the case with the products of the above formulæ, if we may rely on the statements of those who have employed them for years. The last two are suitable for both harness and carriage leather. See HEEL BALLS, &c.

BLADD'ER. *Syn.* VES'ICA, L.; VESSIE, Fr.; BLASE, BLATTER, Ger. In *anatomy*, &c., a thin membranous sac or bag, in an animal, serving as a receptacle for some secreted fluid; *appr.*, the urinary bladder. See CALCULUS, INFLAMMATION, RUPTURE, &c.

Bladd'ers. (In *commerce*.) The better qualities of these articles are prepared by cutting off the fat and loose membranes attached to them, and washing them first in a weak solution of chloride of lime, and afterwards in clear water; they are then blown out and submitted to strong pressure by rolling them under the arm, by which they become considerably larger; they are next blown quite tight, dried, and tied up in dozens. Commoner qualities are merely emptied, the loose fat removed, and then blown out, and strung up to dry.—Used chiefly by druggists and oilmen to tie over pots, bottles, and jars, and to contain pill-masses, hard extracts, and other similar substances; also in surgery, to cover wounds, sore heads, &c.—*Obs.* Bladders should never be purchased unless perfectly dry and air-tight; as, if the reverse be the case, they will neither keep nor prove useful, but will rapidly become rotten and evolve a most offensive odour. If purchased whilst damp, they should be at *once* hung up in a current of air, so as to dry as soon as possible.

BLAIN* (blāne). A boil; a sore; a pustule.

BLANC (blŏn*g*). [Fr.] In *cookery*, a dish which, according to Mrs. Rundell, is formed of grated bacon and suet, of each, 1 *lb.*; butter, ½ *lb.*; 2 lemons; 3 or 4 carrots (cut into dice); 3 or 4 onions; and a little water; the whole being simmered for a short time, with or without the addition of a glass of sherry or marsala, before serving.

BLANCH'ING. *Syn.* CANDICA'TIO, DEALBA'TIO, &c., L.; BLANCHIMENT, &c., Fr.; BLEICHEN, &c., Ger. A whitening, or making white; a growing white. In some cases it means decortication. See ALMONDS, BLEACHING, DECOLORATION, &c.

Blanching. In *cookery*, an operation intended to impart whiteness, plumpness, and softness, to joints of meat, poultry, tongues, palates, &c. It is usually performed by putting the articles into cold water, which is then gradually raised to the boiling-point, when they are at once taken out, plunged into cold water, and left there until quite cold. They are subsequently removed and wiped dry, ready for being dressed.

Obs. The operation of blanching meat, although it renders it more sightly according to the notions of fashionable life, at the same time lessens its nutritive qualities, by abstracting a portion of the soluble saline matter which it contains, especially the phosphates, and thus deprives it of one of the principal features which distinguish fresh meat from salted meat. Animal food, before being dressed, may be washed or rinsed in cold water without injury, provided it be quickly done; but it cannot be soaked in water at any temperature much

below the boiling-point without the surface, and the parts near it, being rendered less nutritious. Washing meat when first received from the butcher is, indeed, a necessary act of cleanliness; but soaking it for some time in water is unnecessary, and for the reasons stated, should be avoided.

Strong acetic acid (concentrated vinegar) poured on or rubbed over hard lean meat, gradually renders it soft and gelatinous. Ordinary household vinegar has the same effect, but in a less degree. Tough meat thus treated for a short time before dressing it, becomes more tender and digestible, though somewhat less nutritious; whilst the taste and flavour of the vinegar is removed by the heat subsequently employed in dressing it.

BLANCMANGE'. (blo-mŏngzh'‡). *Syn.* BLANCMANGER (blŏng-mŏng-zhā), Fr. *Literally*, white food; in *cookery*, a confected white jelly. It is commonly prepared by simmering 1 *oz.* of isinglass, 2 or 3 *oz.* of lump sugar, and a little flavouring,[1] in about a pint of milk, until the first is dissolved, when the whole is thrown into a jelly-bag, and the strained liquor is allowed to cool and solidify; it is next remelted by a gentle heat, and, when nearly cold, poured into moulds, which have been previously rubbed with a little salad oil and then wiped out again.

Obs. Good gelatine, or strong calves' feet jelly, is often substituted for the isinglass. At other times the jelly is made with about ½ pint of water (instead of milk), when ½ pint of almond-milk, or of cream, is added to the remelted jelly. Sometimes ground rice or arrow-root is employed in lieu of isinglass, when the product is called RICE-BLANCMANGE, or WEST-INDIAN B., as the case may be. TRANSPA"RENT BLANCMANGE[2] is merely clarified isinglass-jelly, flavoured. See CREAM (Stone), ISINGLASS, and JELLY.

BLANQUETTE' (blang-ket'). [Fr.] In *cookery*, a species of white fricasee. It is also the name of a delicate species of white wine, and of a particular sort of pear.

BLAST'ING. In *civil* and *military engineering*, the disruption of rocks, &c., by the explosion of gunpowder, or other like material.

BLAST'ING POWDERS (Melville and Callow's). *Prep.* 1. (POWDER No. 1.) Chlorate of potassa, 2 parts; red sulphuret of arsenic, 1 part; to be separately carefully reduced to powder, and lightly mixed together, scrupulously avoiding the use of iron instruments, percussion, much friction, the slightest contact with acids, or exposure to heat.

2. (POWDER No. 2.) Chlorate of potassa, 5 parts; red sulphuret of arsenic, 2 parts; ferrocyanide of potassium (prussiate of potash), 1 part; as No. 1.

3. (POWDER No. 3.) Chlorate of potass and ferrocyanide of potassium, equal parts.

Obs. These compounds are not permanently injured by either salt or fresh water, merely requiring to be dried to regain their explosive character. They possess fully eight times the force of ordinary powder. One of their advantages, especially to the underground miner, is the very trifling amount of smoke produced by their explosion. On the other hand, the extreme facility with which they explode by attrition, contact with a strong acid, and a slight elevation of temperature, render them unsuited to most of the purposes of ordinary gunpowder. On this account they should only be prepared in small quantities at a time, and with the utmost caution. Mr. Callow, the inventor of them, lost several of his fingers, and was rendered a cripple for life, by an explosion of the kind referred to, which occurred only a few weeks after the sealing of his patent. A straw, or small strip of wood, only slightly wetted with oil of vitriol, and applied to a small heap of the powder, produces instantaneous explosion. See GUN-COTTON, GUNPOWDER, MINING, &c.

BLEACH'ING. (blēche'-). *Syn.* DEÄLBA'TIO (-sh'o), INSOLA'TIO,[3] &c., L.; BLANCHIMENT, BLANCHISSAGE, Fr.; BLEICHEN, Ger. The process by which the colour of bodies, natural or acquired, is removed, and by which they are rendered white or colourless. It is more particularly applied to the decolorisation of textile filaments, and of cloths made of them.

Hist. Bleaching is a very ancient art, as passages referring to it in the earlier sacred and profane writers fully testify. It had probably reached a high degree of excellence among the inhabitants of the first Assyrian empire, and was certainly practised in Egypt long before the commencement of written history. We may fairly assume that fine white linen formed part of the "raiment," which, together with "jewels of gold, and jewels of silver," and "precious things," Abraham sent as presents to the beautiful Rebecca and her family,[4] fully three centuries and a half before the Exodus. Subsequently, in Scripture, we have special mention of "fine linen, white and clean." Herodotus, the earliest Greek historian, tells us, that the Babylonians wore "white cloaks;"[5] and in Athenæus we read of "shining fine linen," as opposed to that which was "raw" or unbleached.[6] At this early period, and for many centuries afterwards, the operations of washing, fulling, and bleaching, were not distinctly separated. The common system of washing followed by drying in the sun, adopted by the ancients, is a process which of itself, by frequent repetition, decolorises the raw materials

[1] This may be 5 or 6 bitter almonds (grated), or a little cinnamon, orange, or lemon peel, &c., at will. Sometimes these are omitted, and a little orange-flower water, rose-water, or essence of vanilla, added to the remelted jelly.
[2] A misnomer of the confectioners and cooks.
[3] Bleaching by exposure in the sun.
[4] *Gen.* xxiv, 53: B. C. 1857.
[5] *Herod.*, i, 195.
[6] *Athen.*, ix, 77.

of textile fabrics, and thus must inevitably have taught them the art of 'natural bleaching' of a character similar to that practised in Europe up to a comparatively very recent period. And this appears, according to the authority of ancient authors, to have been the case. Washing or steeping in alkaline and ammoniacal lyes, or in milk of lime, followed by exposure in the sun, formed the chief basis of their system; whilst woollens, then as now, were treated with soap and fuller's earth, or with potter's clay, marl, Cimolian earth, or other like mineral. Urine was highly esteemed among them; and we are told that in the time of the emperor Vespasian,[1] and undoubtedly long before it, cloths were sulphured. Indeed, according to Pliny, sulphuring was often had recourse to in ordinary washing, as well as in the bleaching process.[2]

Bleaching continued to be practised with no essential change of its principles until the discovery of chlorine, to which we shall presently refer. In the last century, Holland obtained the best name for bleaching. The process passed then to Ireland and Scotland, and thence into England. It was even customary to send goods from this country to be bleached in Holland. The first attempt to vie with Holland, was made, in Scotland, in 1749.

The first steps towards the modern or chemical system of bleaching were the investigations of Berthollet on chlorine, in 1784, but which were not communicated to the French Academy until the year 1787. The knowledge of the use of chlorine as a bleacher was soon afterwards brought to this country by the Duke of Gordon, and by Prof. Copeland of Aberdeen, and through them was practically applied by Messrs. Milnes of that place. About the same time, James Watt, a correspondent of Berthollet, successfully introduced its use in the neighbourhood of Glasgow, and then generously laid a statement of the results before the Manchester manufacturers. In enforcing the importance of the new substance and process on these gentlemen, he was ably followed and seconded by Dr. Henry. In 1798, Mr. Chas. Tennant, of Glasgow, obtained a patent for a new bleaching liquor prepared by saturating *lime-water* with *chlorine;* and another, in 1799, for dry *chloride of lime*, a substance which is still preferred as a bleacher to all other preparations of chlorine. The new or continuous process of bleaching, as it is called, and that which is at present in general use in all the chief bleach-works of Lancashire, was introduced by Mr. David Bentley, of Pendleton, and *patented* by him in 1828.

Proc. Bleaching is commonly said to be natural, when exposure to light, air, and moisture, forms the leading part of the process; and to be chemical, when chlorine, chloride of lime, sulphurous acid, or other like substances, are employed. In some cases, as with linen, the two processes are combined. The subject requires to be noticed under separate heads, depending on the material operated on:—

I. BLEACHING of Cotton:—*Cotton* is more easily bleached, and appears to suffer less from the process than most other textile substances. On the old plan it was first (1) thoroughly washed in warm water, to remove the weaver's paste or dressing; then (2) 'bucked' or 'bowked' (boiled) in a weak alkaline lye, or in milk of lime, to remove colouring, fatty, and resinous matters, insoluble in simple water; and after being (3) again well washed, was (4) spread out upon the grass, or bleaching ground, and freely exposed to the joint action of light, air, and moisture (technically called 'crofting'). The operation of 'bucking' in an alkaline lye, washing, and exposure, was repeated as often as necessary, when the goods were (5) 'soured' or immersed in water acidulated with sulphuric acid, after which they (6) received a final thorough washing in clean water, and were (7) dried, finished, and folded for the market. From the length of the exposure upon the bleaching ground, this method is apt to injure the texture of the cloth; and from the number of operations required, is necessarily expensive and tedious. It is therefore now very generally superseded by the system of chemical bleaching briefly described below.

In the CHEMICAL SYSTEM of bleaching, the goods are 'washed' and 'bucked' as on the old plan, then submitted to the action of a weak solution of chloride of lime, and afterwards passed through water soured with hydrochloric or sulphuric acid, when they have only to be thoroughly washed, and to be dried and finished, for the entire completion of the process.

The *new* or *continuous process*, before referred to,[3] is the method of chemical bleaching at present in the most general use; and, indeed, it has nearly superseded all other methods. In this system the pieces, previously tacked together endwise so as to form a chain, are drawn, by the motion of rollers, in any direction, and any number of times, through every solution to the action of which it is desired to expose them, and this entirely and completely under the control of the operator.

The following *Table* exhibits an outline of the several operations in the improved form of the continuous process as practised by Messrs. McNaughten, Barton, & Thom, at Chorley, and in most other large bleach-works:—

1. Preliminary operations:—*a.* The 'pieces'[4] are separately stamped with the printer's name, a solution of silver, or sometimes coal-tar, being employed for the purpose.

[1] About A. D. 60.
[2] *Hist. Nat.*, xxxv, 57, &c.
[3] See *Hist.* (antè).
[4] Usually about 30 yards each.

b. They are tacked together endwise either by hand or a machine, so as to form one continuous piece of 300 to 350 yards in length, according to the weight of the cloth.

c. They are singed.[1]

d. They are crushed into a rope-like form by drawing them through a smooth aperture,[2] the surface of which is generally of glass or porcelain—the rope form being given them to enable the water, and other liquids, to penetrate the goods more easily, and to allow them to be laid in loose coils in the kiers.

2. The pieces are bucked or boiled in milk of lime[3] for 12 to 14 hours,[4] followed by rinsing or cleansing in the washing-machine.

3. They are soured in water acidulated with hydrochloric acid,[5] and again washed; similar machines being employed for each.

4. They are bucked or boiled for 15 or 16 hours in a solution of resinate of soda,[6] and then washed as before.

5. They are chemicked by being laid in a wooden, stone, or slate cistern, when a solution of chloride of lime[7] is pumped over them, so as to run through the 'goods' into a vessel below, from which it is returned on them, by continued pumping, so that the cloth lies in it for 1 to 2 hours; it is then washed.

6. They are bucked or boiled, for 4 or 5 hours, in a solution of 1 *lb.* of crystallised carbonate of soda, dissolved in 5 galls. of water, to every 35 *lbs.* of cloth; and washed.

7. They are again 'chemicked,' as before; and washed.

8. They are soured in very dilute hydrochloric acid;[8] and then left on 'stillages'[9] for 5 or 6 hours.

9. They are, finally, thoroughly washed, well squeezed between rollers, dried over steam-heated tin-cylinders, starched or dressed, and finished.

This is the usual process for good calicos. Muslins, and other light goods, are handled rather more carefully; whilst for commoner ones, the sixth and seventh operations are generally omitted. The whole usually occupies 5 days; but by using Mr. Barlow's high-pressure steam kiers, it may be performed in two days. Yarns, &c., may be bleached in a similar manner by first looping the skeins together.

Obs. According to the most reliable authorities, the strength of cotton-fibre is not impaired by its being boiled for two hours in milk of lime, under ordinary pressure, out of contact with the air; not, according to the bleachers, even by sixteen hours boiling at the strength of 40 *lbs.* per 100 galls. It is said that lime is less injurious than 'soda.'

Solution of caustic soda, sp. gr. 1·030, does not injure it, even by boiling under high pressure; but, in practice, soda-ash, or carbonate of soda, is used, and this only in the second bucking, and in the third, if there be one. The strength now never exceeds 25 *lbs.* of the crystals to the 100 *galls.*, and is usually less.

Experiments have shown that immersion for 8 hours in a solution of chloride of lime containing 3 *lbs.* to the 100 galls., followed by souring in sulphuric acid of the sp. gr. 1·067, or for 18 hours in acid of 1·035, does not injure it.

By the improved method of previously treating the goods with lime or alkalies, little chloride of lime is required. Indeed, it is said that where 300 *lbs.* were formerly employed, 30 to 40 *lbs.* only are now used. At the same time it is right to mention, that though a solution at ½° Twaddle is usually regarded as the best and safest strength, yet in some bleach-works, particularly for inferior and less tender goods, this is greatly increased, even up to 5°, the period of immersion being proportionately reduced, as it is not safe to expose the goods long to the action of such powerful solutions. With the higher strengths they are passed rapidly through the liquid with the calender, sufficient time only being allowed to soak them thoroughly; then immediately through the acid or souring, followed by washing as before.

In Scotland and Ireland the washing is generally performed by wash-stocks; whilst in Lancashire, dash-wheels or washing-machines with squeezers, are almost always used for the purpose.

Cotton loses about 1-20th of its weight by bleaching.

II. BLEACHING of Linen:—*Linen* may be bleached in a similar way to 'cotton,' but the process is much more troublesome and tedious, owing to its greater affinity for the colouring matter existing in it in the raw state. Under the old system, several alternate buckings with pearlash or potash and lengthened exposure on the field, with one or two sourings, and a final scrubbing with a strong lather of soft soap, constituted the chief details of the process. In this way a high degree of whiteness, though not an absolutely pure or snow white, was ultimately produced. Grass-bleaching or crofting is still extensively used for linen; but it is more generally employed only for a limited time, and in combination with a

[1] Generally on one side only; but for goods to be subsequently finely printed, on both sides. For very fine printing the nap is sometimes removed by shearing instead of 'singeing,' an ingenious and effective machine being employed for the purpose.

[2] Such apertures are also used instead of pulleys, in the transfer of the rope from place to place.

[3] The common proportions are about 1 lb. of quick-lime slaked and reduced to milk, with 2 galls. of water, for every 14 or 15 lbs. of cloth.

[4] This is done in a large iron boiler furnished with a perforated false bottom of wood, and technically termed a 'kier.'

[5] This dilute acid or acidulated water has usually the sp. gr. 1·010, or 2° Twaddle.

[6] Made with about 17 *lbs.* of soda-ash and 3 *lbs.* of resin, with water, 50 galls., to every 20 or 21 *lbs.* of cloth.

[7] Technically called 'chemick.' The strength of the solution is usually of the sp. gr. 1·0025, or ½° Twaddle.

[8] Sp. gr. 1·0125, or 2½° Twaddle.

[9] Low stools or props to keep them from the ground.

modification of the system at present almost universally adopted for cotton goods; whilst, in some cases, crofting is omitted altogether, and the bleaching conducted wholly by the latter process. The following *Tables* exhibit the outlines of the new system as at present practised in Ireland and Scotland:—

a. For *plain sheetings*:—

1. They are bucked for 12 or 15 hours in a lye made with about 1 *lb.* of pearlash (or soda-ash) to every 56 *lbs.* of cloth, and washed.
2. Crofted for about 2 days.
3. Bucked in milk of lime.
4. Turned, and the bucking continued, some fresh lime and water being added; and washed.
5. Soured in dilute sulphuric acid at 2° Twaddle.
6. Bucked with soda-ash for about 10 hours, and washed.
7. Crofted, as before.
8. Bucked again with soda-ash, as before.
9. Crofted for about 3 days.
10. Examined, the white ones taken out, and the others again bucked and crofted.
11. Scalded or simmered in a lye of soda-ash of about only 2-3rds the former strength, and washed.
12. Chemicked, for 2 hours, at ½° Twaddle, washed, and scalded.
13. Again chemicked, as before.
14. Soured for 4 hours, as in No. 5; washed, and finished.

This occupies 13 to 15 days, according to the weather.

b. For *shirtings*, &c.:—As the preceding, but with somewhat weaker solutions.

c. For goods to be subsequently *printed*:—

1. Bucked in milk of lime for 10 or 12 hours.
2. Soured in dilute hydrochloric acid of 2° Tw., for 3 to 5 hours, and washed.
3. Bucked with resinate of soda for about 12 hours.
4. Goods turned, reboiled as before, and washed.
5. Chemicked at ½° Tw., for 4 hours.
6. Soured at 2° Tw., for 2 hours, and washed.
7. Bucked with soda-ash for about 10 hours, and washed.
8. Chemicked as in No. 5.
9. Soured, as at No. 6, for 3 hours; washed, and dried.[1]

Obs. The chief difficulty in bleaching linen arises from the fact that its colouring matter is insoluble in acid or alkaline solutions until it has been long acted upon by light, air, and moisture, as in the common process of grass-bleaching. Chlorine hastens the operation; but, unfortunately, it can only be employed towards the end of the process; as when earlier used, the colour of the raw cloth becomes set, and irremovable. To obviate this difficulty Mr. F. M. Jennings, of Cork, has lately introduced the joint use of an alkali and an alkaline hypochlorite (chloride) in the place of the ordinary chloride of lime. He prepares a bath of solution of soda at 5° Twaddle, which he raises by the addition of chloride of soda (or of potash) to 6 or 7°, and in this he steeps the cloth (after the first bucking and souring) for some hours, heat, or constant squeezing between rollers, being had recourse to, to facilitate the action. Souring and washing follow, when the goods are again put into the alkaline and chloride bath, as before; after which they are soured, and bucked again with soda. These last three operations are repeated until the cloth is almost white, when crofting for one-half to one fourth the time required by the usual method renders it fit for the final bucking, and finishing. Indeed, it is said that if the process be very carefully managed it renders crofting unnecessary.

Raw linen loses about 1-3rd of its weight in bleaching.

III. Silk:—*Silk* is usually bleached by first steeping it, and then boiling it in solutions of white soap in water, after which it is subjected to repeated rinsings, a little indigo-blue, or archil, being added to the last water to give it a pearly appearance. When required to be very white (as for gloves, stockings, &c.), the goods are cautiously submitted, for 2 or 3 hours, to the action of the fumes of burning sulphur, and then finished by rinsing, as before.

Obs. Boiling or sulphuring is not required for the white silk of China. Raw silk loses from 4 to 5 *oz.* per *lb.* by bleaching.

IV. Wool:—In bleaching raw wool it is first deprived of the yolk or peculiar natural varnish with which it is covered. For this purpose it is steeped and stirred for about 20 minutes in rather warm water (135°—140° Fahr.), either with or without the addition of 1-4th part of stale urine; after which it is placed in baskets to drain, and soon afterwards thoroughly rinsed in a stream of water, when it is again allowed to drain, and is hung up to dry. The further operations depend on circumstances, wool being sometimes whitened in the fleece, or in the yarn, but still more frequently and extensively, not till woven. When it is intended to send it in the first two forms white to market, it is hung up or spread out, whilst still wet, and sulphured (see *below*); after which it is either at once rinsed for some time in cold water, or is previously treated with a very weak bath of soft soap.

In the case of woollen fabrics the operations of purifying or whitening the wool, beyond the removal of the yolk, are, for the most part, mixed up with the weaving and working of it. The pieces leave the hands of the weaver of a dingy gray colour, loaded with oil, dirt, and dressing. They then pass to the

[1] The strengths of the solutions, when not otherwise stated, are about the same as those given under COTTON (*antè*).

[2] *Patent* dated 1859.

fulling-mill, where they are treated with fuller's earth and soap, often preceded with ammonia or stale urine, after each of which they are well washed out or scoured with cold water, and are then ready for the dyer. When it is intended to obtain them very white, or to dye them of a very delicate shade, they are commonly sulphured; after which they are washed or milled in cold water for some hours, a little finely ground indigo being added towards the end, to increase their whiteness; an addition also made when the cloth is sufficiently white without the sulphuring process.

The usual mode of SULPHURING woollen goods is to hang them up on pegs or rails, as in the case of fleece-wool, to spread it about, at the upper part of a close, lofty room or chamber, called a Sulphur-stove. In each corner of this room is set a cast-iron pot containing sulphur, which, after the introduction of the goods, is set on fire, when the door at the lower part of the chamber is shut tight and clayed. This is commonly done overnight; and by the morning the bleaching being finished, the goods are removed, washed, and azured.

Sulphuring, unless very skilfully managed, imparts a harsh feel to woollen goods, which is best removed by a very weak bath of soap-and-water (lukewarm); but the action of soap in part reproduces the previous yellowish-white tinge. Milling with cold, or luke-warm water, tinged with indigo, is the best substitute.

Obs. Raw wool loses from 35 to 45% of its weight by scouring, and 1 to 2% more in the subsequent operations of the bleacher; the loss being in direct proportion to the fineness of the staple.

*** The above are the four principal applications of the art of bleaching; but, in technical language, the words bleaching, bleacher, bleachery, bleach-works, &c., when employed alone, are understood to have reference only to cotton and linen. This has arisen from the enormous extent of these manufactures, and from the process of bleaching them forming a business entirely distinct from that of weaving, dyeing, or printing them. The following, with the exception of the first, are of comparatively minor importance and interest:—

V. **Materials for Paper**:—Old rags for the manufacture of paper, and paper-pulp, are now almost universally bleached with chlorine or chloride of lime; the former being generally used in France, and the latter in England. The process usually consists in (1) boiling in an alkaline lye to remove grease and dirt, (2) washing, (3) pressing, (4) deviling or tearing up the pressed cake into fine shreds or pulp, (5) chemicking, with agitation, for about an hour, in a clear solution of chloride of lime,[1] followed by (6) washing, (7) souring with dilute hydrochloric acid at 1 or 2° Tw., or treatment with a solution of some antichlor, or both, and (8) a final washing and pressing. For the common kinds of paper, the operations included in No. 7 are omitted; but unless the whole of the lime-salt be removed from the pulp, the paper made of it is liable to turn brown and become rotten by age. In some cases rags are bleached before being divided and pulped. Cotton-waste is bleached in a similar way to rags.

In France, the chlorine, in a gaseous form, is passed from the generators into the bleach-cisterns containing the pulp, which in this case must be fitted with close covers.

VI. **Printed Paper**, as *Books*, *Engravings*, *Maps*, &c.—These when stained or discoloured may be whitened by (1) wetting them with pure clean water, (2) plunging them into a dilute solution of chloride of lime, (3) passing them through water soured with hydrochloric acid, and then (4) through pure water until every trace of acid be removed. This process may be further improved by further dipping them into a weak solution of some antichlor, and again washing them, before finally drying them. It is only rare and valuable original works or specimens of art that are worth this treatment, which, owing to the very nature of paper, requires considerable address to manage. In many cases a sufficient degree of renovation may be effected by simply exposing the articles, previously slightly moistened, to the fumes of burning sulphur, followed by passing them through a vessel of pure water.

VII. **Straw, Straw-plait**, and articles made of them, are, on the large scale, usually bleached by (1) a hot steep or boil in a weak solution of caustic soda, or a stronger one of soda-ash, followed (2) by washing and (3) by exposure to the fumes of burning sulphur. To effect the last, the goods are suspended in a close chamber connected with a small stove, in which brimstone is kept burning. On the small scale, a large chest or box is commonly employed. A piece of brick, or an old box-iron heater, heated to dull redness, is placed at the bottom of an iron crock or earthen pan, a few fragments of roll sulphur thrown on, the lid instantly closed, and the whole left for some hours. Care should be taken to avoid inhaling the fumes, which are very deleterious as well as disagreeable and annoying. Straw goods are now also frequently bleached by the use of a weak solution of chloride of lime, or of water strongly soured with oxalic acid or even oil of vitriol, followed by very careful rinsing in clean water; but here, as in the

[1] The 'strength' varies with the colour and quality of the rags. From 2 to 4 *lbs.* per *cwt.* of rags is a common proportion; but for dyed and printed rags as much as 7 or even 8 *lbs.* per *cwt.* are often employed. It is better, however, to prolong the process with a weaker solution, than to hasten it by using the chloride in excess. Large rectangular cisterns of wood, or of slate, are commonly employed as the bleach-vessels. Cisterns of wood or brick-work lined with gutta percha or with asphalto-bitumen, are employed in some paper-mills, and answer admirably.

former case, the natural varnish, dirt, grease, &c., must be first removed by alkalies or soap, to enable the chlorine or acid to act on the fibres.

Concluding remarks. The theory of bleaching, notwithstanding the giant strides of chemistry during the last 20 years, remains still unsettled; and hence the processes employed are still, for the most part, empirical. It appears probable that chlorine acts by uniting with the hydrogen of the water, or of other compounds present, or probably with that of both, and that it is the oxygen thus liberated, and whilst in the nascent state, that is the true operative agent. Hence bleaching by chlorine, or by the hypochlorites, may be regarded as an oxidation of the colouring matter; but whether the chlorine or the oxygen effects this oxidation is of little practical importance—the result being the same—the destruction of the compound, and the removal of the colour that depends on its existence. It is doubtful whether the bleaching power of sulphurous acid is due to it as an oxidising or a deoxidising agent; but the last is probably the case, with a like destruction of the compound constituting the colouring matter. It may, however, be supposed that sulphurous acid acts as an oxidiser, as it appears to do when it decomposes sulphuretted hydrogen; or it may act by simply altering the compound by inserting itself, a view receiving some support from the fact that wool whitened by sulphuring may be restored to nearly its previous colour by merely treating it with soap or alkalies.

The bleaching power of light depends on its actinic or chemical rays, which, like chlorine, appear to act as an oxidising agent.

Chlorates, chromates, chromic acid, manganates, &c., have been proposed as bleaching agents for textile filaments and fabrics, but without success or practical advantage. Immersion in water more or less strongly impregnated with sulphurous acid has, however, been successfully substituted for the common sulphuring process, particularly for silk.

To avoid the injury of the goods by sparks, and by drops of water highly saturated with sulphurous acid falling from the roof, Mr. Thom has invented a method of passing them rapidly through, or keeping them in constant motion in, the sulphuring chamber. His apparatus is constructed on the principle of the washing-machine, the fumes of burning sulphur being used instead of water.

[Further information in connection with bleaching will be found under the heads ACTINISM, BLANCHING, CALICO-PRINTING, CHARCOAL, CHLORIDES (Bleaching), CHROMATES, CHROMIC ACID, HYPOCHLORITES, HYPOCHLOROUS ACID, LIGHT, RINSING, SPOTS and STAINS, SULPHURING, WASHING, &c.; also under BONES, ENGRAVINGS, FAT, FEATHERS, HORN, IVORY, OIL, PAPER, PRINTED BOOKS, RAGS, SPONGE, STRAW-PLAIT, TALLOW, WAX, &c.[1]]

Bleaching Liq'uid. Solution of chloride of lime.

Bleaching Pow'der. Chloride of lime.

Bleaching Salts. The commercial hypochlorites.

BLEAR'-EYE [blēre'-ī). *Syn.* LIPPITU'DO, L.; CHASSIE; LIPPITUDE, Fr. An exudation of a puriform matter from the margins of the eyelids, which are red, tumid, and painful; and frequently, during the night, glued together by the discharge.

Treatm. Mild astringent collyria, as those of sulphate of zinc or alum (6 or 8 grs. to 1 oz. of water). An ointment formed of 1 part of the ointment of nitrate of mercury (Ph. L.), diluted with 11 parts of sweet washed lard, may be advantageously applied nightly, by means of a camel-hair pencil, the smallest quantity possible only being used. Excess in eating and drinking should be avoided, and some aperient medicine taken.

BLEAK (blēke). *Syn.* BLAY‡, BLEY‡ (blā). The *cypri'nus albur'nus* (Linn.), a small river-fish, the scales of which are used in making artificial pearls (which *see*).

BLEED'ING (blēde'-). In the sense of a flow or loss of blood, see HÆMORRHAGE; in that of bloodletting, see CUPPING, LEECHING, VENESECTION, &c.

BLENDE (blĕnd). A name applied to several minerals; *appr.*, zinc-blend, or native sulphuret of zinc—the black jack of miners.

BLIGHT (blīte). See MILDEW, and PLANTS (Diseases of).

BLIND'NESS (blīnd'-). *Syn.* ABLEP'SIA, CÆ'CITAS, &c., L.; AVEUGLEMENT, CÉCITÉ, Fr.; BLINDHEIT, Ger. Deprivation or want of sight.

Blindness may be congenital, or born with a person; or it may arise from accident, external violence, or disease. In the latter it may frequently be relieved by medical and surgical treatment. See AMAUROSIS, CATARACT, EYES, OPHTHALMIA, VISION, &c.

Day Blindness. *Syn.* NIGHT'-SIGHT; NYCTALO'PIA, L. A disease of the eye in which vision is painfully acute or more or less extinct in a strong light, as that of day; but clear and pleasant in the dusk of evening and at night. Its chief *causes* are excessive exposure of the eyes to the direct influence of very strong or glaring light, or to heat, or both of them together; and is often one of the sequelæ of ophthalmia (which *see*).

Night Blindness. *Syn.* DAY'-SIGHT; HEMERALO'PIA, L. An affection of the eye, the reverse of the preceding, in which objects are clearly seen only in broad daylight. In the beginning of the complaint the patient continues to be able to see, though less clearly, for

[1] An accurate description of the apparatus and machinery employed in *bleach-works*, with numerous engravings, will be found in Ure's "*Dict. of Arts, Manuf. & Mines*," 5th ed., i, 318-351, &c.

a short time after sunset, and even by moonlight, and perhaps distinctly by bright candlelight; but after a short time this power is lost. It most frequently occurs in hot climates, and low latitudes at sea. Its chief causes are fatigue and exposure of the eyes to the glare of the tropical sun, probably coupled with gastric derangement. In some cases it is congenital, and is then generally incurable. The *treatment* consists in avoiding exciting causes, and endeavouring to restore the tone of the stomach, and the general health, by the usual methods. The eyes at the same time should be topically medicated by the frequent use of cold water, or mild astringent collyria. See OPHTHALMIA (Chronic).

BLIS'TER. *Syn.* PAP'ULA, PUS'TULA, L.; PUSTULE, VESSIE, &c., Fr.; BLASE, BLATTER, Ger. A bladder or vesicle caused by the deposition of serous fluid between the cuticle and the derma or true skin, occasioned by the application of a vesicant, or by a burn, scald, or friction.

Blister. *Syn.* VESICATO"RIUM, L.; EPISPASTIQUE, VESICATOIRE, Fr.; BLASEN-PFLASTER, B.-STOFF, Ger. A substance which vesicates or raises blisters; in *pop. lang.*, a vesicating plaster or similar application.

The *use* of blisters is very ancient, and appears to date back long prior to the time of Hippocrates. Indeed, their value as cutaneous stimulants and counter-irritants appears to have been recognised by the medical faculty of all nations down to the present time. It is a principle sufficiently established with regard to the living system, that where a morbid action exists, it may often be removed by inducing an action of a different kind, as a state of excitement or irritation, in the same or a neighbouring part. In this way is explained the utility of blisters in local inflammation and spasmodic action, and it is this principle which regulates their application in pneumonia, gastritis, hepatitis, phrenitis, angina, rheumatism, colic, spasmodic affections of the stomach, &c.—diseases in which they are employed with the most marked advantage. A similar principle exists with respect to pain; exciting one pain often relieves another. Hence blisters frequently give relief in neuralgia, toothache, and other like painful affections. Lastly, blisters, by their operation, communicate a stimulus to the whole system, and raise the vigour of the circulation. Hence, in part, their utility in fevers of the typhoid kind, though in such cases they are used with still more advantage to obviate or remove local inflammation.

Blisters are commonly prepared with cantharides-plaster, or with some other preparation of cantharides; and, in the former case, usually have their surface sprinkled over with powdered Spanish fly; whilst the blistering surface is surrounded with a margin spread with common adhesive plaster, for the purpose of causing them to adhere to the part to which they are applied. In order to prevent the action of the cantharides upon the mucous membrane of the bladder, or urinary organs, they are also often sprinkled with a little powdered camphor, or better still, are moistened with camphorated ether, which, on its evaporation, leaves a thin layer of camphor on the surface; but care must be taken that the layer be not too thick, as in that case the plaster would not take effect. With a like object, a piece of thin book-muslin or tissue-paper (silver-paper) is frequently placed between the blistering surface of the plaster and the skin; the efficacy of which may be still further heightened by first soaking the muslin or paper in olive or almond oil.

The usual time an ordinary blister of cantharides-plaster is allowed to remain in contact with the skin is from 10 to 12 hours. It is then gently removed. The subsequent treatment depends on the object in view. When it is not wished to maintain a discharge from the blistered surface, the vesicle is cut with the point of a pair of scissors at its most depending part, to let out the fluid which it contains, followed by a dressing of spermaceti or other simple ointment; but when the case requires the blister to be kept open, or to be converted into a perpetual blister, as it is sometimes called, the whole of the detached cuticle is carefully removed with the scissors, and the part is dressed with either the ointment of cantharides or of savine, at first, more or less diluted with lard or simple ointment, with an occasional dressing of resin cerate. According to Mr. Crowther, the blistered surface is best kept clean by daily fomentation with warm water.

Of late years, to obviate the unpleasant effects occasionally arising from the common blister, various compounds having cantharides for their base, as well as fabrics spread with them, have been brought before the public. These are noticed hereafter. See PLASTERS, VESICANTS, &c.

Extempora"neous Blisters. Among the best of these may be mentioned the following:—

1. A piece of lint dipped in the strongest vinegar of cantharides, and immediately after its application to the skin, covered over with a piece of strapping, or preferably a piece of sheet gutta percha or oiled silk, to prevent evaporation. Raises a blister in from 5 to 8 minutes.

2. Concentrated acetic acid, applied in the same way, has a similar effect.

3. (Dr. Darcq.) Into a flat watch-glass pour from 8 to 10 drops of highly concentrated liquor of ammonia; cover the liquid with a small piece of linen of rather less diameter than that of the glass, and at once apply this little apparatus to the previously shaved skin. The whole must be kept in its place by means of moderate pressure with the fingers, until a red ring, about 2 centimètres in breadth, is observed round the glass, when it is certain that vesication is effected. Sometimes scarcely 30 seconds are necessary for

obtaining the result. The apparatus may then be removed, and the blistered part treated in the usual manner; the dressing being according to the object in view.

4. (Trousseau.) Bibulous paper slightly wetted with a little of the ethereal extract of cantharides, and instantly applied to the skin, the whole being covered with a piece of common adhesive plaster to prevent evaporation.

5. Boiling water applied by means of a suitably shaped tube, the adjacent parts being at the same time protected from injury. Instantaneous.

Horse Blister. See VETERINARY MEDICINES.

Perpet'ual Blister*. See BLISTER (*antè*).

BLIS'TERING. *Syn.* VES'ICANS, VESICATO''RIUS, L.; EPISPASTIQUE, VÉSICANT, VÉSICATOIRE, Fr.; BLASENZIEHEND, &c., Ger. In *medicine*, &c., that vesicates or raises blisters when applied to the skin.

Blistering Pa'per, Plas'ter, Tis''sue (tĭsh-ū), &c. See PLASTERS, VESICANTS, &c.

BLOAT'ER. See BLOTE.

BLONDE. [Fr.] *Syn.* BLOND'-LACE. Silk-lace. The name is now also applied to cotton-lace edged with silk. For the mode of cleaning it and getting it up, see LACE and MUSLIN.

BLOOD (blŭd). *Syn.* SAN''GUIS, L.; SANG, Fr.; BLUT, Ger. The general circulating fluid of animals, and that on which the nourishment and growth of their bodies depend, and from which all the secretions are formed. It is warm and red in vertebrated animals; and, for the most part, cold and white in the invertebrata. In man and all other mammals, and in birds—the two highest classes of the animal kingdom—the blood, though collectively forming but one circulating stream, varies considerably in appearance according to the part or vessels in which it is found. That contained in the left side of the heart, and in the arteries, possesses a very brilliant scarlet colour, and is called arte''rial blood; whilst that found in the right side of the heart, and in the veins, has a darkish purple colour, and is called ve'nous blood. The two, however, differ little from each other in their chemical properties and composition; the most marked point of difference being that venous blood holds carbonic acid in solution, whilst oxygen predominates in the blood of the arteries. The fibrine of venous blood is also soluble in a solution of nitrate of potassa; while that of arterial blood is insoluble in that menstruum.

Comp. Blood consists of a transparent and nearly colourless fluid (plas'ma, se''rum, sĕr-albu'men), in which float about a countless multitude of microscopic round red bodies (blood'-discs, b.-cor'puscles, -pŭslz), to which its colour is due, accompanied by a few colourless globules (white b.-c.) of a somewhat larger size. The red corpuscles are found, on more minute examination, to consist of an envelope containing a solution of hæmatosine.

Prop. These are, for the most part, well known. It has an alkaline reaction, a saline and rather disagreeable sweetish taste, and when newly drawn evolves a peculiar odour or halitus, which almost immediately disappears. As it cools and on repose it coagulates, owing, according to some, to the spontaneous solidification of the fibrine; but more probably, as has been recently shown, to the loss of ammonia, traces of which are always present in newly drawn blood.

Uses, &c. That of bullocks is employed for the clarification of wines and syrups; also in the preparation of adhesive cements, as the vehicle in coarse paint for out-door work, as a manure, as a bleaching powder, to make pure animal charcoal, and for several other purposes. The blood of sheep, pigs, and bullocks, mixed with flour or oatmeal, and seasoned, is eaten by the common people, but it is rather indigestible, and apt to induce disease. Gut-skins stuffed with this mixture form the black puddings of the vulgar.

Bullock's blood, dried by exposure in thin layers to a current of air, at a heat under 125°, and then reduced to powder, is exported in large quantities to the colonies, where it is used, as a 'clarifier,' in the sugar-works. Dried at a temperature ranging between 212° to 220°, then coarsely powdered, and the dusty portion sifted off, it is much used by fraudulent dealers to adulterate grain-musk. See ANIMAL-CHARCOAL, GLOBULINE, HÆMATOSINE, PLASMA, SERUM, STAINS, VISION, &c.

Spitt'ing of Blood. See HÆMOPTYSIS.

Vom'iting of Blood. See STOMACH DISEASES.

BLOOD'-ROOT. *Syn.* RED'-ROOT, PUCCOON'; SANGUINA''RIA, L. The *sanguinār'ia Canaden'sis* (Linn.), a papaveraceous plant of North America; also its root (SANGUINA''RIA, Ph. U. S.), which is the part used in medicine. Juice, blood-red, used in dyeing. In *small doses* (3 to 5 grs.), it is stimulant, diaphoretic, and expectorant; in *large ones* (10 to 20 grs.), narcotic, emetic, and purgative. The powder is sometimes used as an escharotic. See SANGUINARINE.

BLOOD'STONE. A hard compact variety of *hæmatite* used to form burnishers. The name is also applied by lapidaries to the heliotrope.

BLOOM. In *perfumery*, &c., a name given to several colorific skin-cosmetics, of which the following are examples:—

Bloom of Almonds (ah'-mŭndz). *Syn.* AL'-MOND-BLOOM. *Prop.* Boil 1 oz. of ground Brazil-wood, in 2½ pints of soft water for 30 minutes, adding the juice of two lemons towards the end; strain, and add ¾ oz. of isinglass, ½ oz. of powdered cochineal, 1 oz. of alum, and ½ oz. of borax; boil again for 4 or 5 minutes, and strain through muslin. Glass or earthenware vessels must be used, as metals injure its colour.

Bloom of Roses. *Prep.* 1. Dried red rose leaves, 1½ oz.; boiling water, 1 pint; infuse in glass or earthenware for 2 hours; press out the

liquor, and add the juice of 3 large lemons; the next day filter, or decant the clear portion. Both the above should be kept in a cool place, otherwise they soon spoil. A little spirit of wine (3 or 4 fl. oz. to the pint) is sometimes added to them, to remove this objection. They are greatly inferior to the following:—

2. Carmine, ¼ oz.; strong liquor of ammonia (not weaker than 900), 1 oz.; put them into a stoppered bottle, set it in a cool place, and occasionally agitate it for two or three days, to effect a solution; then add of rose-water, 1 pint; and, after admixture, further add of esprit de rose, ½ fl. oz.; pure rectified spirit, 1 fl. oz.; again well agitate, and set the whole aside for a week; lastly, decant the clear portion from the dregs (if any), for use or sale. Very fine. A cheaper article is made by omitting a portion of the carmine, and the whole of the esprit and spirit; and a still inferior one, by substituting 1½ oz. of silver-grain cochineal (in powder) for the carmine, with digestion for a week in the ammonia previously diluted with one half of the water.

BLOTE. To prepare or cure by drying and smoking; now only applied to fish.

BLO'TER. *Syn.* BLOAT'ER. A bloted fish; *appr.*, a herring slightly salted, and only very slightly dried and smoked.

BLOW'PIPE (blō'-). *Syn.* CHALUMEAU, Fr.; LÖTHROHR, Ger. An instrument by means of which the flame of a candle or lamp, or a gas-jet, is directed upon any substance placed to receive it, which is thus subjected to an intense heat. The blowpipe is to the artist, and the experimentalist, what the wind-furnace is to the artisan; but it is proportionately more powerful, convenient, and economical.

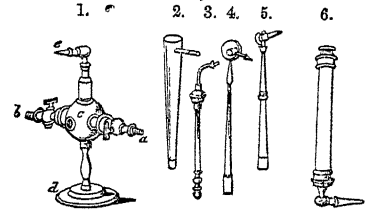
Beginners are usually unable to maintain a continued stream of air from the jet of this instrument, although the doing so is really a very simple affair. The operation merely depends on a little artifice in using it, which is more difficult to describe than to acquire. The effect intended to be produced is a continual stream of air for many minutes, if necessary, without interruption, even for an instant. This is done by simply applying the tongue to the roof of the mouth, so as to interrupt the communication between the mouth and the passage of the nostrils; by which means the operator is at liberty to breathe through the nose, at the same time that by the muscles of the lips he forces a continued stream of air from the anterior part of the mouth through the blowpipe. When the mouth begins to be empty it is replenished by the lungs in an instant, while the tongue is withdrawn from the roof of the mouth, and replaced again in the same manner as in pronouncing the monosyllable *tut*. In this way the stream of air may be continued for a long time without fatigue, provided the flame be not urged too impetuously; and even should it be so urged no other inconvenience will be felt than that of slight fatigue of the muscles of the lips.

The hottest portion of the flame produced by the action of the blowpipe is at the tip of the outer white flame, which has also the property of rapidly burning or oxidising substances placed in it which are susceptible of such a change; and it is hence commonly called the OXIDISING FLAME. The interior blue flame is, for a like reason, called the DEOXIDISING or REDUCING FLAME, as it possesses the property of extracting oxygen from most bodies capable of being so affected.

Substances to be submitted to the action of the blowpipe-flame are placed on a support, which is either a piece of charcoal, or a wire or small spoon of platinum, gold, or silver, as the case may require. Sometimes a plate of cyanite is used. Pine-wood charcoal is preferred for this purpose; and the sides, not the ends of the fibres, are presented to the flame. When a very intense heat is required, the substance operated on should not exceed the size of half a peppercorn.

For producing extreme degrees or heat the flame is blown with a jet of oxygen gas, the instrument being then called an OXYGEN BLOWPIPE; or a mixture of oxygen and hydrogen is burned, when it is called an OXY-HYDROGEN BLOWPIPE. The heat produced by the last is so great that no substance can stand exposure to it, even the most refractory native compounds being immediately fused. Gold is volatilised, and iron is rapidly consumed the instant it is placed in the flame.

The principal varieties of the blowpipe in general use are figured in the engravings below:—

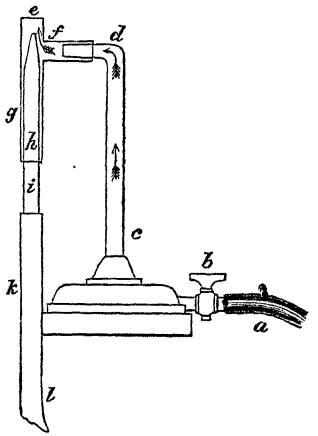


1, Hemming's safety-jet for the oxy-hydrogen blowpipe.
a, Pipe conveying oxygen gas.
b, " hydrogen gas.
c, Ball stuffed with fine wire-gauze.
d, Jet (internal diameter 1-80th of an inch).
2, Black's blowpipe.
3, Bergman's "
4, Pepy's "
5, Wollaston's "
6, Oxy-hydrogen blowpipe.

Beside the above there are several other varieties of the blowpipe occasionally employed; one, in which the air is expelled by the pressure of a column of water, and hence called the HYDROSTATIC BLOWPIPE; another, in which the flame is blown with the vapour of boiling alcohol, is named the SPIRIT-BLOWPIPE.

Blowpipe, Herepath. For sealing and bend-

ing glass tubes and constructing glass apparatus of various forms, it is convenient to have the blowpipe mounted on a fixed support, and when a flame of considerable power is required, the blast must be supplied by bellows worked with the foot. A very convenient form of blowpipe for these purposes is that invented by Herapath, and represented in the following figure. *a*



is a flexible tube attached to a stop-cock (*b*), which communicates with a tube (*c d*), bent at right angles at *d*, where a T-shaped tube (*e f g*) slips on by means of the piece *f*. The blowpipe jet (*h i*) passes into the longer arm of the T-piece, and fits somewhat tightly; *k l* is a second piece of flexible tube, terminating in a mouthpiece, or connected with a blowing apparatus. On turning on the gas, it passes in the direction marked by the arrows, and is to be inflamed at *e*. On blowing with the mouth, or by means of a pair of bellows, into the tube *k l*, the ignited gas takes the form of a blowpipe flame of great power, the nature of which is entirely under control by means of the stop-cock *b*, and also by regulating the quantity of air supplied through the tube (*k l*). The T-shaped piece is movable at *f*, so that the jet may be directed to any position. The apparatus may be mounted on a heavy foot, and connected with the gas-supply, by means of the flexible tube, so that it can be placed in any required position on the laboratory table; or it may be permanently fixed on a table specially devoted to the purpose, and having beneath it a pair of bellows worked by a treadle.

BLUB'BER. *Syn.* AD'EPS BALÆNA''RUM, L.; GRAISSE DE BALEINE, Fr. The soft fat of whales, and of other large sea-animals, from which the oil (TRAIN' OIL, WHALE' OIL) is obtained by heat,

Sea Blubber. The popular name of several species of marine animals of the genus *medusa*, having a body resembling a large mass of jelly. They are very plentiful in some parts of the coast of England, and are said to form a rich and cheap manure for pasture and arable land. They are used at the rate of about 1 *ton* to every 20 or 30 loads of mould, together with a chaldron of lime, per acre. In 3 or 4 months the land is usually found in prime condition. Pilchards, and other fish that swarm upon our coasts, and for which there is not a ready market, may be used in the same way, and are much richer, being, when properly managed, but little inferior to guano.

BLUE (bl'ōō). *Syn.* CÆRU'LEUS, L.; BLEU, Fr.; BLAU, Ger. Of the colour of the clear sky, or of any shade of it, whether lighter or darker; *subst.*, a blue colour, blueness (COL'OR CÆRU'LEUS, L.); or a blue colouring material or pigment (CÆRU'LEUM, L.).

BLUE DYE. *Syn.* TEINTE BLEUE, Fr.; BLAU FARBE, Ger. The most permanent blue is that given by indigo, and particularly by what is called the 'indigo-vat.' A variety of shades, of great beauty, and considerable permanence, may also be given by the 'Prussian-blue process.' Cheaper blues are commonly dyed with logwood. Each of these are noticed at length under their respective heads. The following are also employed, and are well adapted for common goods, on the small scale and for domestic use.

1. Give the goods a mordant of alum, or of acetate of alumina ('red liquor'), then rinse them well, and boil them in a bath of logwood, to which a small quantity of blue vitriol has been added; lastly, rinse and dry.

2. Boil the goods for a short time in a bath of logwood; then add to the liquor tartar and verdigris, in the proportion of 1 oz. of each to every lb. of logwood employed; and again boil for a short time.

3. Give the goods a mordant of tartar; lift, add a little chromate of potash; again work for 15 or 20 minutes, and rinse; next boil in a bath of logwood, adding towards the last a few grains more of the chromate; again boil, and finish. The whole quantity of chromate used should not exceed ¼ oz. to each lb. of logwood taken for the bath. Very dark.

4. Bilberries, elder-berries, mulberries, privet-berries, and several other like vegetable substances, may be used to die blue, as above, instead of logwood.

Obs. By increasing the proportion of alum or red-liquor the colour verges on purple; and by employing a little acetate of iron or green copperas, the darker shades of blue are produced. Verdigris, blue vitriol, and alkalies, turn it more on the blue; whilst a mordant of tin imparts a violet cast. If much more chromate be used than that ordered the result is a blue-black. See DYEING, INDIGO, LOGWOOD, MORDANTS, PRUSSIAN BLUE, &c.

BLUE PIG'MENTS. *Syn.* CÆRU'LEA, &c., L. The preparation of the principal blue pigments of commerce is described under their respective names. In the following list those

for which directions are given are of a miscellaneous and less usual character.

Az'ure, *Syn. Azure Blue.* A name frequently given to smalts. That of the oil-painter is ultramarine, that of the ancients is noticed below. See AZURE (p. 165), ULTRAMARINE, &c.

Barth's Blue. See SULPHATE OF INDIGO.

Berlin'-Blue. Prussian blue.

Blue Bice. Native blue carbonate of copper, prepared by grinding and elutriation. That of the shops is generally a factitious compound made from smalts.

Blue Carmine. See CARMINE and SULPHATE OF INDIGO.

Char'coal-Blue. Carbonised vine-stalks are triturated with an equal weight of salt of tartar or pearlash, the mixture put into a crucible, and heated over the fire until it ceases to swell, the mass being kept well stirred all the time; when cold, it is dissolved in water, and the excess of alkali saturated with dilute sulphuric acid. The liquid becomes blue, and a dark precipitate falls down, which turns of a brilliant blue colour when dried and cautiously heated.

Chi'na-Blue, *Syn. Roy'al Smalts.* The crude oxide of cobalt, or zaffre, is ground with an equal weight of potash, and about eight times its weight of felspar, the mixture submitted to fusion in a crucible, and when cold reduced to an impalpable powder. *Used* to paint pottery, and as a blue pigment.

Co'balt-Blue, *Syn. Cobalt'ic Az'ure.* This is commonly prepared by one or other of the following formulæ:—

1. Zaffre, 1 lb., is dissolved in nitric acid (diluted with an equal weight of water), ¾ lb., by digestion for some hours; the solution is evaporated nearly to dryness, and the residuum redissolved in warm water; to this solution, after filtration, a solution of phosphate of soda is added as long as a precipitate forms; this last is collected on a filter, washed with cold water, and mixed, whilst still moist, with 8 times its weight of fresh-precipitated hydrate of alumina; the paste is then dried, and exposed to a cherry-red heat in a crucible, after which the mass is cooled and reduced to a very fine powder.

2. A solution of nitrate of cobalt is precipitated with ammonia-alum, and the precipitate washed, dried, and exposed to a cherry-red heat, as before. The products of the above formulæ are very beautiful and permanent. See COBALTO-ULTRAMARINE.

Egyp'tian Az'ure, *Alexan'drian Frit, Azure of the Ancients.* A mixture of carbonate of soda, 1 *lb.*; calcined flints, 1½ *lb.*; copper filings, ½ *lb.*; (all in fine powder;) fused together in a crucible for 2 or 3 hours, and when cold, reduced to an impalpable powder. A beautiful and unchangeable sky-blue colour. *Used* in both oil and fresco painting; and as a substitute for smalts, of which, indeed, it is a variety.

In'digo (which *see*).

I'ron-Blue, *Fer'ric Blue.* Ordinary phosphate of iron prepared by precipitating a solution of protosulphate of iron with another of phosphate of soda, the resulting powder being washed, and dried at a gentle heat. A lively sky-blue colour, but without much depth or body.

Blue Lake. See LAKES and SULPHATE OF INDIGO.

Molybde'num-Blue. From sulphuret of molybdenum, dissolved in nitric acid, and some tin filings and a little muriatic acid added. After digestion for some time, the clear liquid is poured off, and evaporated to dryness. The resulting powder is then mixed with moist hydrate of alumina (as in making cobalt blue), heated to a very dull red, and when it has again become cold, reduced to powder. Used both as a paint and an enamel-colour.

Moun'tain-Blue. Native carbonate of copper, mixed with more or less earthy matter, reduced to fine powder. That of the shops is often factitious.

Par'is-Blue. Prussian blue.

Pow'der-Blue. Smalts.

Prus"sian Blue (which *see*).

Queen's Blue. See STONE-BLUE (*below*).

San'der's Blue. Ultramarine-ashes.

Sax'on Blue, *Saxon Az'ure.* A compound of hydrate of alumina and Prussian blue, prepared as follows:—

1. To sulphate of iron, 1 *oz.*; and alum, 8 *oz.*; dissolved in water, 1 gal.; add, simultaneously, separate solutions of prussiate of potash and common pearlash, until they cease to produce a precipitate; after repose collect the deposit, wash it well with water, and dry it.

2. A solution of sulphate of iron is precipitated with another of prussiate of potash, and instantly mixed with the precipitate which has just been obtained by treating a solution of alum with a solution of pearlash; the mixed precipitates being finally treated as before.

Smalts (which *see*; also CHINA-BLUE and EGYPTIAN AZURE, *above*).

Thénard's Blue. See ULTRAMARINE (Cobaltic).

Thumb'-Blue, *Cake'-blue, Crown'-Blue, Fig'-blue, Knob'-blue, Mech'lenburg-blue* (mĕk'-), *Queen's blue, Stone-blue*, &c. Names given to the lump-blue used in laundries, which vary according to the quality and the particular form given to it.

Prep. 1. A mixture of powdered starch with sufficient indigo (in impalpable powder) to give the necessary colour, made into a stiff dough with starch-paste, and then formed into lumps or cakes of the desired size and shape, and dried. This forms the ordinary 'washerwoman's blue' of the shops.

2. As the last, but substituting cæruleo-sulphate of potassa or blue carmine[1] for the

[1] See INDIGO (Sulphate of).

'powdered indigo' ordered in the last formula. Very fine.

3. As No. 1, but substituting whiting for the powdered starch, and weak size or a decoction of Irish moss for the starch-paste. Inferior.

Uses, &c. Employed by laundresses to impart a faint blue tinge to linen, in order to increase its apparent whiteness. The common forms given to it are that of small balls of about ¾ to 1 inch in diameter; the same, but rather larger, and pinched with the thumb and finger in three directions, so as to leave corresponding depressions (THUMB-BLUE); and cakes, which are cut out of the mass, previously rolled into a sheet, by a suitably shaped cutter.

Turn'bull's Blue. Ferridcyanide of iron (which *see*; also TURNBULL'S BLUE).

Blue Verditer. See VERDITER.

Ultramarine' (-rēne'), *U.-blue.* See ULTRAMARINE.

BLUSH'ING. *Syn.* RU'BOR, RUBE'DO, L. In *physiology*, &c., the red glow on the cheeks or face occasioned by confusion, bashfulness, surprise, or shame.

Blushing is caused by a sudden increase in the quantity and velocity of the blood in the capillaries, occasioning their turgescence; and, consequently, a heightening of the natural pale-reddish hue of the skin. It is referable to sudden mental emotions of an exciting character, such as surprise, confusion, consciousness of slight, injury, or indignity, and the like. Emotions of a depressing character frequently produce an opposite effect. This is termed pallor; and depends on the rush of blood from the skin and surface of the body upon the internal organs. The first, though often unpleasant, is never dangerous; the last, always so. The cure of the habit of blushing consists in persisting efforts to maintain a sufficient degree of presence of mind and self-confidence to permit of reflection, or a calm view of the exciting circumstance, instead of sinking into a state of temporary mental imbecility and helpless confusion.

BOIL (boyl). *Syn.* FURUN'CULUS, L.; FURONCLE, Fr.; BEULE, EITERSTOCK, Ger. In *surgery*, a well-known inflammatory tumour, of a superficial and more or less temporary character, which generally terminates by suppuration.

Boils (*furun'culi*) generally attack the healthy and robust during the period of youth and early manhood, and seldom trouble persons who have arrived at the middle age of life.

Treat., &c. When boils begin to appear, and exhibit persistency by daily enlargement and increasing pain, suppuration should be promoted by warm poultices of bread and linseed-meal, to which a little fat or oil may be added, to prevent their getting hard. If poultices are inconvenient, warm and stimulating embrocations, or exposure to the vapour of hot water, or the application of stimulating plasters, may be adopted instead. When the tumour is sufficiently 'ripe,' the matter should be evacuated by gentle pressure, and the wound dressed with a little simple ointment spread on a piece of clean lint or linen. The diet may be full and liberal until the maturation of the tumour and the discharge of the matter, when it should be lessened, and the bowels kept gently open by saline purgatives, as Epsom-salt or cream of tartar. When there is a disposition in the constitution to the formation of boils, the bowels should be kept at all times regular, and tonics, as bark or steel, had recourse to, with the frequent use of sea-bathing when possible. An occasional dose of the Abernethy-medicines (which *see*) also often prevents their recurrence. A course of sarsaparilla may be likewise taken with advantage. See ABSCESS, TUMOURS, &c.

BOIL'ERS. See INCRUSTATION and STEAM.

BOIL'ING. In *cookery*, the operation of dressing food in water at the point of ebullition, or one very closely approaching it. The practice of cooking animal food by boiling, although exceedingly simple, and often most convenient, is neither judicious nor economical when the broth or liquid in which it has been dressed is to be rejected as waste; as in this way, the most nutritious portion of the flesh of animals, consisting of soluble saline and other matter required for the formation of bone, and the nutrition of the muscular tissues, &c., is to a great extent lost. This particularly applies to small pieces so dressed, and to those presenting a large surface to the action of the water in proportion to their weight. Large pieces of meat suffer less in proportion than smaller ones, for the same reason; but even with them the outside should be rejected, as it is both insipid and innutritious compared with the interior portion. To reduce the solvent and deteriorating action of the water to the lowest possible point, the articles to be boiled should not be put into the water until it is in a state of full ebullition, which should be maintained for 5 or 6 minutes afterwards, by which time the surface, and the parts lying immediately beneath it, will have become, to a certain degree, hardened, and will then act as a protective shield to the inner portion of the mass. To induce tenderness, the subsequent operation should be carried on at a mere simmer; the slighter the better. The practice of dressing meat by putting it into cold water, which is then gradually raised to the boiling-point, cannot be too much censured. A ¼ of an hour per lb. for dressing young meat, poultry, and small pieces, and 20 minutes per lb. for old, tough, and larger ones, are the usual times allowed by cooks for the purpose. See BOILED, FOOD, &c.

BOIL'ING-POINT. See EBULLITION.

BOIS DURCÉ (bwah dŭr-sā). [Fr.] The substance invented in France, and to which

this name is given, is made from sawdust, which, under the influence of a high temperature and the enormous pressure of 600 tons, acquires a degree of hardness very much exceeding that of ordinary wood. It has a very fine grain, and is unaffected by atmospherical variations; but its principal merit is its adaptation to moulding, so that by the most economical processes, forms and impressions are given to it which it would require, in any other way, considerable labour and workmanship.

BOLAS. Sweet light cakes which, according to Mrs. Rundle, are prepared as follows:—Into flour, 2 lbs., pour of warm milk, ¾ pint, a small teacupful of yeast, and 6 eggs; make a dough, add of butter, 1 lb. (by degrees), and [illegible] in a warm place to rise for an hour; then mix in of powdered sugar, 1 lb.; and make the mass into cakes; put these into cups or tins previously well buttered, and ornament the top with candied orange or lemon peel; lastly bake them. See CAKES.

BOLE. *Syn.* BO'LUS, L.; TERRE BOLAIRE, &c., Fr. The name of several argillaceous minerals, varying in colour from white to yellow, red, and brown, which they owe chiefly to iron. See OCHRES and RED and BROWN PIGMENTS.

BOLOG''NA PHI'AL (-lawn'-yă). See PHIALS.

BO'LUS. [L., Eng.] *Syn.* BOL, Fr. Boluses, in *pharmacy* and *medicine*, are small, roundish masses of medicinal substances, which are taken in the same manner as pills, which they resemble, except in their larger size. Those persons who object to swallowing them in their common state, may wrap them in soft paper, or introduce them into the emptied husks of raisins or grapes.

Boluses (bo'lī, L.) are prepared with the same ingredients, and in a similar manner to pills (which *see*).

BON'-BON (bŏng'-bŏng). [Fr.] A sugar-plum. See CONFECTIONERY and SUGAR-PLUMS.

BONE. *Syn.* Os, L., Fr.; BEIN, KNOCHEN, Ger.; BÁN, Sax. The hard substance forming the interior skeleton of animals, or any single part of it.

Comp. According to Berzelius:—

	Human bones.	Ox bones.
Animal matter soluble in boiling water	32·17	33·30
Vascular substance	1·13	
Triphosphate of calcium, with a little fluoride of calcium	53·04	57·35
Carbonate of calcium	11·30	3·85
Phosphate of magnesium	1·16	2·05
Chloride of sodium and other salts	1·20	3·45
	100·	100·

The soluble animal matter is chiefly fat and gelatine.

Uses, &c. The bones of animals are employed for various purposes in the arts, manufactures, and domestic economy. Those of good meat form most excellent materials for making soups and gravies, as is well known to every cook. In France, soup is extensively made by subjecting bruised bones to a steam heat of 2 or 3 days' continuance. In England the same is commonly effected in an iron Papin's digester. When the earthy matter of a bone is dissolved out by digesting it in a large quantity of very dilute hydrochloric acid, a lump of gelatine is obtained, which, after being well washed with water, is equal to isinglass for all the purposes of making soups and jellies. The following is the process recommended by Proust for making the best of bones, in hospitals, gaols, and similar establishments:—

The bones, crushed small, are to be boiled for 15 minutes in a kettle of water, and the fat (which is fit for all common purposes) skimmed off, as soon as cold. The bones are then to be ground, and boiled in 8 to 10 times their weight of water (of which that already used must form a part), until half of it is wasted, when a very nutritious jelly will be obtained. Iron vessels should alone be used in this process, as the jelly and soup act upon copper, brass, and the other common metals. The bones of fresh meat are the most productive; those of boiled meat come next, whilst those of roasted meat scarcely afford any jelly. As 'boning' meat before cooking is now a very general practice, a quantity of fresh bones may always be obtained.

Bones are, for the most part, WROUGHT, TURNED, BLEACHED, and DYED, in a similar manner to ivory; but with less care, owing to their inexpensive and coarser character. Before being submitted to any of these operations they are, however, first submitted to long boiling, to deprive them of grease.

The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose colour in 24 hours, and of a deep scarlet in 3 days; but the bones of adult animals take a fortnight to acquire even a rose colour. The bones nearest the heart become tinged the soonest. In the same way extract of logwood tinges the bones of young pigeons purple. See BLEACHING, DYEING, IVORY, &c.

BONE'-ASH. Impure triphosphate of calcium, obtained by calcining bones to whiteness, and reducing the ash to fine powder. Used to make pure phosphate of calcium, to form cupels, &c.; also sold for burnt hartshorn.

BONE'-DUST. *Syn.* BONE-MANURE. Bones (previously boiled for their grease) ground to different degrees of coarseness, in a mill. It is sowed along with the seed in a drill. Wheat thus treated, is said to yield 30 to 50 per cent. more weight in straw and grain than by the common methods. Turnip, and other light soils, it renders more than ordinarily productive. Bone manure is much used in the west of Yorkshire, Holderness, and Lincoln-

shire. The usual quantity per acre is 70 bushels, when used alone; but when mixed with ashes or other common manure, 30 bushels per acre is said to be enough. When coarse, and applied in the same manner as other manures, it has been found to remain upwards of seven years in the ground, the productiveness of which it has increased during the whole time.

BONE'-GLUE. See GELATINE.

BONE'-GREASE. From refuse bones, bruised, boiled in water, and the broth skimmed when cold. *Prod.* $\frac{1}{8}$th to $\frac{1}{4}$th of the weight of the dry bones. (Proust.) Used for making soap and candles. See ANIMAL CHARCOAL.

BONE'-PHOSPHATE. See TRIBASIC PHOSPHATE OF LIME.

BONE'-SHAVINGS. *Syn.* BONE'-DUST (Turners'), BONE-TURNINGS. This, by boiling with water, yields a beautiful jelly, which is nearly equal to that produced from hartshorn and ivory shavings, for which it is very frequently sold. Used to make jellies and blancmanges, to stiffen straw bonnets, &c.

BOOK'BINDING (-bind-). Although a full description of the various operations of this well-known art, or handicraft, does not properly fall within the province of this work, a brief notice of them will probably, in many cases, prove useful to the amateur and the emigrant:—

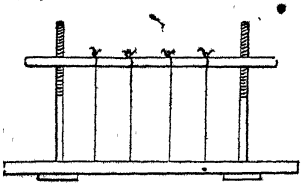
The process of binding books is divided into several distinct operations, which, in large establishments, are usually performed by different persons; such a method being found to produce greater expedition, and better work, than when the whole is done by one person.

The sheets received from the hands of the printer are—

1. *Folded*, which is done correctly by observing the 'marks' or 'signatures' at the bottom of the pages. As the sheets are folded they are laid upon each other in proper order, and are ready to undergo—

2. The operation of *beating*. This is performed by either laying them upon a large stone, and striking them with a heavy smooth-faced hammer, or by passing them through a rolling-press. The former method is usually adopted in the small way, and the latter on the large scale.

3. The sheets are next *fastened to bands*, which is done by taking them up one by one, and sewing them to pieces of cord, stretched in a little frame screwed or fastened to the counter or table, called the sewing press. (See *engr.*) The number of bands used, is



generally 6 for a folio, 5 for a quarto, and so on proportionally, less than 4 being seldom employed even for small sizes. The ends of the cords being cut off to within about 2 inches of the back, the sheets are ready for—

4. *Glueing*. The back being knocked into shape with a hammer, and the sheets placed in the cutting-press, which is then slightly screwed up, melted glue is thinly and evenly applied. After a short time to permit it to become sufficiently set and hard, the book is removed from the press, and the back properly adjusted with a hammer, when it is again put into the cutting-press, where it is screwed up very tight, and is then ready for—

5. *Cutting*. The instrument employed for this purpose is of a peculiar shape, and called a plough or plough-knife, which consists of a stout flat knife, double-edged at the 'cutting point,' firmly set in a kind of frame, in which it may be adjusted by screws.

6. *Affixing* the *boards*. The bands are now scraped out fine at the ends, and fastened to the pasteboard intended to form the covers, which is then properly adjusted, and further shaped, if necessary, with a large pair of shears. The edges now undergo the operation of—

7. *Sprinkling*, *gilding*, or other *adornment*. The first is performed with a stiff brush made of hog's bristles, dipped in the colour; the brush being held in the one hand, and the hairs moved with the other, so as to scatter the colour in minute drops equally over the surface.

8. The *external covering* of leather, fancy cloth, or paper, is now applied, having been previously soaked in paste, to make it properly adhere. One or more of the blank leaves of the book are next glued to the inside of the cover, to secure those that are turned over, when [illegible] ANHYDRIDE hed; or for choice work, IDE. er' for—

9. [illegible] RATE. [Eng., Fr., &c. Ordinary gold-leaf AXSAURE SALZE, Ge of white of egg, the patter ydrogen of boracic pressure with heated brass adical. The bor design or letters on their sur gesting the ole is then glazed over with white the acid, d polished.

The succession of the above operations sometimes slightly varies with the workmen, and with the nature of the binding. The examination of a bound book during their perusal will, however, render the whole quite familiar to the reader.

There are several varieties of binding, of which only the following deserve notice here:—

BOARDS. A book rather loosely done up, without cutting the edges, and covered with coloured paper or cloth, is said to be in 'boards.'

CLOTH, CLOTH-BINDING. This is the style of binding in which the majority of works are now issued. It admits of great neatness and even beauty, is cheap, and when well executed is very durable.—The prepared cloth (hard-

glazed or varnished calico), cut by a pattern to the proper size, is passed rapidly between the engraved cylinders of a rolling-press, by which the design is given to it. Paste is now applied to each piece of cloth, which is then placed over the volume previously prepared to receive it. In many cases the covers are prepared separately before being embossed, and are afterwards fastened in the finished state to the book by means of a piece of canvas or calico previously affixed to its back for the purpose, when all that is required is to paste the ends of it to the inside of the boards, with the last blank leaf over it. Books in cloth are seldom cut at the edges, unless they are otherwise highly finished.

HALF-BINDING. Books forwarded in boards, and finished with leather backs and corners, are said to be 'half-bound.'

LEATHER-BINDING. A book is only said to be 'bound,' or 'fully bound,' when both its back and sides are wholly covered with one piece of leather.—The leather is wetted by immersion in water, wrung or squeezed, stretched on a smooth board, cut to the proper size, pared thin on the edges, and covered with paste. It is then applied to the book (previously forwarded in boards, and cut), drawn tightly over it, turned down on the inside, rubbed smooth with a folding-stick, and otherwised adjusted; after which it is placed in some suitable situation, at a distance from a fire, to dry.

Rough calf requires to be damped on the grain side with a sponge and water before pasting and covering.

Russia-leather is well soaked in water for an hour, taken out, pressed and rubbed; after which the paste (q.v.) are pressed into the flesh side before covering and in a similar manner.

Morocco is first [illegible]ching it on a board, with the [illegible]-bōng). [Fr.] A[illegible]d, after being pasted, left [illegible]CTIONERY and S[illegible]uarter of an hour; after w[illegible]rith a piece of woollen cloth, Fr.; BEIN, KNOCrain.

Roan is either soa[illegible]hard substance fo[illegible]left to soak when pasted. [illegible]animals, or an[illegible]

SCHOOL-BINDING. [illegible]pplied to school-books strongly sewelius-[illegible]done up' in sheep-skin, which was either left of a plain brown, or sprinkled or marbled with copperas-water. Similar works of a cheaper class, are now often 'done up' in canvas, brown-holland, and even coarse and strong coloured glazed calico.

Concluding remarks. Numerous patents for improvements in binding books, several of which possess very great merit and usefulness, have been obtained during the last 30 years. Among these, one known as 'Hancock's Patent Binding,' from its extreme novelty, simplicity, durability, and inexpensiveness, deserves a passing notice here. By Mr. Wm. Hancock's method the sheets are folded in double leaves, and being properly placed together and adjusted (by setting them vertically, with the edges forming the back of the book downwards, in a concave mould so formed that whilst giving shape it may leave the whole breadth, and nearly the whole length exposed), and firmly secured by a few turns of packthread, the book is subjected to the action of a press, and a strong and quick-drying solution of India rubber is smeared over the back with the finger, when the whole is left for 3 or 4 hours, or longer, to dry. The operation is repeated, as often as necessary, after which fillets of cloth are cemented on with the same varnish, and the book is ready to have the boards attached. The sheets of books that cannot be folded in 'double leaves' may be strongly stitched through, separately, before adjusting them in the mould. In this way, several of the usual operations of binding are dispensed with. We most willingly bear testimony to the strength and durability of this method, as well as to the great convenience it affords in allowing the books to open perfectly flat upon a table, or to be distorted in any possible manner, without injury to their backs. It is, undoubtedly, the best way of binding books for travellers. The Editor of the last edition of this work once had a large trunk of books, among which was a massive volume bound on Hancock's plan. All the rest were nearly torn to pieces by a few months' journey, but this one remained uninjured even after five years, during which time it accompanied him in his travels, extending, collectively, to upwards of 23,000 miles. See GILDING, MARBLING, SPRINKLES, STAINS, &c.

BOOTS and SHOES. The cleaning of boots and shoes forms no unimportant part of the domestic duties of a large establishment; as on it being properly performed depend both their appearance and durability. A votary of St. Crispin, in whom we place considerable reliance, assures us, that to effect this object in the best style, all that is necessary is to employ very little blacking (merely enough to moisten the surface of the leather), and to brush it off whilst still damp. Never make the surface wet, nor allow the blacking to dry before applying the polishing brush. For this purpose, a portion only of the boot or shoe should be attended to at a time. The dirt is, of course, to be carefully brushed off before applying the blacking. When it is desired to restore the shape of a boot or shoe, as well as to clean it, boot-trees may be used. Of the brushes, we are told that there should be at least three—one (dirt-brush) with bristles stiff, but not wiry nor scratchy, to remove mud and dirt; another (blacking-brush), with fine, flexible hair, and plenty of it, for applying the blacking; and a third (polishing-brush), covered with long, fine, springy, and slightly stiff hair, for giving the polish. The employment of inferior or worn-out brushes, is said to be false economy, and proves particularly destructive to the lighter classes of leather.

The occasional use of a little oil or grease to the uppers of boots and shoes, increases their

softness and durability, as well as the 'depth,' but not the brilliancy of the polish, from common blacking. For this purpose some good tallow or 'dubbing' may be used; the absorption being aided by a very gentle heat. The soles or bottoms of new boots and shoes may be thoroughly saturated with similar substances, by which means their durability will be fully doubled. The common practice among the shoemakers is to moisten the surface of the leather with a wet sponge before applying the oil or grease; by which (they say) its pores are opened and its absorbent powers increased.

Patent-leather boots and *shoes* are best cleaned with a little sweet oil or milk, (preferably the first,) the dirt having been previously removed in the usual way.

India-rubber goloshes and *overshoes* may be cleaned with a sponge or brush, and water, care being taken not to wet the linings. The same applies to gutta percha. See BLACKING, LEATHER, WATERPROOFING, &c.

The reasons why boots and shoes so commonly cause corns, and fatigue, and give pain in wear, are explained in our article on the FEET (which *see*).

BOOT-POW'DER. French chalk reduced to powder by scraping or grating. *Used* to facilitate the 'getting on' of new or tight boots, a little of it being rubbed on the insides of the backs, heels, and insteps.

BOOT-TOP LIQ'UID. *Syn.* BOOT'-TOP COMPOSI''TION. There are numerous articles of this class extant, but, with few exceptions, they are most unchemical mixtures, not infrequently containing ingredients which are either unnecessary, or opposed to the action of the rest. The following are examples:—

Prep. a. WHITE-TOP:—1. Oxalic acid and white vitriol, of each, 1 *oz.*; water, 1½ pint; dissolve.—It is applied with a sponge, the leather having been previously washed with water; after a short time it is washed off with water, when the boot-tops are either dried in a current of air, or by a gentle heat; they are lastly either polished with a brush, so as to appear like new leather, or they are left rough, as the case may require.

2. Sour milk, 1 quart; butter of antimony, cream of tartar, tartaric acid, and burnt alum, of each, 2 oz.; mix.

3. Sour milk (skimmed), 3 pints; cream of tartar, 2 *oz.*; alum and oxalic acid, of each, 1 *oz.*

4. Alum, cream of tartar, magnesia, and oxalic acid, of each, 1 *oz.*; salt of sorrel and sugar of lead, of each, ½ *oz.*; water, 1 quart. The preceding are for white tops.

b. BROWN-TOP:—Alum, annatto, and oxalic acid, of each, 1 *oz.*; isinglass and sugar of lead, of each ½ *oz.*; salt of sorrel, ¼ *oz.*; water, 1 quart; boil for 10 minutes.

BORAC'IC ACID (-răs'-). H_3BO_3. *Syn.* BO''RIC ACID, SED'ATIVE SALT†, S. S. OF VIT'RIOL†; ACIDUM BORAC'ICUM (-răs'-), L.; ACIDE BORACIQUE, A. BORIQUE, Fr.; BORAXSÄURE, &c., Ger. The pure acid is obtained from common borax. That of commerce is extracted from the boracic acid lagoons of Tuscany.

Prep. 1. Borax, 1 part; boiling water, 4 parts; dissolve, and add sulphuric acid until the solution acquires a distinctly acid reaction, for which purpose about ½ the weight of the borax will be required. As the solution cools, crystals of BORACIC ACID will be deposited. These may be purified by placing them on a filter, and washing them with a little very cold water, followed by re-solution in boiling water, and recrystallisation. Nearly pure.

2. As the last, but substituting hydrochloric acid for the sulphuric acid, there ordered. Very nearly pure.

3. By exposing the product of the first crystallisation of either of the preceding formulæ to heat in a platinum crucible, and redissolving and recrystallising the residuum. Chemically pure. *Used* in analysis.

Prop., &c. Odourless; bitter-tasted; dissolves in 25 times its weight of cold water, and in 3 times its weight of boiling water; very soluble in alcohol, which then burns with a bright green flame; reddens litmus; browns turmeric-paper; (properties characteristic of this substance;) when strongly heated it forms a brittle glass (VITRIFIED BORACIC ACID) on cooling. The crystallised acid contains 3 atoms, or 43·5%, of water. Its salts are called BO''RATES.

Uses. Boracic acid was once administered internally, in large doses, as an anodyne, antispasmodic, and sedative, but is now scarcely ever employed as a medicine. The crude acid is used in the manufacture of borax; the pure acid, in the manufacture of certain chemicals.

BORACIC ANHYDRIDE. See BORIC ANHYDRIDE.

BO''RATE. [Eng., Fr.] *Syn.* BO''RAS, L.; BORAXSÄURE SALZE, Ger. A salt in which the hydrogen of boracic acid is replaced by a basic radical. The borates may be formed by either digesting the hydrate of the base in a solution of the acid, with the assistance of heat, or from a solution of borax and a soluble salt of the base, by double decomposition. They are all decomposed by the stronger acids.

Tests. The borates may be tested by digesting them in a slight excess of oil of vitriol, evaporating the resulting solution to dryness, powdering the residuum, and dissolving it in alcohol; the resulting solution possesses the property of burning with a green flame if the sample examined was a borate, or contained a notable quantity of one. See BORACIC ACID.

BO''RAX. [Eng., Fr., Ger., L., B. P.] $2NaBO_2.B_2O_3$. *Syn.* BIBO''RATE OF SO'DA, BO''RATE OF S.*, SUBBO''RATE OF S.†, GOLD SOLDER†*, REFINED' TINC'AL†*; SO'DÆ BIBO''RAS, S. BO''RAS, L.; CHRYSOCOLLE, &c., Fr.; BORAXSÄURES NATRON, &c., Ger. Commercial biborate of soda. Borax is obtained

either by purifying native borate of soda (TINC'AL, TINC'AR), or by saturating crude boracic acid with the alkali. It is never prepared on the small scale unless for chemical analysis.

Prop. Crystals, six-sided prisms, which contain 10 equiv. of water, and effloresce in dry air; soluble in 20 parts of cold, and in 6 parts of boiling water; solution has an alkaline reaction on test-paper; by heat it loses its water of crystallisation, and at a higher temperature fuses to a glass-like substance (see *below*).

Pur. This may be ascertained by determining the quantity of sulphuric acid required to neutralise a given weight of the sample under examination, as indicated by litmus paper. Common salt and alum are frequently mixed with borax to lower the value. The first may be detected by a solution in hot water giving a curdy-white precipitate with nitrate of silver, soluble in ammonia; the last, by water of ammonia, giving a bulky-white pulverulent precipitate. The former must be distinguished from the white pulverulent precipitate of borate of silver, which is thrown down from pure borax.

Uses, &c. Borax is extensively employed as a flux for metals, for soldering, and in medicine. Internally, it is diuretic, sedative, emmenagogue, and refrigerant, in doses of 15 to 40 grs.; externally, made into a gargle for sore throat, and in powder as a detergent in aphthæ, and ulcerations of the mouth. Dissolved in *rose-water*, it is used as a *cosmetic*; and mixed with about 8 times its weight of lard, forms a useful ointment in piles and sore nipples.

Borax, Glass of. Borax dried at a gentle heat, and then melted by increasing the heat until it forms a vitreous mass on being cooled. *Used* in soldering, and as a flux, particularly in blowpipe experiments.

BO"RIC ACID. See BORACIC ACID.

BORIC ANHYDRIDE. B_2O_3. *Syn.* ANHYDROUS BORACIC ACID, BORACIC ANHYDRIDE, BORIC OXIDE. The only known oxide of boron. It can be produced by burning boron in oxygen, in the air, or in nitrous oxide, but is most easily and economically prepared by strongly heating boracic acid so as to deprive it of water. It is a brittle vitreous solid, not volatilised by heat except in the presence of water. Dissolves in water, forming boracic acid. Its alcoholic solution burns with a green flame, like that of boracic acid.

BO'RON. B. The base of boracic acid. It was discovered by Homberg in 1702; but, from attracting little notice, was soon forgotten. It was rediscovered almost simultaneously, by Sir H. Davy, and by Gay-Lussac and Thénard, in 1807-8.

Prep. Boron is prepared by a process similar to that employed to obtain silicium:—*Potassium* and *perfectly dry boracic acid*, or, preferably, *boro-fluoride of potassium*, intimately mixed together, are placed in a glass adopter-tube, and submitted to a low red heat. When cold, the loose cork that fastened its mouth is removed, and hot water poured in, in successive portions, until the whole matter is detached and all its soluble portion dissolved; the liquid is next allowed to settle, and the precipitate washed first with a solution of sal-ammoniac, and afterwards with alcohol; the residuum (boron) is lastly dried in a capsule, and put into a well-stoppered phial.

Prop., &c. A solid, tasteless, and inodorous powder, of a dark grayish-brown colour. With sulphur it unites at high temperatures, forming sulphurets (sulphides of boron); and when placed in chlorine gas it spontaneously inflames, and a gaseous chloride of boron is formed. The compounds of boron with simple bodies are termed BO"RIDES (-ĭdz) or BO"RURETS*.

Obs. Among the most remarkable of the recent discoveries in chemistry, are those of MM. Wohler and Deville, relative to silica and boron. Each of these substances is now proved to exist in three very different states, analogous to the three known states of carbon, namely, charcoal, graphite, and diamond. The last of these states is, of course, the most interesting. Crystallised boron possesses a hardness, brightness, and refractive power, comparable to those of the diamond; it burns in chlorine, without residue, and with circumstances resembling those of the combustion of diamond in oxygen; it is not acted on by any of the acids, and appears to be the least alterable of all the simple bodies. Its powder is already used in the arts, instead of diamond-dust; and it seems not improbable that, when obtained by the chemist in crystals of a larger size, it may rival even the diamond as a gem.

Boron, Terflu'oride of. See FLUOBORIC ACID.

BOTT'LES (bŏt'lz). See GLASS, INFANCY, LACTATION, PHIALS, PHOSPHORUS, &c.

BOTT'LING (bŏt'l-ĭng). See CORKS, MALT LIQUORS, WINE, &c.

BOUGIE (bōō'-zhē). [Fr.] *Syn.* CE'REUS, CERE'OLUS,[1] CANDE'LA PROBATO"RIA*, L. In *surgery*, a long slender instrument, originally of wax,[2] introduced into the urethra, œsophagus, or rectum, in stricture and other diseases of those organs.

Prep. 1. (Prof. Pickel's.) Amber (melted), 1 part; boiled oil, 3 parts; mix, cool a little, and further add of oil of turpentine, 1 part; spread the mixture, at 3 successive intervals, upon loose spun-silk cord or web; dry in a heat of 150° Fahr., and repeat the process until the instrument has acquired the proper size; lastly, polish it, first with pumice-stone, and afterwards with tripoli and oil. This is the original receipt of the once celebrated French professor Pickel, and is still generally

[1] Properly, a 'little bougie.'
[2] Hence the name.

used, slightly modified, on the Continent. At the present time, in Paris, a little caoutchouc, equal to about $\frac{1}{20}$th of the weight of the oil employed, is generally added. For the best ELAS'TIC BOUGIES the process usually occupies from 6 to 8 weeks, to allow full time for the drying and hardening of the composition. When the bougie is required to be hollow, a piece of polished metallic wire is introduced into the axis of the silk; or tin-foil is rolled round the wire and the composition applied as before. When dry and hard the wire is withdrawn.

2. (Hunter's.) Yellow wax, 2 parts; red lead, 3 parts; olive oil, 6 parts; slowly boiled together until combination takes place; strips of soft linen (rather wider at the one end than the other) are then dipped into the composition, rolled up firmly, and finished off on a polished slab.

3. (Piderit's.) Olive oil, 1 part; wax, 6 parts; as before.

4. (Bell's.) Lead-plaster, 11 parts; yellow wax, 4 parts; olive oil, 1 part.

5. (St. B. Hosp.) Wax, 12 parts; Chio turpentine, 4 parts; red sulphide of mercury, 1 part.

6. CAOU'TCHOUC BOUGIES:—In France, where ether is comparatively inexpensive, these are made by applying an ethereal solution of India rubber to the silk or foil prepared as before. In England, naphtha was, until recently, employed instead of 'ether;' but it furnishes a very inferior product. Now bisulphuret of carbon is generally used as the solvent. Sometimes strips of India rubber, previously boiled in oil or wax, or that have had their edges softened by moistening them with a little ether, or bisulphuret of carbon, are wound round the only wire or 'foil' and kept in their place by a bandy is made of tape applied over them. The wire is then withdrawn, and the bougie, when cold, is carefully smoothed off and polished with a suitable paper.

7. GUTTA-PERCHA (or *inducement*) BOUGIES:—These are formed of gutta-percha, *variously* prepared, and, when intended for use, are softened by immersion in hot water (previously softened by the addition of certain salts, such as common salt, nitre, &c.), by rolling it between the hands, and straightening it on a hot glass or marble. When skilfully made, and of the best (uncoloured) gutta percha, a beautiful transparency is obtained, which is one of the best distillation, and which renders them admirable instruments. A bougie of this description, of moderate size, and delicate texture, may be kept for a long time filled with COGNAC BRANDY, or with a solution of gum-water, glycerine, or other fluid, of the same specific gravity as that of the blood, and passed through the whole length of the urethra, artificially coloured to resemble that of a healthy person without causing the slightest pain. Gutta-percha bougies (as now made) are still more flexible and pliable than those formerly in use, and hence, even when of small size (new bougies) are still more frequently called for, and may remain in the urethra for a long time without causing irritation. Bougies, or *commonly* a very important advantage in such matters. Bougies, or spoilt with cannot, however, be too careful to avoid those made of coloured gutta percha, which, from the 'ordinary' ingredients, rapidly become very brittle and unfit for use. Those originally manufactured in the spirit to 1 were coloured black, and were cloth which is breaking whilst in use; a disaster from which various serious and even fatal cases of [illegible] there is no such danger to be dreaded from those made of the uncoloured material when of good quality.

BOULES DE NANCY. See BALLS (Martial).

BOUILLI (bōōl'-ye). [Fr.] A name frequently applied by cooks to dishes of boiled or stewed meat, as a refinement on its plain English synonymes. Thus, *beef bouilli, beef in bouilli*, &c., mean stewed or boiled beef, &c. As, however, the name is à la française, so must be the 'accompaniments,' which generally consist of herbs and vegetable seasoning in greater quantity and variety than is usually deemed essential for an humble dish of English boiled or stewed meat.

BOUILLON (bōōl'-yong). [Fr.] In *cookery*, broth, soup.

BOUQUET' (bōō-kā'). [Fr.] A nosegay. In *perfumery*, highly scented spirits (*esprits*) adapted for the handkerchief are commonly called *bouquets*. The following are examples:—

Bouquet d'Amour. *Prep.* From esprits de rose, jasmin, violette, and cassie (flowers of *acacia farnesiana*), of each, 2 parts; essences of musk and ambergris, of each, 1 part; mix, and filter.

Bouquet de la Reine. *Prep.* 1. Essence of bergamot, 1 dr.; English oil of lavender, 25 drops; oil of cloves, aromatic vinegar, and essence of musk, of each, 10 drops; alcohol, 1 fl. oz.; mix.

2. Oils of begamot and lavender, of each, 30 drops; neroli, 15 drops; oils of verbena and cloves, of each, 5 drops; essences of musk, ambergris, and jasmin, of each, ½ dr.; rectified spirit of wine (strongest, scentless), 2 fl. oz.; mix. A much-esteemed perfume.

BRA'GRAS. Tar, black resin, and the dregs of strained resin, melted together.

BRAIN (brāne). *Syn.* BRAINS‡; CER'EBRUM, L.; CERVEAU, Fr.; GEHIRN, HIRN, Ger. The soft whitish mass of nerve-matter contained in the skull of animals, and, in man, supposed to be the seat of the soul and the mind.

Brains. (In *cookery*.) There appears to be scarcely anything which is at all eatable, that the ingenuity and taste of the modern cook does not appropriate to his purposes, and clothe with delectability, or transform into something execrable. We observe that our chef de cuisine—no unimportant personage—has taxed every viscera and brought together every novelty and dainty to humour and excite the appetite. Animals which were guiltless of brains whilst living, are found by him to possess excellent ones when dead, from which he prepares a variety of miniature dishes, which are truly novel and inviting. Let frugal housewives for the future carefully value their brains, and apply them to useful purposes in a double sense. When cleaned, washed, blanched, and flavoured with the necessary seasoning, they may be formed into a variety of hors-d'œuvres, creditable to any table. Mrs. Rundell tells us, that "beat up with a little white pepper and salt, a sage-leaf or two

(scalded and finely chopped), and the yelk of an egg, and fried, they make excellent cakes, fritters, &c."

BRAN. *Syn.* FUR'FUR L.; BRAN, SON, Fr.; KLEIE, Ger. The inner husk or proper coat of the cereal grains, sifted from the flour; appr., that of wheat. *Comp.* 100 parts of bran contain albuminoid bodies, 13·80; oil, 5·56; starch, fibre, &c., 61·67; ash, 6·11; water, 12·85.

Uses, &c. The bran of wheat, diffused through hot water, is largely employed by the calico-printers to remove the colouring matter from those parts of their goods which are not mordanted. A handful mixed with a pail of warm water forms an excellent emollient foot-bath. Infused in hot water (bran-tea), and sweetened, it forms a popular demulcent, much used in coughs and hoarseness, and which, taken in quantity, proves gently laxative. It also forms an excellent manure, and, from containing the ammoniaco-magnesian phosphate, is especially adapted as a 'dressing' for potatoes. It is frequently mixed with flour, and made into bread (bran-bread), which is eaten by the poorer orders for economy, and by the higher classes because it is recommended by the faculty as being more wholesome than white wheaten-bread.

BRAN'DY. *Syn.* SPIR'ITUS GAL'LICUS, S. VI'NI GAL'LICI (-sī; B. P.), A'QUA VI'TÆ†*, L.; EAU-DE-VIE, Fr.; BRANNTWEIN, COGNAC, Ger.; BRAN'DYWINE†. A well-known spirituous liquor obtained by the distillation of the wine of grapes. The name is also often, though improperly, given to the spirit distilled from other liquors, and particularly from the fermented juice of fruits; but in this case, usually with some qualifying epithet.

When first distilled, brandy, like other spirituous liquors, is colourless (WHITE BRANDY), and continues so if kept in glass or stoneware; but if stored in new oak casks, as is usually the case, it gradually acquires a yellowish tint from the wood (PALE BRANDY). The deep colour that this spirit frequently possesses when it reaches the consumer, is imparted to it by the addition of a little *burnt sugar* (caramel). *Catechu*, or terra japonica, in powder or solution, is also sometimes added to give a roughness to the spirit. The original intention was merely to imitate the appearance acquired by brandy from great age, when kept in wood; but in process of time the thing has come to be overdone. The natural colour which the spirit receives from the cask, however long it may be kept in it, never exceeds a light amber tint, about equal to that of pale Jamaica rum. Nothing, however, will now please the public taste but a spirit of lively and full 'brandy-colour,' as it is called. The consequence is, that more colouring is commonly added than is compatible with a rich appearance or a very fine flavour.

The brandies most esteemed in England are imported from France, and are those of Cognac and Armagnac, the preference being generally given to the former. The brandies of Rochelle and Bordeaux come next in quality, while those obtained from Portugal, Spain, and Italy, are very inferior.

The *constituents* of pure brandy are alcohol and water, together with small quantities of a volatile oil, acetic acid, acetic ether, œnanthic ether, colouring matter, and tannin. It is from the presence of the two ethers that the spirit derives its characteristic smell and flavour. The amount of absolute alcohol in brandy varies from 45 to 55 per cent. When first imported, it is generally 1 or 2 over-proof but its strength decreases by age, and by the time it is taken from the bonded store for sale, it is seldom stronger than 3 or 4 under proof. Pure brandies of the best quality, even when new, seldom exceed proof, and are generally a little below it. The reason of this is that they are but slightly rectified, as redistillation tends to injure the ethereal oils, upon which the flavour of the brandy depends.

The quality and flavour of the brandy imported from France vary, and often considerably from that which is drunk at the best tables on the Continent; this principally arises from it being prepared, or, as it is technically termed, 'made up,' for the London market by the addition of *flavouring it* which means colouring, &c. This is done to which the plain spirit, colour by the English purchaser any extent desired, and the prices of the substances so added are regulated, and the quantity and foreign brandy is sold in England varies from 3 and from brandy proof. In large quantities seems to depends much upon the strength, of course the character; a fine old the age and quality of rival even 17 u. p., while brandy being, perhaps, a commonone of the last year's vi of. See p., or even quality, may be as strong to even u. p. These matters a See GLASS, experienced brandy dealHOSPHORUS, &c.

In *France* there are g). See CORKS, brandy, which are known tive of their qualities, so [Fr.] *Syn.* CE'REUS,

"*Eau-de-vie supérieu*PROBATO"RIA*, L. In pale white wines by ski instrument, originally remarkable for its richto the urethra, œsopha- It forms the finest varieture and other diseases both 'white' and 'p drinker, being seldom arel's.) Amber (melted), deepest tint, though lorarts; mix, cool a little, exceeds a pale amber; of turpentine, 1 part; thus coloured, it is fr 3 successive intervals, brandy' by the uninitiatcord or web; dry in a

"*Eau-dê-vie ordinair*nd repeat the process is distilled from inferiorias acquired the proper wipes; average sp. gr. first with pumice-stone, to 27 u. p.). It forms tripoli and oil. This is of the taverns and hotof the once celebrated 'made up' with plain siel, and is still generally very large portion of th 'little bougie.'

Of each of the abo name.

ther increased in number by their admixture, and by the addition to them of plain spirit.

"*Eau-de-vie de marc.*" From the lees of sour, damaged, and inferior red wines, the marc or cake of grapes, &c., distilled by a quick fire, to drive over as much essential oil and flavouring matter as possible. Coarse flavoured and inferior. *Used* chiefly to mix with other brandy, or to flavour plain spirit.

"*Eau-de-vie seconde.*" The weak spirit that passes over, after the receiver has been changed. Very weak and inferior.

"*Eau-de-vie à preuve d'Hollande.*" Sp. gr. ·941 to ·942 (18 to 20 u. p.). The common strength at which brandy is retailed in France, and that at which it stands the 'proof' or 'bead.'

"*Eau-de-vie à preuve d'huile.*" Sp. gr. ·9185 (about 23° Baumé, or 1¼ o. p.); pure olive oil just sinks in it. It is the strongest brandy kept for retail sale in France.

"*Eau-de-vie forte.*" From common brandy distilled at a low temperature. It answers to our spirit of wine. Sp. gr. ·839 (38° Baumé, or 55° o. p.).

"*Esprit de vin*" is brandy or spirit, carefully rectified to ·861 (28° Baumé, or 42 o. p., and upwards).

Pur., &c. The method of determining the *strength* of brandy is explained under 'ALCOHOLOMETRY.' Of the large quantity of this liquor consumed in England, we can assure the reader, that a small fraction only escapes adulteration. Pure French brandy is indeed an article quite unattainable by the small consumer. The brandy of our shops and taverns is not only systematically 'lowered' a little (with spirit from the Cape wine or British brandy) by the wholesale dealer, but it undergoes a like process, but to a much greater extent, at the hands of the retailer. The only method to obtain perfectly pure brandy is either to take it direct from the bond store, or to buy it of some familiar respectable party, and to pay a price that leaves no inducement to dishonesty. When adulteration is to be done, British brandy had better be purchased, by which money will be saved, and strength for strength a more wholesome article obtained. Brandy is obtained by distillation only, as already noticed, is compounded with *water, malt brandy,* and various delicate flavours, by which its original flavour is disguised, of COGNAC brandy in particular. This spirit, when of the best quality, is artificially coloured with *cochineal* and kept in wooden vessels, and hence, even by the retailers, is to reduce frequently called with a large quantity of water. In consequence their liquor suffers in flavour, and its deficiency in strength or spoilt whisky is so apparent, that they soon lose about 0·947 of either abandoning the trade or resorting to others of a more 'ordinary' character to disguise it. The *Cognac* and commonly adopted. An addition of *sugar* is immediately introduced, which is followed by sundry powerful varieties of *pepper, grains of paradise,* and other flavouring qualities, with *sulphuric ether,* &c., to give it a pungency and 'make-believe strength' that "passes muster" with the petty consumer. This fraud may be detected by gently evaporating a little of the suspected liquor in a spoon or glass capsule, when the acrid matter, colouring, and sugar, will be left behind, and may be readily detected by their flavour, sweetness, glutinosity, &c. A little perfectly pure brandy evaporated in a similar manner, (on a watch-glass, for instance,) merely leaves a trifling discoloration on the surface of the glass. *Genuine French brandy* always *reddens* blue litmus paper, from containing a little acetic acid; the old coloured varieties are also *blackened* by a solution of a persalt of iron. Sometimes brandy is contaminated with a small quantity of 'lead' or 'copper,' derived from the apparatus or utensils with which it has been prepared or measured. 'Sugar of lead' has also sometimes been used by the ignorant dealer to clarify it. The presence of these highly deleterious substances may be detected in the following manner:—

1. COPPER:—*a.* A small piece of clean polished iron or steel immersed in the suspected liquid for a short time (with agitation) becomes coated with a film of *metallic copper,* when that metal is present. To facilitate the precipitation of the metal, the sample under examination may be slightly acidulated with a few drops of pure acetic acid. Minute traces of copper may sometimes be detected on the surface of the iron with a lens, which would be passed over unnoticed by the naked eye.

b. (Böttger.) A little of the brandy is to be agitated with a few drops of pure olive oil. The latter will acquire a *green* colour if copper be present.

2. LEAD:—*a.* Sulphuretted hydrogen and hydrosulphuret of ammonia produce a *black precipitate* or *discoloration* in brandy containing lead.—*b.* A solution of sulphate of soda (*Glauber-salts*), or water soured with sulphuric acid, produces a heavy white precipitate, which turns *black* when moistened with hydrosulphuret of ammonia.

Concluding remarks. In the 'trade,' the addition of water ('*liquor*') to spirit is technically called '*reducing*;' whilst absolute adulteration is known under the questionable name '*improving*.' Both of these operations have now been so long practised with impunity as to form the leading qualifications demanded in a cellarman.

The following formulæ for 'reducing' brandy are those of two large wholesale dealers, who consider themselves much more honest than their brethren in the same line:

1. *Cognac brandy* (10 u. p.), 20 galls.; *British brandy* (17 u. p.), 5 galls.; *water,* 4½ galls. Strength of mixture, 25 u. p.

2. To 72 galls. of *full-flavoured French brandy* (5 u. p.) are added 10 galls. of *spirit of wine* (58 o. p.); 25 galls. of *water,* and 1 pint of *good colouring.* The whole is then well 'rummaged up,' and allowed to stand for two

days, when it is fit for use. Strength of mixture, 22 u. p.

A liqueur, sold in London under the name of "brandy improver," or "brandy essence," consists of a thin sugar syrup, flavoured with acetic ether and essence of cayenne, and coloured with burnt sugar. It is said to heighten the true Cognac flavour, and restore lost alcoholic strength.

Brandy, British. *Syn.* MALT BRANDY, &c. For a long time this liquor was distilled from spoiled wine and the dregs of wine, both British and foreign, mixed with beer-bottoms, spoiled raisins, and similar substances. Malt and molasses spirits were afterwards employed, as at the present day, for the purpose; but it was long considered as "an unpardonable and wicked misuse of these articles." Modern experience, however, has proved that pure malt spirit is, in this country, the most convenient, if not the best kind, to form the basis of an imitation brandy.

Prep. 1. To 12 galls. of *malt spirit* (finest and flavourless), at proof, add, of *water*, 5 galls.; *crude red tartar* or *wine-stone*, ¾ lb. (previously dissolved in 1 gal. of *boiling water*); *acetic ether*, 6 fl. oz.; *French wine-vinegar*, 2 quarts; *French plums* (bruised), 5 lbs.; *sherry wine-bottoms*, ½ gal.; mix in a sherry or French-brandy cask, and let them stand for about a month, frequently 'rummaging up' the liquor with a stick; next draw over 15 galls. of the mixture from a still furnished with an agitator. Put the 'rectified spirit' into a clean, fresh-emptied Cognac-braudy cask, and add of *tincture of catechu*, 1 pint; oak shavings, 1 lb.; and *spirit colouring*, ½ pint; agitate occasionally for a few days, and then let it repose for a week, when it will be fit for use. *Prod.*, 15 galls. of BRANDY, 17 u. p. Age greatly improves it.

2. *Malt spirit* (as before), 99 galls.; *red tartar* (dissolved), 7 lbs.; *acetic ether*, ½ gall.; *wine-vinegar*, 5 galls.; *bruised raisins* or *French plums*, 14 lbs.; *bitter-almond cake* (bruised and steeped for twenty-four hours in twice its weight of water, which must be used with it), ½ lb.; *water*, q. s.; macerate as before, and draw over, with a quick fire, 120 galls. To the distilled spirit add a few lbs. of *oak shavings*; 2 lbs. of *powdered catechu* (made into a paste with hot water), and *spirit-colouring*, q. s.; and 'finish' as in the last. *Prod.*, 120 galls. of spirit, fully 17 u. p. Equal in quality to the last.

3. *Clean spirit* (17 u. p.), 100 galls.; *nitrous ether*, 2 quarts; *cassia buds* (ground) 4 oz.; *bitter-almond meal*, 5 oz.; *orris-root* (sliced), 6 oz.; *powdered cloves*, 1 oz.; *capsicum*, 1½ oz.; *good vinegar*, 3 galls.; *brandy colouring*, 3 pints; *powdered catechu*, 2 lbs.; *full-flavoured Jamaica rum*, 2 galls. Mix in an empty Cognac 'piece,' and macerate for a fortnight, with occasional stirring. *Prod.*, 106 galls., at 21 or 22 u. p.

4. *Malt spirit* (17 u. p.), 100 galls.; *catechu*, 2 lbs.; *tincture of vanilla*, ½ pint; *burnt-sugar colouring*, 1 quart; *good rum*, 3 galls.; *acetic* or *nitrous ether*, 2 quarts. Mix as the last.

5. *Clean spirit* (17 u. p.), 89 galls.; *high-flavoured Cognac*, 10 galls.; *oil of cassia*, 2 drs.; *oil of bitter almonds*, 3 drs.; *powdered catechu*, 1 lb.; *cream of tartar*, (dissolved), 1¼ lb.; *Beaufoy's concentrated acetic acid*, ½ gal.; *sugar colouring*, 2 to 3 pints; *good rum*, 1 gal. When the above mixtures are distilled, the French brandy, colouring, and catechu, should be added to the distilled spirit.

6. To *plain spirit* (coloured), at 17 u. p., add a little *tincture of catechu*, and a sufficient quantity of *eau-de-vie de marc*, or of the *oil distilled from wine-lees*, to flavour it.

Obs. The oil referred to in the last formula is obtained by distillation from the lees of wine, either dried and made up into cakes, or in their wet state, mixed with about 7 or 8 times their weight of water. This oil should be kept dissolved in alcohol, as it is otherwise apt to lose its flavour. Brandy from any part of the world may be very closely imitated, by distilling the oil from the lees of the wines produced in that particular district. Where black tea is cheap, as in the United States of America, it is very commonly employed to impart the roughness of brandy to the coloured spirit, and the subsequent addition of a little 'flavouring' greatly improves it. A really good article of cider-spirit thus treated forms a passable 'mock brandy.' In conclusion, we may remark that, as the strength and quality of ingredients frequently vary, and success depends greatly on skill in manipulation, much must be left to the experience, judgment, and discretion of the operator. In all cases he must recollect that a certain degree of 'age' is absolutely necessary to give a high character to any spirit. Indeed, to age in the one case, and its absence in the other, may be referred the reasons why French brandy and British brandy, apart from mere shades of flavour, so materially differ.

The production of a flavoured British spirit closely resembling French brandy is a subject well worthy of the attention of the ingenious chemist, rectifier, and cellarman, as a matter of profit; and of the amateur, as affording an interesting field for useful and amusing experiment.

Brandy, Car'away. A species of cordial commonly prepared as follows:—1. *Caraway-seeds* (bruised), 4 oz.; *lump sugar*, 2 lbs.; *British brandy*, 1 gal.; macerate a fortnight, occasionally shaking the bottle. — 2. *Sugar*, 1 lb.; *carraways* (bruised), 1 oz.; 3 *bitter almonds* (grated); *spirit-colouring*, 1 oz.; *plain spirit* or *gin* (22 u. p.), ½ gal.; as before. Some persons omit the colouring.

Brandy, Cher'ry. *Prep.* 1. Brandy and cherries (crushed), of each, 1 gal.; let them lie together for 3 days, then express the liquor, and add 2 lbs. of lump sugar; in a week, or two, decant the clear portion for use.

2. To the last add 1 quart of raspberry juice, and ½ a pint of orange-flower water. Both the above are excellent.

3. Treacle, 1 cwt.; spirit (45 u. p.), 41 galls.; bitter almonds (bruised), 1 lb. (or more or less to taste); cloves, 1 oz.; cassia, 2 oz.; macerate a month, frequently stirring. This is the article now commonly vended in the shops and at stalls for cherry brandy.

Obs. Equal part of fully ripe Morello cherries and black cherries produce the richest cordial. Some persons prick each cherry separately with a needle instead of crushing them; in which case they retain them in the liquor, and serve up a few of them in each glass. The plan named in the first formula is, however, that usually adopted. On the small scale, the fruit is commonly bruised between the fingers. A portion only (if any) of the stones in the cherries should be crushed, to impart a nutty flavour. See LIQUEURS.

Brandy, Ci'der. From *cider* and *perry;* also from the *marc* of *apples* and *pears* fermented. It is very largely manufactured in the United States of America and Canada, where it may be purchased for about 2*s.* 1*d.* a gallon. See BRITISH BRANDY (*above*).

Brandy, Dant'zic. From *rye*, ground with the *root* of *calamus aromaticus*. It has a mixed flavour of orris and cinnamon.

Brandy, Guern'sey. *Beet-root spirit* flavoured.

Brandy, Lem'on. *Prep.* 1. *Fresh lemons* (sliced), 1 dozen; *brandy*, 1 gal.; macerate for a week, press out the liquor, and add of *lump sugar*, 1 *lb.*

2. *Proof spirit*, 7 galls.; *essence of lemon*, 3 drs.; *sugar*, 5 lbs.; *tartaric acid*, 1 oz.; (dissolved in) *water*, 2 galls.; *turmeric powder* or *spirit-colouring*, a dessert-spoonful; as before. Sometimes *milk* is added to the above, in the proportion of 1 quart (boiling hot) to every gallon.

Brandy, Malt. See BRITISH BRANDY.

Brandy, Or'ange. As lemon brandy, but employing *oranges*.

Brandy, Pale. This article has been already referred to. (See p. 248.) That of the gin-shops and publicans is generally a spurious article, made by mixing together about *equal parts* of good *brown French brandy*, *clean spirit of wine*, and *soft water*, and allowing the whole to stand until the next day to 'fine down.' If the first is 9 u. p., and the second, 58 o. p., the product will be 17 u.p. Any deficiency of strength is made up by adding a little more *spirit of wine*.

Brandy, Pat'ent. The article so much bepuffed under this name, by certain houses, is merely very clean *malt-spirit* mixed with about 1-7th of its bulk (or less) of *strong-flavoured Cognac*, and a little *colouring*.

Brandy, Peach. From *peaches*, by fermentation and distillation. Much used in the United States, where peaches are very plentiful, and consequently cheap. A *cordial spirit* under the same name is prepared as follows:—

1. From *peaches*, sliced and steeped in twice their weight of *British brandy* or *malt-spirit*, as in making cherry brandy.

2. *Bitter almonds* (bruised), 3 oz.; *proof spirit* (pale), 10 galls.; *water*, 3 galls.; *sugar*, 5 or 6 lbs.; *orange-flower water*, ½ a pint; macerate for 14 days. Add *brandy-colouring*, if required darker.

Brandy, Rais'in (rā'zn). See SPIRIT (Raisin).

Brandy, Rasp'berry (răz'-). From *raspberries*, as directed under CHERRY BRANDY. Sometimes a little *cinnamon* and *cloves* are added. The only addition, however, that really improves the flavour or bouquet, is a little *orange-flower water*, a *very little essence of vanilla*, or a *single drop* of *essence of ambergris*.

Brandy, White. See BRANDY (p. 248) and PALE BRANDY (*above*).

BRASS. *Syn.* Æs, Æ''RIS METAL'LUM, L.; AIRAIN, LAITON, CUIVRE JAUNE, Fr.; ERZ, MESSING, Ger.; BRÆS, Sax. A well-known alloy of copper and zinc.

Prep. Brass is now generally manufactured by plunging copper, in slips, into zinc melted in the usual manner. The former metal rapidly combines with the fluid mass, and the addition is continued until an alloy somewhat difficult of fusion is formed, when the remainder of the copper is at once added. The brass thus obtained is broken into pieces, and remelted under charcoal, and a proper addition of either zinc or copper made, to bring it up to the colour and quality desired. It is next poured into moulds of granite. Before being submitted to the rolling-press for reduction to thin plates, it undergoes the operation of annealing.

The proportions of the metals forming this alloy are varied according to the desired colour, and the purposes to which it is to be applied. The following formulæ are founded chiefly on analyses of standard brasses and yellow metals, made expressly for this work. Small fractions are omitted; the nearest whole numbers being generally taken:—

a. FINE BRASS:—1. *Copper*, 2 parts; *zinc*, 1 part; either combined, as explained above, or the two metals separately melted, suddenly poured together, and united by vigorous stirring.

2. *Copper*, 7 parts; *zinc*, 3 parts. Bright yellow; malleable.

3. *Fine copper*, 4 parts; *zinc*, 1 part. Deeper coloured than the last; an excellent and very useful alloy.

b. MALLEABLE BRASS:—1. *Copper*, 33 parts; *zinc*, 25 parts; as before.

2. *Copper*, 3 parts; *zinc*, 2 parts. These alloys are malleable whilst hot.

c. RED BRASS. This name is commonly applied to all those alloys which do not contain more than 18 to 20% of zinc. In the deeper-coloured foreign varieties (RED TOMBAC), the per-centage of copper occasionally amounts to 88, 90, or even 92%.

d. YELLOW BRASS. See FINE BRASS (*above*).

e. BUTTON-BRASS:—1. *Copper*, 8 parts; *zinc*, 5 parts. This is the 'PLATIN' of the Birmingham makers.

2. *Yellow brass*, 16 parts; *zinc*, 2 parts; *tin*, 1 part. Paler than the last.

3. *Copper*, 25 parts; *zinc*, 20 parts; *lead*, 3 parts; *tin*, 2 parts. Pale; used for common buttons.

f. For FINE CASTINGS:—1. As *fine brass*, according to the colour desired. (See *above*.)

2. *Copper*, 62 parts; *zinc*, 35 parts; *lead*, 2 parts; *tin*, 1 part.

3. *Copper*, 60 parts; *zinc*, 36 parts; *tin*, 4 parts. Both the last two are rather pale and brittle.

4. *Copper*, 90 parts; *zinc*, 7 parts; *tin*, 2 parts; *lead*, 1 part. Rich deep colour.

5. *Copper*, 91 parts; *zinc*, 5 parts; *tin*, 3 parts; *lead*, 1 part; as the last.

g. For GILDING:—1. As *fine brass* (*above*).

2. *Copper*, 64 parts; *zinc*, 32 parts; *lead*, 3 parts; *tin*, 1 part.

3. *Copper*, 82 parts; *zinc*, 18 parts; *tin*, 3 parts; *lead*, 1 part.

h. For SOLDER:—1. *Fine brass*, 12 parts; *zinc*, 6 parts; *tin*, 1 part; melted together.

2. *Brass*, 2 parts; *zinc*, 1 part; as before.

3. *Brass*, 3 parts; *zinc*, 1 part. Very strong. *Used* for soldering tubes and other like purposes requiring great strength. The above alloys form the 'HARD SOLDER' of the braziers. For certain purposes a little silver is added to them, when the compound receives the name of 'SILVER-SOLDER.'

i. For TURNING:—1. *Fine brass*, 98 parts; *lead*, 2 parts; melted together.

2. *Copper*, 61 parts; *zinc*, 36 parts; *lead*, 3 parts.

3. *Copper*, 65 parts; *zinc*, 33 parts; *lead*, 2 parts.

j. For WIRE:—1. *Copper*, 72 parts; *zinc*, 28 parts; the resulting alloy being subsequently properly annealed.

2. *Copper*, 64 parts; *zinc*, 34 parts; as before.

3. To the last add of *lead*, 2 parts.

Anal. This may be briefly described as follows:—

a. 100 grs. of the alloy is digested in nitric acid. The insoluble portion is peroxide of tin, every 74 grs. of which, when washed and dried, contain 58 grs. of metallic tin.

b. Sulphuric acid is added to the nitric solution as long as a white precipitate falls; after a time the precipitate is collected on a filter, washed with a mixture of water and alcohol, and ignited in a porcelain crucible. Every 152 grs. of the residuum represents 104 grs. of metallic lead.

c. The liquid filtered from the precipitate of sulphate of lead is treated with a stream of sulphuretted hydrogen; the precipitate is collected on a filter, washed with water mixed with a little sulphuretted hydrogen, dried, and digested in pure nitric acid until the sulphur which separates acquires its natural full yellow colour; the resulting solution is next diluted with water, and reprecipitated with potassa, the whole being boiled until the precipitated oxide of copper becomes of a deep brown or black; it is then collected on a filter, washed, dried, ignited in a platinum crucible, and weighed therein immediately after it becomes cold. Every 40 grs. of oxide of copper thus obtained represents 32 grs. of pure copper.

d. The liquid poured from the precipitate of sulphide of copper is boiled for about a minute, when it is precipitated with a solution of carbonate of sodium; the whole is then boiled for a few minutes, and the precipitated oxide of zinc collected, washed, dried, and ignited. Every 40 grs. of this oxide contains 32 grs. of metallic zinc.

Concluding remarks. In the adoption of his formula the operator should be entirely led by the object he has in view. The larger the proportion of copper, the deeper will be the colour, and the greater the density, and, within certain limits, the toughness of the alloy. Zinc lessens the specific gravity and colour. Tin gives it hardness and grain; whilst lead toughens it, and renders it fitter for turning. These facts are known to every experienced brass-founder. See ALLOYS, COPPER, MOSAIC GOLD, PRINCE'S METAL, TOMBAC, &c.

BRASS'-COLOUR. *Syn.* BRASS-PIGMENT, B.-BRONZE. *Prep.* 1. Grind copper filings, or the precipitated powder of copper, with a little red ochre. Red-coloured.

2. *Gold-coloured brass*, or *Dutch leaf*, reduced to a very fine powder. Yellow or gold coloured.

Obs. Before application these powders are mixed up with pale varnish, no more being worked up at once than is wanted for immediate use. They are also applied by dusting them over any surface previously covered with varnish to make them adhere.

BRASS-PASTE. *Prep.* 1. *Soft soap*, 2 oz.; *rotten-stone*, 4 oz.; beaten to a paste.

2. Rotten-stone made into a paste with sweet oil.

3. *Rotten-stone*, 4 oz.; *oxalic acid* (in fine powder), 1 oz.; *sweet oil*, 1½ oz.; turpentine, q. s. to make a paste.

Obs. The above are used to clean brass-work, when neither varnished nor lacquered. The first and last are best applied with a little water; the second, with a little spirit of turpentine or sweet oil. Both require friction with soft leather. See BRASS-WORK, PASTES, &c.

BRASS-STAIN. *Prep.* 1. Sheet-brass (cut into small pieces), is exposed to a strong heat for 2 or 3 days, then powdered, and again further exposed in a like manner for several days; the whole is then reduced to fine powder, and exposed, a third time, to heat, testing it occasionally, to see if it be sufficiently burnt.

When a little of it, fused with glass, makes the latter swell and froth up, the process is complete. It imparts to glass a green tint, passing into turquoise.

2. Equal parts of plate-brass and sulphur are stratified together in a crucible, and calcined, until they become friable; the whole is then reduced to powder, and exposed to heat as before. This imparts a calcedony red or yellow tinge to glass by fusion; the precise shade of colour being modified by the mode of using it.

Obs. The common practice in the glass-houses is to conduct the calcination by exposing the metal, placed on tiles, in the leer or annealing arch of the furnace; a plan both convenient and economical.

BRASS'-WORK. Articles of brass and copper, when not varnished or lacquered, may be cleaned and polished with sweet oil and tripoli, rotten-stone, or powdered bath-brick, applied with friction, on flannel, and 'finished off' with leather; due care being taken to ensure the absence of anything gritty, which would scratch and disfigure the surface of the metal. A strong solution of oxalic acid in water gives brass a fine colour. Vitriol and spirits of salts make brass and copper very bright, but the polish thus obtained soon tarnishes, and the articles consequently require more frequent cleaning. A strong lye of roche alum and water also improves the appearance of brass. In all cases where acids or saline matter has been used, the metal should be at once well rinsed in clean water, and then wiped dry, and finally dry polished with soft leather.

BRASS INLAID-WORK may be cleaned with tripoli and linseed oil, applied by a rubber of felt or leather; the whole being afterwards thoroughly rubbed off, and then finished with clean soft leather. The ornaments of a French clock, and similar articles, are said to be best cleaned with bread-crumb, carefully rubbed, so as not to injure the wood-work. ORMOLU CANDLESTICKS, LAMPS, and BRANCHES, may be cleaned with soap and water. LACQUERED and GILDED ARTICLES are spoiled by frequent rubbing, and by acids and alkaline leys.

A fine colour may be given to BRASS ORNAMENTS, when not gilt or lacquered, with a little sal-ammoniac, in fine powder, moistened with soft water. The articles must be afterwards rubbed dry with bran and whiting. Another plan is to wash the brass-work with a strong lye of roche alum (1 oz. to water 1 pint), and after rinsing it in clean water and drying it, to finish it off with fine tripoli. These processes give to brass the brilliancy of gold. See BRASS-PASTE.

BRASS'ING. *Syn.* BRASS-COATING. 1. Copper-plates and copper-rods may be covered with a superficial coating of brass by simply exposing them, in a heated state, to the fumes given off by melted zinc at a high temperature. The coated plates and rods are rolled into thin sheets or drawn into wire. The spurious gold wire of Lyons is said to be made in this way.

2. Vessels of copper may be coated with brass, internally, by filling them with water strongly soured with hydrochloric acid, adding some amalgam of zinc and cream of tartar, and then boiling the whole for a short time. This plan may be usefully applied in certain cases to copper boilers in laboratories, and to other purposes.

3. By the electrotype (which *see*).

BRAWN. A boar or its flesh. When young, the horny parts feel moderately tender. If the rind is hard, it is old. (Mrs. Rundell.) Also, in cookery, the flesh of the boar, or of swine, collared so as to squeeze out as much of the fat as possible, boiled, and pickled.

Mock Brawn. *Prep.* (Mrs. Rundell.) Take the head and belly-piece of a young porker, well saltpetred; split the head and boil it; take out the bones and cut it to pieces; then take 4 ox-feet, boiled tender, and cut them in thin pieces; lay them in the belly-piece with the head cut small; roll it up tight with sheet tin, and boil it 4 or 5 hours. When it comes out set it up on one end, put a trencher on it (within the tin), press it down with a heavy weight, and let it stand all night. The next morning take it out of the tin and bind it with a fillet, put it in cold salt-and-water, and it will be fit for use; it will keep a long time, if fresh salt-and-water are put into it about once every four days.

BRAZIL'-WOOD (-zēle'-). *Syn.* BRAZIL'‡; LIG'NUM BRAZILIEN'SE, L.; BOIS DE BRÉSIL, Fr. A dye-stuff furnished by several species of trees of the genus *cæsalpin'ia*, and much used in dyeing various shades of red. The usual practice is to boil it for some hours in hard spring-water, and to keep the resulting decoction for some time, or until it undergoes a species of fermentation; as it is thus found to yield more permanent and beautiful colours than when employed fresh. The following are examples of its application:—

a. For COTTON:—

1. The goods are first boiled in a bath of sumach, next worked through a weak mordant of solution of tin, and then run through the Brazil bath lukewarm. This gives a bright red.

2. The goods are alumed, rinsed, next mordanted with solution of tin, rinsed again, and then turned through the Brazil dye bath. This gives a rose colour.

b. For LINEN:—This, for the most part, is similar to that adopted for *Cotton*.

c. For SILK:—The goods, after being alumed in the same way as wool, but at a lower temperature, are rinsed, and passed through the Brazil-wood bath lukewarm.

d. For WOOL:—The goods are first steeped or boiled in a weak mordant of alum and tartar, for 1 hour, and then allowed to lie in the cold liquor for 2 or 3 days, with frequent

moving about; they are lastly boiled in the Brazil-wood bath for about ½ an hour.

Obs. The shades of colour given with Brazil-wood may be modified by varying the strength of the bath, the mordant, &c. The addition of a little alum turns it on the purple. A little alkali added to the bath, or passing the goods, after being dyed, through water holding a little alkali in solution, produces what is called false crimson. A deep crimson is obtained by adding a little logwood to the Brazil-wood bath. 1 lb. of Brazil-wood, ½ oz. of alum, and 2 oz. of tartar, are sufficient to dye from 20 to 28 lbs. of cotton, according to the depth of shade required. See DYEING, RED DYES, &c.

BRAZI″LINE (-zēle′-in). *Syn.* BREZE″LINE, SAPAN′INE. The colouring matter of Brazil-wood. It forms small orange-coloured needles, soluble in both water and alcohol. Alkalies turn it violet; acids, yellow.

BRA″ZING. The operation of uniting pieces of copper, brass, iron, &c., by means of hard solder.

Proc. The edges, after being filed or scraped quite clean, are covered with a mixture of hard solder and powdered borax, made into a paste with water. The whole is then allowed to dry, and is afterwards exposed, in a clear fire, to a heat sufficient to melt the solder. See AUTOGENOUS, SOLDERING, SOLDERS, &c.

BREAD (brĕd). *Syn.* PA′NIS, L.; PAIN, Fr.; BROD, Ger.; BROOD, Dut.; BRÖD, Dan., Swed.; BREOD, Sax. Loaves or cakes made from ground corn, and constituting the staple article of food of all civilised nations.

This important article of food is made of the flour of different cereal grains, but only those that contain gluten admit of conversion into light or spongy bread. In this respect wheat-flour is superior to all others. When this flour is made into a paste or dough with water, and the dough, previous to baking, is left for some time in a moderately warm place, a state of fermentation comes on, owing to the sugar of the flour gradually undergoing the process of conversion into alcohol, in every respect similar to that which takes place during the fermentation of wine and beer. In this process a large quantity of carbonic acid gas is liberated, and the toughness of the dough preventing its escape, the whole mass becomes puffed up and spongy, and a light porous paste is formed, the porosity of which is still further increased by the heat of the oven. The natural process of fermenting the dough just described is, however, tedious and uncertain, whilst the dough has a tendency to run into the acetous fermentation, and to acquire a sour and disagreeable taste, by which it is rendered less nutritious, and less easy of digestion. This has led to the use of a ferment, which produces a similar condition more speedily, and with greater certainty. Leaven or dough was originally employed for this purpose, and the bread so made was hence called LEAVENED BREAD. At the present time barm or yeast is almost universally used for this purpose. All that is essential to make a loaf of bread, is to add a proper quantity of yeast to the dough, and to allow it to remain for a short time in a warm place, and as soon as it rises or becomes spongy, to subject it to the process of baking.

In preparing his dough, the modern baker takes a part of the water needed for the batch, and having rendered it tepid or lukewarm (80° to 90° Fahr.) by the addition of boiling water, dissolves his salt in it, and adds the yeast, together with a portion of the flour. With these he forms a thin dough, which he sets aside in a moderately warm place provided for the purpose, and technically called the 'kneading trough,' 'prover,' or 'tryer,' where it soon begins to ferment and swell up. This process is called 'setting the sponge;' and according to the proportion the water in it bears to the whole quantity that is to be used, it receives the name of 'whole,' 'half,' or 'quarter sponge.' Here, the sponge heaves and swells, and ultimately the surface bursts and subsides, and if not checked, swells again and again in a similar manner, and would continue to do so, until the whole of the 'saccharine matter' was destroyed, and the dough had become sour. The baker is careful, however, to stop it before it has communicated a sourness to the mass. After the first, or at the furthest, after the second or third 'dropping of the sponge,' he adds the remaining quantity of flour, water, and salt, necessary to form the 'batch,' and then kneads the whole until it becomes sufficiently tough and elastic to bear the pressure of the hand without adhering to it. The 'dough' is now left to itself for a few hours, during which the fermentation still goes on. The inflated mass is then again kneaded, cut into pieces, weighed, and shaped into loaves. In an hour, or two, these unbaked loaves swell up to nearly double their former size, and are then placed in the oven, and baked. During this operation they continue for a time to increase in size, in consequence of the dilation of the pent-up gas by the heat. At length the fermentation is checked, and the dough becomes too solid to admit of further alteration.

Such are the principles and practice of the art of baking. The operations are precisely the same on both the small and the large scale, and therefore need not be separately described.

Adult. The adulteration of both flour and bread is carried to a fearful extent, more especially in London. The bakers' flour is very often made of the worst kinds of damaged foreign wheat; and other cereal grains, and particularly beans, are mixed with them in grinding them into flour. In this capital no fewer than *six* distinct kinds of wheaten flour are brought into the market—*fine flour*,

seconds, middlings, fine middlings, coarse middlings, and *twenty-penny flour*.

Among the principal substances which have been proved to have been used to adulterate wheat-flour and bread are the following:—

**Alum.	*Plaster of Paris.
*Ammonia (Sesquicarbonate).	*Potash (Carbonate and bicarbonate).
**Beans.	**Potatoes.
*Bone dust.	**Rice.
*Chalk.	**Soda (Carbonate and sesquicarbonate).
Clay.	*Starch (Potato).
Copper (Sulphate).	**Water (in excess).
Lime (Sulphate from the soda water makers).	Zinc (Sulphate).
*Magnesia (Carbonate).	

Of these substances, those marked thus (*) are very frequently used; and those marked thus (**), almost universally so.

According to Mr. Accum, the smallest quantity of alum that can be employed with effect to produce white, light, and porous bread, from the inferior kinds of flour commonly used by the bakers, is from 3 to 4 oz. to a sack of flour weighing 280 lbs. But Dr. P. Markham states, that the ordinary bread of the London baker is made of one sack or 5 bushels of flour; 8 oz. of alum; 4 lbs. of salt; ½ gal. of yeast; and about 3 galls. of water. Our own analyses, extending to many hundred samples of London bread, as well as those of other chemists, show that even this large quantity of alum is often very much exceeded by the bakers.

Alkaline substances, as the carbonates of ammonia, soda, and potash, are often employed to realise the important consideration of producing light and porous bread from spoiled, or, as it is technically called, sour flour. The first salt becomes temporarily converted into a gaseous state during the operation of baking, causing the dough to swell up in minute bubbles, which thus render it light and porous; the salt itself being at the same time, for the most part, volatilised. Alum is added, not only with a like intention, but also to enable the dough to carry more water. There are several instances of convictions on record of millers and bakers having used gypsum, chalk, and pipeclay, in the manufacture of their goods. A gentleman lately writing from the North of England, says that he found in one sample of flour, which he recently examined, upwards of 16% of gypsum; and in another, 12% of the same earth.

A few years since it was discovered that some of the bakers in France and Belgium added blue vitriol to their dough to make it take more water, in the same way as the English baker uses alum. 1 oz. of this sulphate was dissolved in a quart of water, and a wine-glassful of this solution added to the water necessary to make about 50 4-lb. loaves. This enormous crime was soon detected, and deservedly caused the ruin of its heartless perpetrators.

Exam. The principal adulterants above referred to are fortunately easy of detection. The following are the simple and most approved methods for this purpose:—

1. ALUM:—*a.* (Robine and Parisot.) About ½ lb. of the suspected bread (somewhat stale or dry) is reduced to crumbs, macerated for 2 or 3 hours in cold water, and then squeezed through a clean piece of white linen. The liquid is next evaporated to dryness at a steam-heat, the residuum redissolved in a little hot water, and the solution filtered. Liquor of ammonia or a solution of sal-ammoniac, and a solution of chloride of barium, added to the filtered liquid, give a white precipitate when ALUM is present.

When nearly the whole of the alum has suffered decomposition in the loaf, as is frequently the case, the following process is required:—

b. (M. Kuhlman.) 4 or 5 oz. of bread are reduced to ash, which is powdered and treated with nitric acid, the mixture evaporated to dryness, and about 1 oz. of hot water added. A little caustic potassa is added to the last solution (unfiltered), the whole boiled a few minutes, and passed through a filter. The filtrate is next tested with a solution of sal-ammoniac, and the whole again boiled for 2 or 3 minutes. If a precipitate forms it is alumina; every 50 grs. of which are equivalent to 332 grs. of crystallised alum.

c. The suspected sample is wetted with a weak solution of logwood, or, preferably, of cochineal. Pure bread is only slightly stained by this solution; bread containing alum strikes a lavender, lilac, or purple colour, according to the quantity of the adulterant present. If it acquires a pearl-gray, or bluish tint, some alkali (potash, soda, or ammonia) is present.

2. COPPER:—*a.* Moisten the suspected bread with a few drops of a solution of ferrocyanide of potassium. It will assume a pinkish-brown colour if copper be present.

b. A little of the bread may be steeped in hot water, or better still in water soured with a little nitric acid, and the clear liquor squeezed or poured off, and tested with ferrocyanide of potassium, as before.

3. MAGNESIA:—Bread adulterated with magnesia, on digestion in hot water acidulated with sulphuric acid, furnishes a liquid which gives a white precipitate when tested with a solution of either carbonate of potassa or of carbonate of soda, especially on boiling.

4. SODA; POTASSA:—Hot water after digestion on the ashes or charcoal turns turmeric paper brown. The liquid may be evaporated to dryness, redissolved in distilled water, slightly acidulated with hydrochloric acid, and tested with bichloride of platinum. If a yellow crystalline precipitate forms, either at

once or after some hours, it is potash; otherwise, the alkali present is soda.

5. CHALK, WHITING, BURNT BONES, PLASTER OF PARIS, and similar substances, are easily detected by calcining a little of the flour or bread in a clean open vessel, when the amount of ash left will indicate the quantity of adulteration. The quantity of the ash left by genuine bread or flour is very trifling indeed, about $2\frac{0}{0}$.

Concluding remarks. A number of processes are used by cooks and confectioners to make the different varieties of fancy bread, cakes, puddings, &c., which vary according to the peculiar characteristic it is desired to communicate to them; but none of these articles properly belong to the trade of the common baker. Thus, some kinds of cakes and pastes are made to eat 'short,' as it is called, or are rendered less tenacious, and a species of brittleness imparted to them, by the addition of starch, rice-flour, or sugar. In pastry a similar effect and peculiar lightness is produced by butter or lard, whilst in some articles, white-of-egg, gum-water, isinglass, and other adhesive substances, are added to produce an exceedingly light and porous mass.

The different varieties of bread made in England vary, in their quality, chiefly according to the flour of which they are formed. The best WHITE BREAD is made from the purest wheat-flour; ordinary WHEATEN BREAD, of flour containing a little of the finest bran; SECONDS, from flour containing a still larger proportion of bran; and common HOUSEHOLD-BREAD, from flour produced by grinding the whole substance of the grain, without *any* separation of the bran. The last variety is undoubtedly the most wholesome and nutritious, although that least frequently used. SYMNEL-BREAD, MANCHET or ROLL-BREAD, and FRENCH BREAD, are varieties made of the purest flour, from the finest wheat, a little milk being usually added for rolls, and butter and eggs for choicer purposes. Several other minor kinds of bread are also made, varied by the addition of sundry trifles, as sugar, currants, and other palatable ingredients. The SCOTCH SHORT-BREAD is made from a very thick dough, to which butter, sugar, orange-peel, and spices, are added, according to the taste of the maker.

In the manufacture of white bread from damaged or inferior flour, a large quantity of alum is employed by the fraudulent baker, as already noticed; but with the 'best flour' no alum is required. The utmost beauty, sponginess, and sweetness may be given to bread without the addition of one particle of alum, provided the best materials alone enter into its composition. As such materials are seldom employed by the bakers, the usual practice is to introduce 4 or 5 oz. of alum to every sack of flour, or about 1 oz. to each bushel; and very frequently fully double this quantity of alum is employed. But even this enormous quantity is often not the whole of the alum present in common bread; for the miller, in order to cheat the baker, puts in the 'doctor,' in the shape of 4 to 6 oz. of alum to the sack, whilst the baker, unconscious of this victimisation, subsequently uses a double dose of alum in order to cheat his customers.[1] The method of detecting this pernicious adulteration has been already explained. The proper quantity of salt is 4 lbs., and never more than 5 lbs., to the sack, or 1 lb. per bushel. One sack of the best flour, with 4 or 5 lbs. of salt, yields about 360 lbs. of good bread; and a sack of seconds, 345 to 350 lbs. of bread; each being moderately baked. If the loaves are well-baked or over-baked, the product will be from 345 to 350 lbs. only; but if they are slack-baked or under-baked, from 370 lbs. to 385 lbs. of crumbling bread may be obtained from 1 sack of good white flour.

The attention of chemists has, at various times, been directed in search of some method to rectify or lessen the effects of bad harvesting and improper storage on grain, so that a damaged or inferior article might be rendered serviceable, and available for human food. Prof. E. Davy recommends the addition of $\frac{1}{4}$ oz. of carbonate of magnesia to about every 3 lbs. of sour, melted, heated, and similarly damaged flour. This substance materially improves the quality of the bread, "even when made from the worst new seconds flour;" whilst it is said to be perfectly harmless; and the bread so prepared, for temporary use, is certainly unobjectionable. What effects would arise from the daily consumption of such bread for several months has not been determined; but it is doubtful whether it would prove salutary. Indeed there are sufficient reasons for condemning the adoption of such bread in the general diet of a people for any very lengthened period.[2] Our own experiments in bread-making, extending over a long period of years, lead us to prefer carbonate or bicarbonate of soda, for the purpose. Theoretically, the corresponding salts of potassa would be preferable. A mixture of equal parts of the bicarbonates of potassa and of soda, will, perhaps, ultimately be found to be more useful than either substance used separately.

In times of scarcity and famine various substances, besides the flour of the cereals, have been made into bread, or have been mixed with it, in order to lessen the quantity of the former required by the people. For this purpose, almost every amylaceous vegetable at once plentiful and cheap, has, in its turn, been eagerly appropriated. Acorns, beech-mast, the leguminous seeds, numerous

[1] The common excuse of the bakers for using alum is, that without it the bread is not sufficiently white to please their customers, and that the batches are not easily parted into loaves after baking; but Liebig has shown that clear lime-water, which is perfectly harmless, will effect the same object if substituted for the simple water used to make the dough.

[2] See GOITURE, MAGNESIA, &c.

starchy bulbous roots, and similar substances, have been employed, either in the form of meal, or made into an emulsion or jelly, which has been used instead of water to form the flour of bread-corn into a dough. At such times bran, the most nutritious and valuable portion of the grain, although usually rejected as worthless, has been retained in the flour, and has even been added to it in excess. Birkenmayer, a brewer of Constance, during a period of scarcity, succeeded in manufacturing bread from the farinaceous residue of beer (brewer's grains). 10 lbs. of this substance, rubbed to a paste, with ½ lb. of yeast, 5 lbs. of ordinary meal, and a handful of salt, produces 14 lbs. of BLACK BREAD, which is said to be "both savoury and nourishing." The nutritious quality of brewers' grains is shown by their extensive employment at the present day as food for pigs and cattle, and particularly for milch cows. In like manner Iceland, Carragheen, and other mosses, have been made into bread, either alone, or mixed with flour meal. They are used, in the first case, in state of meal, in the same way as flour; the second case, 7 lbs. of moss are directed be boiled in 10 or 12 galls. of water, and resulting glutinous liquid or jelly to be ployed to make 70 lbs. of flour into dough, ich is then fermented and baked in the al way. It is said that flour thus produces double its weight of good household- d. A simpler plan is to mix 1 lb. of lichen l with 3 or 4 lbs. of flour; the bitterness he lichen having been first extracted by ing it in cold water. Bread so prepared of late been highly recommended for the cate and dyspeptic. The modern baker is he habit of mixing large quantities of toes with his bread, whenever he can pur- e them at paying prices. Mealy potatoes selected, and are carefully mashed or ed, and the dry flour is worked into this or dough, which is then mixed with the ge in the usual manner. For inferior d, equal weights of potato pulp and dry r are often used. Bread so prepared eats rt,' and is deficient in sponginess, and in fine yellowish-white tint which forms one he characteristics of pure wheaten bread. e recently, rice boiled with water to a has got into very extensive use among bakers. A 'sponge' is made with a por- of the jelly thickened with some flour, the whole process is conducted in the nary manner, except that the fermentation enerally more slowly conducted and allowed proceed for a longer period. Flour so ted yields fully 50% more bread than when ely mixed up with yeast and water. This stitutes the process of Messrs. Moriau, tin, and Journet, of Paris, which was d, a few years since, at Marylebone Work- . The experiment succeeded, but the result to the public has been, that the ion bakers have adopted the plan, and now very generally surcharge their bread with such an excess of water that, in many cases, it only possesses two thirds the amount of nourishment which it did before the publication of the system just referred to. Unfortunately, the cupidity of dishonest tradesmen appears to be continually impelling them to avail themselves of the exertions of philanthropists and the discoveries of science, in order to increase their profits, regardless alike of the quality of their commodities and the health of their customers. Bread containing an excess of water rapidly becomes sour and mouldy, and is apt to disorder the digestive functions of those who eat it.

From the experiments of Dr. Colquhoun, it appears that the starch of flour is partially converted into sugar during the process of fermenting and baking the dough, and thus contributes to the sweetness of the bread. He proposes to add to the flour, arrow-root, the farina of potatoes, and similar amylaceous substances, made into a jelly with hot water, for this purpose. Dr. Percival has recommended the addition of salep with the same intention. 1 oz. of salep, dissolved in 1 quart of water; 2 lbs. of flour; 80 grs. of salt; and 2 ozs. of yeast, gave 3 lbs. 2 oz. of good bread. The same weight of materials, without the salep, gave only 2¾ lbs. If too much salep is added, it gives its peculiar flavour to the bread.

In reference to the above substitutions, and to the relative quantity of bread produced from any given weight of flour, the reader should remember that the mere increase of the weight or bulk of the product does not carry with it a corresponding increase of the nutritive elements contained in the flour. These remain the same in all cases; and just in proportion as the product, in bread, is greater, will be the decrease in the value of such bread as food. So also with potatoes, rice, and other farinaceous and pulpy substances used as substitutes for wheat-flour. Their poverty in nitrogenous matter, or flesh-formers, is so great, that the greatly increased quantity required as food, to support the body, apart from mere inconvenience, more than compensates for their apparent low price. Thus, good wheaten bread at 2*d.* per lb., is more than twice as cheap as potatoes at 1*d.*; for, assuming 2 lbs. of the first as a day's food, 10 lbs. of the last will be required for the same purpose; and even this large quantity will scarcely effect the desired object. Liebig has demonstrated, that, regard being had to the nutritive power of wheat, it is, under all ordinary circumstances, the cheapest article of food provided by nature for man.

In the preceding article we have not entered into particulars respecting oven management, because, on the large scale, it is thoroughly understood by every practical baker. For the instruction of the busy housewife, we may state that the oven should always

be sufficiently heated before the bread is put into it, in order that the gas contained in the cells of the 'sponge' may be expanded as rapidly as possible by the heat, and the resulting light mass quickly rendered sufficiently solid to prevent its subsequent collapse. The heat should also be maintained at nearly the same temperature during the whole of the time the bread is submitted to its action. In general, with ordinary kitchen ovens properly heated, 30 minutes' baking is sufficient for one-pound loaves and cakes; and 15 minutes in addition for every pound after the first, for larger ones. Thus, a 1 lb. loaf requires ½ hour; a 2 lb. loaf ¾ hour; and a 4 lb. loaf, 1¼ hour.

It is the common ambition of the English baker to give that peculiar tint to the crust of his bread in the process of baking which is so highly esteemed by connoisseurs, and so successfully produced by the Viennese and Parisians. It has been long known at Vienna, that if the hearth of an oven be cleaned with a moistened wisp of straw, the crust of bread baked in it immediately afterwards, presents a beautiful yellow tint. It was thence inferred that this peculiarity depends on the vapour, which being condensed on the roof of the oven, falls back on the bread. At Paris, in order to secure with certainty so desirable an appearance, the hearth of the oven is generally laid so as to form an inclined plane, with a rise of about 11 inches in 3 feet; and the arched roof is built lower at the end nearest the door, as compared with the further extremity. When the oven is charged, the entrance is closed with a wet bundle of straw. By this arrangement the steam is driven down on the bread, and a golden-yellow crust is given to it, as if it had been previously covered with the yelk of an egg.

Pure wheaten bread is one of the most wholesome articles of food, and has been justly termed the 'staff of life.' When well fermented and baked, it is very easy of digestion. It should never be eaten until it has stood at least 24 hours after being taken out of the oven. When newer, bread is apt to disagree with the stomach, frequently producing indigestion, biliousness, diarrhœa, dyspepsia, and other like ailments. Bread prepared from meal coataining the whole of the bran is the most nutritious and digestible, and should alone be given to children and growing persons, and eaten by the dyspeptic and delicate. See ALEUROMETER, ALUM, FLOUR, WHEAT, &c.

Bread, Aerated. For a full description of the method of preparing this article, *see* Watts' 'Dic. of Chemistry.'

Bread, Amer'ican. From American barreled flour. "14 lbs. of American flour will make 21½ lbs. of bread; whereas the best sort of English flour produces only 18½ lbs. of bread." (Mrs. Rundell.) This arises from the superior quality of the wheat used in its production; and also from its being kiln-dried before grinding, by which much water is off.

Bread, Bee. The matter collected to form the bottom of the hive. It re a mixture of resin and wax. Its fum formerly thought to be anti-asthmatic

Bread, Bran. 1. From the whole me out sifting out any of the bran.

2. By adding about 3 oz. of bran to of ordinary flour.

Bread, Extemporaneous. See UNFER BREAD.

Bread, French. *Prep.* 1. From fine the best white bread. For the butte and for those intended for rolls and sm bread, the sponge and dough is co wetted with milk and water, and, occa a very little butter is added. "When or small fancy loaves have lain in a qu about a quarter of an hour, turn them other side for about a quarter of longer. Then take them out and c with a knife, which will make th spongy, and of a fine yellow; whereas takes off this fine colour, and renders t less inviting."

2. FRENCH SOUP-BREAD. From but employing fully double the usual of salt. It is baked in thin loaves, so nearly all crust, by which means it more soluble in hot soup.

Bread, Hick's Pat'ent. This is bread baked in an oven so arranged vapours arising during the process densed in a suitable receiver. The liquor is a crude, weak spirit, produc the fermentation of the dough, and little commercial value; indeed, insu pay for the expenses attending its Besides which, the bread prepared patent was rejected by the vulgar, w to the shops of the neighbouring ba professed to sell their bread with in it."

Bread, Household. This name is given to bread made with flour f only the coarser portion of the bra removed; and to bread prepared mixture of flour and potatoes. The are examples:—

1. (Rev. Mr. Haggett.) Remov bran from flour, 14 lbs.; boil th 1 gal. of water until reduced to strain, cool, and knead in the flour, and yeast as for other bread. Very.

2. Flour, 7 lbs.; mealy potatoes ed), 3 lbs.; as before. Objections reasons already given.

Bread, leav'ened. (lĕv'-). Using stead of yeast, and in the same w 1 lb. to each bushel of flour is u cient. The more leaven used, the bread made with it will be; and and sweeter the leaven, the less taste. Leaven, except among the sailors, is now superseded by yeast.

Bread, London White (lūn'-). The common proportions of the London bakers are—Flour, 1 sack; common salt, 4½ lbs.; alum, 5 oz.; yeast, 4 pints; warm water for the sponge (about) 3 galls. The process has been already noticed.

Bread, Paris White. The following has been handed to us as the plan commonly adopted by the Paris bakers for their best white bread:—On 80 lbs. of the dough (before the yeast was added) from yesterday's baking, as much luke-warm water is poured as will be required to make 320 lbs. of flour into a rather thin dough; as soon as this has risen, 80 lbs. are taken out and reserved in a warm place as leaven for the next day's baking; 1 lb. of dry yeast, dissolved in warm water, is then added to the remaining portion, and the whole lightly kneaded; as soon as it has sufficiently risen, it is made into loaves, and shortly afterwards baked; the loaves being placed in the oven without touching each other, so that they may become crusty all round.

Bread, Unferment'ed. *Syn.* EXTEMPORA"NEOUS BREAD. *Prep.* 1. From Jones's patent flour. Very wholesome and excellent; indeed, when skilfully made and baked, almost equal to French bread.

2. From Sewell's patent flour. Slightly inferior to the last.

3. To each lb. of flour, add, separately, 1¼ dr. of bicarbonate of soda, and 1 dr. of tartaric acid (both perfectly dry, and in very fine powder); rub them well together with the hands until thoroughly incorporated; then form the whole into a dough with water, as quickly as possible, and at once bake in a quick oven. About 8 or 9 oz. of water are required for every lb. of flour. Answers well when expertly managed.

4. Flour, 1 lb.; bicarbonate of soda, 1 dr.; mix; make a dough with water, q. s., to which 1 dr. of hydrochloric acid (commercial) has been added, and further proceed as before.

5. Whiting's PATENT BREAD:—This closely resembles the last. The proportions are—Flour, 7 lbs.; carbonate of soda and hydrochloric acid, of each, 1 oz.; water, 2¾ pints. This method was suggested by Dr. Henry, in 1797, and was patented by Dr. Whiting in 1836. If the proportions be not observed, or the mixture be not perfect, the quality of the bread suffers. The action of the acid on the soda forms common salt in the loaf.

6. AMMONI'ACAL BREAD:—Carbonate of ammonia, ¾ to 1 oz.; cold water, q. s.; dissolve, add of flour, 7 lbs.; and make a dough, which must be formed into loaves and baked immediately, as before.—*Obs.* To ensure success the carbonate should be recent, and free from bicarbonate, the presence of which is known by its being white and powdery, and of inferior pungency. If any of the last salt be present, the bread will have a yellowish colour, and a slightly alkaline or urinous flavour. The process answers best for small loaves, cakes, and fancy bread. By employing pure carbonate of ammonia instead of the commercial sesquicarbonate, the process succeeds admirably, and the resulting bread is most wholesome. A late writer recommends the use of bicarbonate of ammonia, but evidently does so in ignorance, as in practice it is inapplicable, as we have verified by numerous carefully conducted experiments.

7. It has been at various times proposed to knead the dough with water highly charged with carbonic acid, on which Dr. Ure observes, that "the resulting bread will be somewhat spongy." We have repeatedly endeavoured to make bread in this way, but never could succeed in producing a light spongy loaf. The quantity of gas in the water is much too trifling for the purpose, and the greater part of it escapes in the process of making the dough, even though all the materials be well cooled, and the operation conducted in a cold place. The only way of obviating the difficulty is to conduct the kneading in a trough under considerable atmospheric pressure, and at a very low temperature, by means of machinery, as is done by Dr. Dauglish, whose method is now protected by letters patent. This method is not, however, adapted either to domestic use or the small scale.[1]

Obs. Unfermented bread has been strongly recommended as being more wholesome, and generally better adapted to bilious and dyspeptic patients, than fermented bread. It must, however, be confessed, that the unfermented bread commonly met with, has a slight 'raw-grain' taste, which is very disagreeable to some persons. But this taste is not necessarily present, being chiefly dependent on bad manipulation, the use of inferior flour, and insufficient baking. The process of fermentation doubtless modifies the condition of the starch and gluten of the dough, and renders them easier of digestion. This species of bread is sadly adulterated with a variety of indescribable messes. See BISCUITS, BREAD (*ante*), FLOUR, GINGERBREAD, &c.

BREAK'FAST (brĕk'-). *Syn.* JENTAC'ULUM, L.; DÉJEÛNER, DÉJEÛNÉ, Fr.; FRÜHSTÜCK, Ger. The first meal of the day; or the food served at it.

The morning meal—the '*early bit*' of the Germans—is, perhaps, the most important one of the day. According to Erasmus Wilson, it is usually "taken at eight or nine." The proper time for the purpose must, however, depend upon that at which the party rises. About an hour, to an hour and a half, after leaving the bed, will generally be found the most appropriate time for breakfast, and appears to be the one pointed out by nature, and the most conducive to health. By that time the powers of the system have fully recovered from the inactivity of sleep, and the functions of the stomach and other viscera have again come into full play. The appetite

[1] For a full description of Dauglish's process, see Watts' 'Dic. of Chemistry.'

is excited and seeks appeasing, and both instinct and reason direct us to the social board. If abstinence be now prolonged, the physical and mental energies, unsupported by the supply of food which indirectly gives them birth, gradually lessen, and incipient exhaustion ensues. The fluids of the stomach and the smaller intestines begin to act upon the coats of those viscera, instead of on the food, and an unpleasant feeling of hunger, or a loss of appetite comes on, with all its depressing consequences. When breakfast cannot be taken within a reasonable period after rising, the gap should be filled up by chewing a crust, a biscuit, or the like. A raw egg or two, sucked from the shell, or broken into a tea-cup and drank, will be found most valuable for this purpose. Raw milk, cheese, salted food, and other indigestible matter, should be particularly avoided at this early period of the day.

The articles of food to be chosen for the breakfast-table must depend entirely on the state of the health, the occupations, &c., of those assembled round it. Coffee appears to be, by common consent, the favourite beverage. For the delicate, the bilious, and the young, it should neither be taken too strong, nor very weak, and should be softened down with milk or cream, and well sweetened with sugar. Tea is more apt to affect the nerves and stomach than pure *un*chicoried coffee. Green tea, taken thus early in the day, often acts as an absolute poison, though a slow one. We have seen severe fits of vomiting and exhaustion follow its use.

The solid food for breakfast should be easy of digestion, and nutritious. Females, children, and persons leading a sedentary life, should confine themselves to a sufficient quantity of good meal-bread with only a moderate quantity of butter, to which an egg, or a small rasher of mild bacon, may be advantageously added. Parties engaged in active occupations may extend their exploits somewhat farther, and add to this bill of fare a little ham or cold meat. When an undue time will elapse before the luncheon or dinner, and particularly during the colder season of the year, the broiled leg of a fowl, an underdressed mutton chop, or a little tender beef-steak, will be found, by the parties last referred to, most useful; nay, in many cases, invaluable. But excess must be particularly avoided. The object is to take enough food to maintain the system in full energy and vigour, and particularly to avoid offending the stomach by overloading it; a misfortune easily effected at the breakfast table. Old commercial travellers —men wise in the mysteries of life and its enjoyments—are scrupulously careful to make a good, but not a heavy breakfast, before commencing the arduous duties of the day. See DÉJEÛNER, MEALS, &c.

Breakfast Pow'der. *Syn.* RYE'-COFFEE, DILLEN'IUS'S C., HUNT'S ECONOM'ICAL BREAKFAST POWDER, &c. Rye, roasted along with a little fat, after the manner of coffee. It was once sold at 2*s.* 6*d.* the lb., and was formerly extensively used as a substitute for foreign coffee, of which it is one of the cheapest and best. Since the reduction of duty on coffee it has nearly fallen into disuse, unless it be by the grocers to adulterate that article.

BREAST (Sore). See NIPPLES.

BREATH (Fetid). Scarcely anything is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally on the administration of *aromatics*, which by their odour smother it for a time; but these require continual repetition, and are liable to interfere with the functions of digestion. The real cause of stinking breath may generally be traced to a diseased stomach, or to decayed teeth. When the former is the case, mild aperients should be administered; and if these do not succeed, an emetic may be given, followed by an occasional dose of the *Abernethy-medicines*. When rotten teeth are the cause, they should be thoroughly cleansed, and then 'stopped;' or if this is impracticable, they should be removed. When this is impossible or inconvenient, the evil may usually be lessened by keeping them scrupulously clean. Dirty teeth also often cause the breath to smell; and hence the use of the tooth-brush should be a daily habit. Occasionally rinsing out the mouth with a little clean water to which a few drops of solution of chloride of lime, or of chloride of soda, has been added, is often an effective method. As a tooth-powder, fresh-burnt charcoal, and particularly areca-nut charcoal, is without comparison the best. Lozenges, such as the following, have been strongly recommended to sweeten and purify the breath: —*Gum-catechu*, 2 oz.; *white sugar*, 5 oz.; *orris powder*, 1 oz.; *neroli*, 5 or 6 drops; make them into a paste with *mucilage*, and divide the mass into very small lozenges. 20 or 30 drops of *oil of cloves* may be substituted for the orris and neroli, at will. One or two may be sucked at pleasure. See CACHOU AROMATISÉ, PASTILS, &c.

BREW'ING. The art of making beer.

The only ingredients allowed by law to enter into the composition of beer are malt, sugar, hops or any substitute for hops, and water, together with a little yeast.

The apparatus and utensils required, under the common system, in brewing beer, are—

1. A copper or boiler capable of holding fully two thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein; and a wooden cover to place over it before the boiling commences, or when not in use. A copper capable of holding not less than 140 galls. is a convenient size for brewing a quarter of malt, and is commonly known as a one-quarter copper.

2. A mash-tub or mash-tun capable of containing one third more than the copper.

3. One or more tuns or vessels, to ferment the beer in.

4. Three or four shallow coolers, to reduce the wort as rapidly as possible to a proper temperature for fermentation.

5. One or two copper or wooden bowls, for bailing, &c.

6. A thermometer with a scale reaching from below 32° to a few degrees above the boiling-point of water (say to 225° or 230° Fahr.).

7. A saccharometer, for taking the density of worts and beer.

8. A suitable number of casks (clean and sweet), to contain the beer.

9. One or more large funnels or tunners.

10. Two or more clean pails.

11. A hand-pump of a size proportionate to the brewing.

12. A mill, for crushing the malt. Brewers, for sale, are restricted by law to the use of mills with plain metal rollers.

These articles will vary in value from £10, upwards to many hundreds, or even thousands, according to the extent of the brewing; but the whole of them necessary for a private family may be bought for less than the former amount, as the mill, pump, &c., may then be dispensed with, and the rest may be of the simplest and least expensive character possible. By proper care they will last for 30 or 40 years, and still continue in a useful state.

Preliminary proceedings:—

The malt is chosen according to the intended character of the brewing—pale, amber, roasted, or any mixture of them, as the occasion may require. It is bruised or crushed in a mill (malt-mill) before employing it in brewing, that it may be the more readily acted on by the water. It should not be ground too small, as it would then make the wort thick, and cause it to run with difficulty from the mash-tun. The crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and be the more easily exhausted by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of good malt should measure 1¼ bushel when ground; and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing-mills furnished with plain iron rollers; on the small scale, by wooden rollers or mills worked by hand. For private brewing, the malt is generally bought ready crushed or ground, for convenience sake.

The hops, after being taken from the 'pockets' or 'bag,' are crumbled with the hands ready to be thrown into the copper. For general purposes those grown in Kent, and of the present season, are preferred. For the finer sorts of ale, East-Kent hops are commonly used; and when it is intended to keep the liquor for a long time, those known by the names of Country's, Alton's, or Farnham hops, are employed.

The quantity of hops required by a given measure of malt varies from 2 lbs. to 22 lbs. per quarter, according to the strength or gravity of the wort, the character of the beer intended to be brewed, and the climate which the beer may have to sustain. Export beer requires, as a rule, an exceptionally large amount of hops to enable it to bear without injury the heat of the country to which it is shipped. The following are the usual proportions:—

	Hops.	Malt.
Table beer	2 lbs.	1 qr.
Mild ale or porter	4 „	1 „
Brown stout	5 „	1 „
Scotch ale (best)	5 „	1 „
Strong ale (ordinary)	5½ „	1 „
„ (keeping)	8 „	1 „
Bitter ale.	10 to 14 „	1 „
East India ale (export)	12 „ 22 „	1 „

When a strong, coarse hop is used, a less quantity suffices for the same strength brewed, but the flavour is always inferior.

The water, which should be clear, and free from all traces of decomposing animal and vegetable matter, must be provided in abundance. Of late years hard water has been preferred by many brewers, on the ground that beer brewed with it is self-fining, and hence requires no artificial clarification either in the vat or cask. The water at Burton-on-Trent, a place celebrated for its ales, is of this class.

The yeast must be sweet and good; and all the vessels and utensils perfectly sweet and clean. If the latter be neglected, even the most skilful brewing will prove a failure.

Process of brewing:—

1. MASHING:—The ground or bruised malt placed in the mash-tun is macerated for some time in hot water, and the infusion (wort) drawn off from a hole in the bottom, over which a strainer or false bottom is placed, to prevent the malt passing out along with the liquor. During the process of mashing a peculiar principle contained in the malt, called diastase, reacts upon the starch with which it is associated, and converts it into grape-sugar. The more completely this conversion is effected, the richer will be the resulting wort in sugar or saccharine, and the stronger and more alcoholic the beer produced by its fermentation. It is, therefore, a desideratum with the brewer to mash at the temperature which most fully promotes this important object. The best temperature for this purpose ranges between 150° and 170° Fahr. When more than one mash is made, the first should be something lower than the first-named temperature; the second may be from 175° to 185°; and the third as high as 200° F.

If the first mashing has been rightly conducted, the whole of the starch should be con-

verted into sugar, and the action of the second and third mashings is merely to wash out any of the remaining saccharine matter still adhering to the crushed grains.

In practice, as soon as the water in the copper acquires the temperature of 170°, 45 galls. are run into the mash-tun, and 1 quarter of crushed malt gradually added to it. The whole is now thoroughly mixed with the mash liquor, by means of oars, or machinery, the agitation (mashing) being continued for 30 or 40 minutes, when 36 galls. more water from the copper are added, and the whole again well agitated, as before. The mash-tun is now closely covered up, and the mash allowed to repose for about two hours, in order that the 'diastase' may exert its saccharifying power upon the unconverted starch of the malt. At the end of this time the tap is set, and the wort run into the 'underback.' It generally amounts to about 50 galls. The second mash is then made with about 60 galls. of water, at 185° F., and the whole process repeated as before. After an hour, the liquor is drawn off, and the malt drained ready for the third mash. This time, only 35 galls. of water are added at 200° F., and the whole is seldom allowed to stand longer than half an hour. It is then run off, and the malt allowed to drain as dry as possible.

In some cases, the worts of the first and second mashes only are used for strong beer; that of the third mashing being kept for table beer, or as liquor to mash a fresh quantity of malt.

Pale malt and mixtures of malt and raw grain should be mashed for a longer time, and at a somewhat lower temperature than brown or high-dried malt.

Instead of making second and third mashes as above described, it has long been the practice in Scotland, and is now becoming common in England, to sprinkle the surface of the grains in the mash-tun with water, at or about the temperature of 180° F., by means of a simple revolving instrument termed a 'sparger,' and to let the liquor drain through the goods and run off by the tap with the last portions of the first wort. By this means the whole surface of the grain is continuously and regularly sprinkled with hot water.

When sugar is used, it may be either mixed with the malt in the mash-tun, at the time of mashing, or put into the underback, just before setting the taps, and the hot wort run upon it. The proportions of malt and sugar vary, according to the quality of the latter, but, on an average, from 170 lbs. to 200 lbs. of good raw sugar may be taken as the equivalent of a quarter of malt.

2. Boiling:—The wort is next transferred from the underback to the copper, and heated to the boiling-point as soon as possible, the object of this expedition being to prevent the formation of acid in the wort, by exposure to the air, before undergoing the changes which take place in the copper. As soon as the boiling of the wort commences the hops are added, and the boiling is continued for about 2 or 2½ hours. A longer boiling is highly objectionable, owing to the extraction of a heavy, resinous bitter from the hop, and the danger of losing the volatile oil upon which the aroma depends. For mild beers the worts are seldom boiled so long; for strong keeping ales, sometimes a little longer. The boiling is known to be completed when the liquor 'clears,' as it is called, and albuminous flocks sink to the bottom of the copper.

The hops, strained from each wort, are returned into the copper with the following one.

The average loss by evaporation in the process of boiling varies from ⅓th to ¼th of the original bulk of the wort. The gravity increases at the same time in about the ratio of 5 to 4; so that, if the gravity be, at first, say 32 lbs. per barrel, it will at the end of the operation have risen to about 40 lbs.

3. Cooling:—The wort, under the common system, is 'run off' from the copper into the 'hop-back,' through a strainer which keeps back the hops. It is then pumped into large square shallow vessels called 'coolers,' where it is freely exposed to a current of air to reduce its temperature as quickly as possible, in order to avoid acidity or 'souring.' In 6 or 7 hours, or sooner, the temperature should fall to about 60° Fahr. In warm weather the depth of the liquor in the coolers should not exceed 3 or 4 inches; and in cold weather, not more than 5 or 6 inches. As soon as the temperature has fallen to about 60° the liquor is 'tunned' and 'yeasted.'

The loss by evaporation and condensation in the coolers, varies from 13 to 18 galls. per quarter.

4. Fermentation:—The cooled wort is next run into the fermenting tuns or vessels (gyle-tuns). In small brewings these may be casks, with one of their heads removed; but under any form they must not be more than ⅔ds filled. The yeast, previously mixed with a little wort, and kept until the whole has begun to ferment (technically termed 'lobb'), is now added, and after agitation, the vessel is covered up, and kept so, until the fermentation is well established. By this time the temperature has risen from 9° to 15°.

The quantity of yeast employed, and the temperature of the wort when it is added, differs in different breweries and for different kinds of beer. It seldom exceeds 2 lbs. per barrel, unless the weather is unusually cold, or the yeast old or stale, when a larger proportion is required. The Scotch brewers generally take only 1 gal. of yeast to fully 4 hhds. of wort.

In England, the temperature at which the yeast is added, varies from 55° to 65° Fahr. In Scotland, the common temperature is 51° to 52°. In cold weather, the heat may be 5° or 6° higher than in mild and warm weather.

and a little more yeast may also be advantageously employed. In cold weather, ale is commonly tunned at 60°, porter at 64,° and weaker beers at 65° or 70° Fahr. In 'warm weather,' strong beer should be 4° or 5°, and other beers 7° or 8° cooler than the 'heats' just mentioned. On the small scale, 1 to 1¼ pint of yeast may be used to every barrel of strong-beer wort, and ¾ pint to every barrel of mild-beer wort.

The commencement of the fermentation is indicated by a line of small bubbles forming round the sides of the tun, and in a short time extending over the whole surface. A 'crusty head' soon forms, and then a 'fine rocky head,' followed by a 'light frothy' one. At length the 'head' assumes a yeasty appearance, the colour becomes yellowish-brown, and a vinous odour is developed. As soon as this last head begins to fall, the tun is skimmed every 2 or 3 hours, until no more yeast is formed. The object of this is, not only to check the violence of the fermentation, but also to remove a peculiar bitterness, with which the first portion of the yeast is impregnated. The beer is then put into casks, or 'cleansed,' as it is called. A minute attention to every stage of this process is necessary to secure a fine flavour and a brilliant beverage.

It may be regarded, as a rule, that the lower the temperature, and the slower, more regular, and less interrupted the process of fermentation, the better will be the quality of the brewing, and the less likely to change by age. A little more yeast is required in winter than in summer. When the fermentation becomes slack in the 'gyle-tun,' a little more 'lobb' is generally added, and the whole is well 'roused up.' On the contrary, if the temperature rises considerably, or the fermentation becomes too brisk, the wort is cooled a little and skimmed, or at once cleansed.

5. CLEANSING:—This consists in running the beer from the gyle-tun into casks, or other vessels, set sloping, so that the yeast, as it forms, may work off the one side of the top, and fall into a vessel placed below to receive it. In small brewings, the beer is often at once transferred from the gyle-tun to the 'store-casks,' which are sloped a little until the fermentation is over, when they are skimmed, filled, and bunged.

The process of cleansing is generally commenced as soon as the 'saccharine' in the fermenting wort falls to about 10 lbs. per barrel, a degree of attenuation which it usually reaches in about 48 hours. Some brewers add a little wheat-flour or bean-flour (about ¼ lb per barrel) to the beer in the gyle-tun, shortly before cleansing, to quicken the discharge of yeast; but it is not clearly ascertained whether such a plan is advantageous, or the contrary.

6. STORING:—As soon as the fermentation is concluded, which generally takes from 6 to 8 days, or longer, the clear liquor is pumped into the store-casks or vats, which are then closely bunged, and deposited in a cool cellar, if not already there, to mature. The preference, which at present exists in most parts of the United Kingdom, is for mild, freshly-brewed malt liquors; the good old or mature-vatted beer, being now seldom met with. This, of course, is a source of increased profit to the brewer, as it enables him to turn over his capital more rapidly, and saves the risk and expense attendant on long storage.

7. RIPENING:—After a period varying from one to twelve months, or longer, according to the nature of the brewing, and the condition of the cellar, the liquor will have become fine, and sufficiently mature for use. During this period the casks, &c., should be occasionally examined to see that there is no leakage, and to open the vent-holes, should any oozings appear at the joints. As equable a temperature as possible should be maintained in the cellar, by ventilation, on the one hand, and the employment of artificial heat on the other, as circumstances and seasonal changes may render necessary.

8. FINING or CLARIFYING:—Beer which has been badly brewed or badly stored, or which from other causes may be thick or muddy, requires clarifying by artificial means. For a barrel about 1 to 1½ pint of brewer's finings (isinglass or fish-gelatine dissolved in sour beer) is put into a bucket, and some of the beer being gradually added, the whole is violently agitated with a whisk until a frothy head is formed. The mixture is then thrown into the cask of beer, and well 'rummaged up,' after which the bung is replaced, and the liquor allowed to repose for a week or ten days.

Sometimes the above method is found to fail with weak and bad-conditioned beer. When such is the case, the addition of a teaspoonful of sulphuric acid, or a table-spoonful of powdered catechu (previously dissolved in ½ a pint of boiling water), followed by agitation for a quarter of an hour, will generally cause the 'finings' to clarify the liquor; 2 or 3 oz. of tincture of catechu (mixed with a little water) may be used in the same way. A handful of hops, previously boiled for five minutes in a little of the beer, and then added to the barrel, and the whole allowed to stand for a few days, before proceeding to clarify it, will generally have a similar effect, and cause the 'finings' to act with certainty. It is the absence of the proper quantity of astringent matter in beer that usually renders them ineffective.

Gen. commentary. The preceding is a concise account of all the essential operations of the system of brewing at present practised in this country. On the large scale, extensive and costly apparatus and machinery are employed for the purpose. On the small scale, various modifications, of a minor character, or the several processes herein detailed, are frequently adopted, according to the circum-

stances or ingenuity of the operator. The principles and practice of brewing beer are, however, essentially the same under all the conditions here referred to. In Scotland, only one mash is made, and that at a temperature of about 180° Fahr., with one third of the quantity of the water required for the brewing. The 'mash-tun' is then covered up for about half an hour, when the wort is drawn off, and the operation of 'sparging' begun. This operation is continued until the density of the mixed worts becomes adapted to produce the quality of the ale then under process of manufacture. The 'gyle-tun' (fermenting-tun) is set at from 50° to 60° Fahr., the fermentation being continued slowly for fifteen to twenty days; and the ale is not 'cleansed' before the degree of attenuation falls to about ½ lb. per day, and not more than one fourth of the original gravity of the wort remains. Scotch ale is justly celebrated for its superior quality. Its usual original gravity is from 34 to 45 lbs. per barrel.

In Bavaria, a country remarkable for the excellence of its beer, the wort is made to ferment at a low temperature, until all the substances which favour acetification have been rendered insoluble, and have separated from the liquor. The fermentation is conducted in wide, open, shallow vessels, which afford free and unlimited access to atmospheric oxygen; and this in a situation where the temperature does not exceed 45° to 60° Fahr. A separation of the nitrogenous constituents thus takes place simultaneously on the surface, and within the whole body of the liquid. The clearing of the fluid is the sign by which it is known that these matters have separated. The fermentation usually occupies three or four weeks, and is conducted during the cooler portion of the year only, and in a situation removed as much as possible from the influence of atmospherical changes of temperature. The sedimentary yeast (unterhefe), and not the surface yeast (oberhefe), of the Bavarian fermenting backs, is employed.

The beers of England and France, as well as most of those of Germany, become gradually sour by contact with the air. This defect, as observed by Liebig, does not belong to the beers of Bavaria, which may be preserved, at pleasure, in half-full casks, as well as in full ones, without suffering any material alteration. This precious quality must be ascribed to the peculiar process employed for fermenting the wort, called by the German chemists 'untergährung,' or fermentation from below; and which "has solved one of the finest theoretical problems that had long taxed the ingenuity and patience of both the scientific and practical brewer." (Liebig.)

In the ordinary fermentation of grape-juice and worts, these liquids do not furnish a quantity of alcohol equivalent to the sugar which they contain; and this because a certain portion of the sugar serves for the oxidation of the gluten, and is not transformed like the rest. But wherever the liquor has arrived at the second period of transformation, the product in alcohol ought to be equivalent to the quantity of sugar present, as actually happens in all fermentations (sedimentary) which are not accompanied with a formation, but a disappearance of the yeast. According to Dr. Ure, worts furnish, in the Bavarian breweries, from 10% to 20% more alcohol than they do by the ordinary process of fermentation (obergährung), or that excited by the use of 'oberhefe' or top-yeast.

East-India Ale or Pale Ale, for exportation, is brewed from worts of a sp. gr. of from 1·060 to 1·070. For the best varieties, 15 to 16 lbs. of the finest East Kent hops are used to every quarter of pale malt. The pale ale or bitter beer of the publicans is commonly a very weak liquor (mere table beer), highly bittered with the hop, and too often with quassia, wormwood, and other still more objectionable substances. The process now adopted by the great brewers of pale ale at Burton-on Trent, combines all the most admirable points of both the Bavarian and Scotch systems of brewing.

Berlin White ale or Pale beer is brewed from wheat-malt mixed with about ⅓th part of barley-malt, the 'wort' being boiled with hops, ½ lb. to the bushel, and slightly fermented with 'top-yeast,' at a rather higher temperature.

The desire of evading the duty led to the discovery of its being only necessary to employ ⅓rd, or less, of the grain, in the form of malt; this portion being sufficient to convert into sugar, in the process of mashing, the starch of the unmalted grain forming the other part. This plan answers well when the wort is merely intended for the production of 'grain spirit;' but beer so made is insipid and inferior in quality to that brewed wholly of malt. Inferior kinds of beer have also been made from other ingredients than barley-malt, among which may be named the grain of the cheaper cereals, bran, potatoes, turnips, beet-root, carrots, parsnips, pea-shells, and other vegetable substances rich in starch and sugar, all of which will produce beer by being mashed with water in the common way, with about 9% or 10% of barley-malt.

One quarter of the best barley-malt yields, by skilful mashing, fully 84 lbs. of 'saccharine,' or soluble sweet extractive matter. This concentrated within the compass of one barrel (36 galls.), gives a sp. gr. of 1·234. In the process of mashing about ⅔ths of this quantity of saccharine (or 48 lbs.) is generally carried off in the first wort; ⅓ths (or 24 lbs.) in the second wort; and ⅙th (or 12 lbs.) in the third wort; the strengths of the worts being to each other respectively as 4, 2, 1. The average gravity obtained by the common brewers from malt of current quality, ranges from 80 to 81 lbs. Sugar may be used as a partial sub-

stitute for malt, with, in most cases, some degree of saving to the brewer, and without injury to the quality of the beer. The kind of sugar to be used will depend on the quality of the beer to be brewed, but it should be remembered, that a bad sugar will not, any more than bad malt, yield a sound palatable beer. From 170 lbs. to 200 lbs. of good raw sugar may be taken as the average equivalent of a quarter of malt.

When the process of mashing has been properly conducted, the wort, after leaving the cooler, should not be turned blue by tincture of iodine, or by iodide of potassium added along with a little acid. If it turns blue some of the starch has escaped conversion into sugar, and is dissolved in the liquor.

By multiplying the decimal part of the number representing the specific gravity of a wort by 360 (the weight in pounds of a barrel of pure water), we obtain the quantity of saccharine, per barrel, corresponding to the given sp. gr.; and by dividing the joint weight of saccharine and water, per barrel, by 360, we obtain the specific gravity. Thus—

Suppose a sample of wort to have a specific gravity of 1·055, then—

Decimal of sp. gr. ·055 × 360 = 19·8 lbs. per barrel.

Again, a barrel of wort weighs 379·8 lbs., that is, 360 lbs., for the weight of a barrel of water, and 19·8 lbs. for the weight of saccharine in the water, then—

297·8 ÷ 360 = 1·055 specific gravity.

It is usually stated in works on brewing that certain temperatures must be reached by each variety of beer, during the progress of the fermentation, in order for the liquor to acquire its characteristic flavour. Thus, it is stated, that—mild beer begins to acquire flavour when the heat of fermentation arrives at 75° Fahr., increases at 80°, and is highest at 90°, but sometimes even reaches 100°. Old ale is said to obtain its best flavour at a temperature not exceeding 75°; and porter at 70° Fahr. In order to reach these temperatures, the worts are directed to be set at from 10° to 15° lower, the rise being due to the heat generated during the fermentation. That these statements refer principally to the old methods of brewing is shown by the fact, that some of the brewers of Bavaria, Scotland, and Burton-on-Trent, produce rich and high-flavoured liquors at temperatures vastly below those above enumerated. Still, however, the fact must not be concealed, that since the introduction of the new German system of brewing into England, the general character of its beers, as they reach the consumer, are inferior in strength and flavour to those of a former period. We may now seek almost in vain for the fine vinous, high-flavoured, invigorating old beers vended in our early days by the common publicans and tavern-keepers, of whom the larger majority were their own brewers. Under the new system of chemical brewing, as worked by those huge monopolists, the 'great brewers,' the only object appears to be to obtain the largest quantity possible of saccharine out of the quarter of malt, and to convert this into the largest possible quantity of beer, with little regard to flavour or quality, but an excessive one for their own profits. In due course this liquor is forced on their helpless tenants, the publicans, who, in their turn, 'reduce' and 'doctor' the liquor, until, by the time it reaches the consumer, its insipidity and low strength would have led even a brewer's drayman of the last century to cast it into the kennel.

The best times for brewing are the spring and autumn; as at those periods of the year the temperature of the air is such as to permit of the easy cooling of worts sufficiently low, without having recourse to artificial refrigeration, or to the use of machinery for the purpose. Old ale cannot be conveniently brewed in summer.

Beers are classed by the brewers into—

Small beers—made from worts not exceeding the sp. gr. 1·025, or 9 lbs. per barrel.

Middlings—made from worts of the sp. gr. 1·030 to 1·050, and averaging about 14 lbs. per barrel.

Strong beers—made from worts of the sp. gr. 1·040 to 1·080, extending from about 35 lbs. per barrel upwards.

The densities of the worts employed for different kinds of beer vary considerably, as will be seen by the following table:—

TABLE *of the Densities of Beers.*

Description.	Pounds per barrel.	Specific gravity.
Burton ale, Class 1	40 to 43	1·111 to 1·120
„ „ 2	35 „ 40	1·097 „ 1·111
„ „ 3	28 „ 33	1·077 „ 1·092
Ordinary ale . .	25 „ 27	1·070 „ 1·075
Common „ . .	21	1·058
Scotch ale, Class 1	40 to 44	1·111 to 1·122
„ „ 2	33 „ 40	1·092 „ 1·111
Porter (ordinary) .	18	1·050
„ (good) . .	18 to 21	1·050 to 1·058
„ (double) . .	20 „ 22	1·055 „ 1·060
Brown stout . .	23	1·064
„ (best)	26	1·072
Table beer . . .	12 to 14	1·033 to 1·039
Small „ (com.) .	6	1·017

EXPORTATION OF BEER:—When beer is exported from any part of the United Kingdom, either as merchandise or ships' stores, the brewer or exporter of such beer is allowed a certain drawback of duty. The amount is

proportional to the quantity of malt or sugar, inferred to have been used in the brewing of the beer. Thus, if the original specific gravity of the worts from which the beer was brewed were not less than 1·040, a drawback is granted of 4*s.* 3*d.* per barrel. This is equivalent to a return of the duty on 1½ bushels of malt, with an allowance of 3*d.* for licence duty, now charged in lieu of the abolished hop duty. For every additional 5 degrees of specific gravity, from 1040° to 1125° inclusive, a further sum of 6*d.* per barrel is allowed.

[For further information connected with the above subject, the reader is referred to the separate articles—ALE, BEER, DEXTRINE, DIASTASE, FERMENTATION, MALT LIQUORS, PORTER, SACCHAROMETER, SPECIFIC GRAVITY, WORT, YEAST, &c.]

Brewing Uten'sils. The cleansing and preservation of brewing utensils, beer casks, &c., has frequently engaged the attention of practical men and brewers' chemists. To preserve them sweet they should always be thoroughly cleaned before setting them aside. Contact with soap, or any greasy material, should be carefully avoided. A scrubbing-brush and scalding-hot water are generally sufficient to clean them. Great care should be taken to remove every particle of yeast or fur on the sides and bottom; and after being well-drained, they should be stowed away in some clean and cold situation, properly exposed to the fresh air. Should they become tainted or mouldy, a strong lye of pearl-ash, common salt, or quicklime, may be spread over them, scalding hot, with a broom or scrubbing-brush. Washing them with oil of vitriol diluted with about 7 or 8 times its bulk of water, is another excellent and very effective method. Fresh-burnt charcoal has also been employed for the same purpose. In each case the vessels must be subsequently thoroughly washed out with clean water, as before. Steam, assisted by the action of a chain, has been successfully applied to clean casks in several breweries. Bisulphite of lime has, within the last few years, been highly recommended for sweetening and cleaning vats, casks, &c. It is also said to prevent beer from developing acidity. See CASKS, VATS, &c.

BRICKS. Brick-making scarcely comes within the province of this work. In connection with hygiene, however, we may call the reader's attention to the superior advantages of both hollow and waterproof bricks; the first, for ventilation and lightness; the last, for preserving the dryness and integrity of our homes under all the vicissitudes of climate, season, and weather, either on damp soils or dry ones. Workman's "Patent Waterproof Bricks" received a strong commendatory notice from the Commissioners of the "Great International Exhibition" of 1851.

BRINE (for Meat). *Prep.* 1. A nearly saturated solution of common salt, 1 lb.; and saltpetre, 1 oz.; in soft water.

2. To the last, add of sugar or treacle, ½ lb. Bay-salt is recommended when the meat is to be kept for a very long period. See PICKLING, &c.

Brine, Red-Cabbage. Red-cabbage leaves steeped in a strong solution of common salt. *Used* as a test for acids and alkalies.

Brine, Vi'olet. From the petals of the blue violet, as the last. *Used* as a test for acids.

BRIOCHE' PASTE (bre-ōsh'). In *cookery*, a species of paste, or crust, prepared of eggs and flour, fermented with yeast, to which a little salt, a large quantity of sugar, and about half as much butter as the weight of the flour used, are afterwards added, and well worked in. *Used* as an addition to soup, and as a casing for lobsters, patties, eggs, &c.

BRISK'NESS. The natural briskness and sparkling of fermented liquors depends on the gradual evolution of carbonic acid gas within the body of the fluid, by the process of fermentation. See MALT LIQUORS, PORTER, WINES, &c.

BRIS'TLES (bris'lz). The stiff hair of swine, &c. They are commonly stiffened by immersion for a short time in alum-water; and are dyed by steeping them for a short time in any of the common dyes used for cotton or wool.

BRITAN'NIA METAL (-y'ă). *Syn.* TUTA''NIA. A superior species of pewter, used for teapots, spoons, &c.

Prep. 1. Plate-brass, bismuth, antimony, and tin, equal parts, melted together, and the resulting alloy added at discretion to melted tin, until it acquires the proper degree of colour and hardness.

2. To the first alloy, prepared as in No. 1, add ½th of its weight of metallic arsenic, before mixing it with the melted tin.

3. Antimony, 1 part; brass, 4 parts; tin, 5 or 6 parts; melted together. See ALLOYS, QUEEN'S METAL, PEWTER, &c.

BRIT'ISH GUM. See GUMS.

BRITISH WINES. See WINES.

BROC'COLI. [Eng., L., Ger.] *Syn.* BROCOLI, Fr.; BROCCOLO, It. A well-known subvariety of cauliflower. The qualities, and the mode of dressing broccoli, are similar to those of cabbages, noticed elsewhere. See VEGETABLES (Culinary), &c.

BRO'MA. *Prep.* 1. Pure cocoa, 1 lb.; sugar and sago-meal, of each, 4 oz.; mix. British arrow-root (*i. e.* carefully prepared potato-starch) is often substituted for the sago.

2. As the last, but using fine wheat-flour, in lieu of sago-meal. Made into a beverage in a similar way to cocoa.

BRO'MIDE (-mīd). *Syn.* BRO'MURET*, HYDROBRO'MATE*; BROMI'DUM, BROMURE'TUM, HYDROBRO'MAS, L.; BROMIDE, BROMURE, Fr. A chemical compound of bromine with another radical.

Prop., &c. The soluble bromides give white precipitates with nitrate of silver, acetate of lead, and protonitrate of mercury.

mersion. Used for binding screws, holders, and other small articles of copper and brass.

10. Sulphate of iron and sulphate of copper, of each, 1 oz.; water, 1 pint; dissolve; wash the surface of the articles with it; let them dry; then apply a solution of verdigris, 2 oz.; dissolved in strong vinegar, ¼ pint; when dry, polish them with a soft brush, and either some plumbago or colcothar. Used for tin castings.

11. The articles (properly cleaned) are either immersed in, or washed over, with a solution of sulphate of copper or of verdigris. In a short time they acquire a coating of pure metallic copper, and are then washed. This only answers with iron and steel goods. It is admirably suited for iron castings.

12. An antique appearance may be given to silver by either exposing it to the fumes of hydrosulphate of ammonia, or immersing it for a very short time in a solution of hydrosulphate of ammonia, or in dilute nitric acid.

Sur'face Bronzing. A term commonly applied to the process of imparting a bronze-like or metallic appearance to the prominent portions of the surfaces of figures made of paper, wood, plaster of Paris, &c. It is effected by first giving them a coat of oil-varnish or size, and when this is nearly dry, applying, with a 'dabber' of cotton, or a camel-hair pencil, any of the ordinary metallic bronze-powders before referred to. Sometimes the powder is placed in a little bag of muslin, and dusted over the surface. The articles should be afterwards varnished.

Paper is bronzed by mixing the bronze-powders up with a little weak gum-water, and burnishing the surface when dry and hard.

BROOM. The common name of the plant *spar'tium scopa''rium.*

Broom Ashes. From broom-stalks burnt. Formerly used as a diuretic in dropsy.

Broom, Salt of. Obtained by dissolving broom ashes in water, and filtering and evaporating the solution. It consists principally of carbonate of potassa. It was formerly used in dropsy, and as an antacid, &c.

BROSSE DE CORAIL. [Fr.] The root of lucerne (*medica'go sati'va*), cleaned, dried, and hammered at the end. Used as a tooth-brush.

BROTH. *Syn.* Jus (coctis carnibus), Jus'culum, L.; Bouillon, Jus, Fr.; Fleischbrühe, Ger. In *cookery*, the liquor in which flesh has been boiled. Broth is distinguished from soup by its inferior strength and quantity of seasoning, &c. It contains much of the nutriment of the meat. See Boiling, Soup, &c.

BROWN DYE. Every shade of brown may be produced, almost at will, by mixtures of reds and yellows with blues and blacks, or directly by simple dyes. The following are examples:—

a. For Cotton:—

1. Give the goods a mixed mordant of acetate of alumina and acetate of iron, followed by a bath of madder or of madder and fustic. Excess of acetate of alumina turns it on the Amaranth tint; the acetate of iron darkens it.

2. First 'gall' the goods, then turn them for a short time through the black bath; next give them a mordant of sulphate of copper, then pass them through a decoction of fustic, afterwards through a bath of madder, and again through the solution of sulphate of copper; drain, dry, rinse well, and finish with a boil in soap and water. This gives a Chestnut-brown.

3. First give the goods a mordant of alum, then a bath of madder, and next a bath of fustic to which a little green copperas has been added. This gives a Cinnamon-brown.

b. For Linen:—This varies little from that commonly employed for cotton.

c. For Silk:—

1. One of the above mordants is followed by a bath made by mixing equal parts of the decoctions of logwood, fustic, and Brazil-wood. The shade may be varied by altering the proportions of the decoctions; Brazil-wood reddening, logwood darkening, and fustic yellowing, the tint.

2. Annotta, 4 oz.; and pearlash, 1 lb.; are dissolved in boiling water, q. s.; the silk is passed through it for two hours, then taken out, and squeezed dry; it is next passed through a mordant of alum, and then through a bath of Brazil-wood, followed by another of logwood to which a little green copperas has been added.

d. For Wool:—

1. Boil the cloth in a mixed mordant of alum, common salt, and water, then dye it in a bath of logwood to which a little green copperas has been added. 2 oz. of alum, and 1 oz. of salt, are required for every lb. of wool.

2. Boil the goods in a mordant of alum and sulphate of iron, then pass them through a bath of madder. The more copperas the darker will be the die. Good proportions are 2 parts of alum and 3 of copperas.

3. Give a mordant of alum and tartar, then pass the goods through a madder bath; next run them through a bath of galls and sumach or logwood to which a little acetate or sulphate of iron has been added.

4. Mordant the cloth as last, dye in a madder bath, remove the cloth, add a little acetate or sulphate of iron, and again pass it through the bath, as long as necessary.

5. Give the cloth a light blue ground with indigo, and then a mordant of alum; rinse, and lastly run it through a bath of madder.

6. A mordant of alum and tartar, followed by, first a bath of madder, and afterwards a bath of weld or fustic to which a little iron-liquor has been previously added. In this way every shade, from Mordoré and Cinnamon to Dark Chestnut, may be produced.

7. Boil fustic-chips, 1 lb., for 2 hours; pass

the cloth through the bath for 1 hour; take it out and drain; add of green copperas, 1½ oz.; good madder, 4 oz.; boil for a short time, and again pass the cloth through the bath, until it acquires the proper tint. BRONZE-BROWNS, and every similar shade, may be thus given by varying the proportions.

e. The following are called SUB'STANTIVE or DIRECT BROWNS:—

1. *Decoction of oak-bark.* It dyes wool of a fast brown of various shades, according to the quantity employed. A mordant of alum brightens it.

2. *Infusion* or *decoction of walnut-peels.* Dyes wool and silk a brown, which is brightened by alum.

3. *Horse-chestnut-peels.* A mordant of chloride of tin turns it on the BRONZE; and sugar of lead, on the REDDISH-BROWN.

4. *Catechu* or *Terra Japonica.* For cottons. Blue vitriol turns it on the BRONZE, and green copperas darkens it, when applied as mordants. Acetate of alumina as a mordant brightens it. The French colour, CARMELITE, is given with 1 lb. of catechu, 4 oz. of verdigris, and 5 oz. of sal-ammoniac.

5. *Sulphate or chloride of manganese.* Dissolved in water with a little tartaric acid, it gives the bronze tint called SOLITAIRE. The stuff, after being passed through the solution, is turned through a weak lye of potash, and afterwards through another of chloride of lime, to heighten and fix it.

6. *Prussiate of copper.* This gives a fine BRONZE or YELLOWISH-BROWN to silk. A mordant of blue vitriol is commonly first given, followed by a bath of prussiate of potash.

BROWN PIG'MENTS. The principal and most useful of these are—*umber*, *terra di Sienna* (both burnt and raw), *Spanish brown*, and some of the *ochres*. Brown, of almost any shade, may be made by the admixture of blacks with reds and yellows, or with greens, in different proportions. See BISTRE, NEWCASTLE-BLACK,[1] OCHRES, SEPIA, &c.

Span'ish Brown. See OCHRES.

BROWN PINK. See YELLOW PIGMENTS.

BROWN'ING. In *cookery*, a fluid preparation used to colour and flavour gravies, soups, &c.

Prep. 1. Sugar, 4 oz.; and butter, 1 oz.; are melted in a frying-pan or ladle with about a tablespoonful of water, and the heat is continued until the whole has turned of a deep brown; the heat is then lowered a little, and some port wine (about 1 pint) is gradually poured in; the pan is now removed from the fire, and the mixture well stirred until the roasted sugar is entirely dissolved; it is then put into a bottle, and ½ oz. each, of bruised pimento and black pepper, 5 or 6 shalots (cut small), a little mace and finely grated lemon-peel, and ¼ pint of mushroom catsup, added. The bottle is shaken daily for a week, and the clear liquid, after 5 or 6 days' repose, decanted into another bottle. Rich-flavoured, but expensive.

2. As the last, but using strong beer, or water, instead of wine. A glassful of spirit may be added after bottling it.

3. Sugar-colouring 1 pint; salt, ¼ lb.; mushroom-catsup, ½ pint; spice, q. s. Excellent for all ordinary purposes.

4. Lump sugar (powdered), 2½ lbs.; salad oil, ½ lb.; heat as before; then add, of port wine, 1 quart; Cape wine, 3 quarts; shalots, 6 oz.; mixed spice, 4 oz.; black pepper, 3 oz.; mace, 1 oz.; salt, 1 lb.; lemon juice, 1 pint; catsup, 1 quart; mix well.

5. Good spirit-colouring or sugar-colouring and mushroom-catsup, of each, 1 gal.; Jamaica pepper, black pepper, and shalots, of each, 4 oz.; cloves, cassia, and mace, bruised, of each ¾ oz.; boil in a covered vessel for 5 minutes; digest for 14 days, and strain.

6. Colouring, 3 pints; mushroom-catsup, 1 pint; common salt, ¾ lb.; Chili vinegar, (strongest) ½ pint; spice, q. s. Half a pint of British brandy or rum may be added.

Obs. The above are excellent additions to gravies, soups, &c.; and of themselves form most admirable sauces for fish, meat, and game.

Browning (for Gun-Barrels). *Prep.* The following are current formulæ:—

1. Blue vitriol, 4 oz.; tincture of muriate of iron, 2 oz.; water, 1 quart; dissolve, and add aquafortis and sweet spirit of nitre, of each, 1 oz.

2. Blue vitriol and sweet spirit of nitre, of each, 1 oz.; aquafortis, ½ oz.; water, 1 pint; as last.

3. Butter of antimony and sweet oil, equal parts; well shaken together. To be applied to the iron previously warmed.

Obs. The above fluids are rubbed on the barrel (previously well polished and cleaned off with whiting to remove the oil), and allowed to remain on for some hours, or until the next day, when they are rubbed off with a stiff brush. The process may be repeated, if necessary. The barrel is next washed in water in which a little pearlash or soda has been dissolved, and afterwards well rinsed in clean water; it is then polished, either with the burnisher, or with a brush and bees' wax. Sometimes a coat of tough shellac varnish is applied.

BRU'CEA* (-sh'ă). False cusparia (which *see*).

BRU'CIA. $C_{23}H_{26}N_2O_4 . 4$ Aq. [Eng., Fr.] *Syn.* BRU'CINE; BRU'CINA, L. An alkaloid discovered, by Pelletier and Caventou, in the bark of *brucia antidysenter'ica*, and afterwards associated with strychnia, in *nux vomica*.

Prep. Ground nux vomica, or the bark of brucia antidysenterica, is boiled in dilute sulphuric acid, and the resulting decoction mixed with hydrate of lime (in excess); the crude precipitate thus obtained is boiled in alcohol (sp. gr. ·850), and the tincture filtered whilst

[1] Under BLACK PIGMENTS.

hot. A mixture of crude strychnia and brucia is deposited as the fluid cools, and the remainder is obtained by evaporation. This is powdered and digested in cold alcohol, which dissolves out the brucia; the solution furnishes crystals on spontaneous evaporation. It may be further purified by re-crystallisation from alcohol.

Prop. Soluble in 850 parts of cold, and about 500 parts of hot water; freely soluble in alcohol; added to the dilute acids until they are neutralised, it forms crystallisable salts, easily obtained by evaporation.

Tests. It is distinguished from strychnia, which in many respects it resembles, by its ready solubility in both dilute and absolute alcohol, and its insolubility in ether. With nitric acid it strikes a fine red colour, which is removed by sulphuretted hydrogen and sulphurous acid. Iodic acid, chloric acid, and chlorine, also turn it red.

BRUISE (brōōze). *Syn.* CONTU'SIO, CONTU'SUM, L.; CONTUSION, MEURTRISSURE, Fr.; BRAUSCHE, QUETSCHUNG, &c., Ger. A contusion; but in popular language applied chiefly to cases in which there is an extravasation of blood owing to the rupture of the minute vessels, with consequent discoloration or tumefaction of the part.

Treatm. In common cases, sufficiently serious, bruises may be rubbed with a little opodeldoc or soap-liniment; or, if the inflammation be considerable, they may be bathed with a little weak goulard water, or with vinegar and water. In more severe cases leeches may be applied. See CONTUSION.

BRUNS'WICK BLACK. See VARNISHES.

BRUNS'WICK GREEN. See GREEN PIGMENTS.

BRY'ONIN (-nĭn). A peculiar bitter principle extracted from the root of white bryony (*bryonia dioica*, Jacq.). It is obtained from the dry extract of the expressed juice, by solution in alcohol, filtration, and cautious evaporation.

Prop., &c. A yellowish-white mass. It is a drastic purgative; and, in large doses, poisonous. It enters into the composition of several quack medicines.

BUBBLE-AND-SQUEAK. In *cookery*, a species of olla podrida variously prepared, as the materials and fancy of the maker dictate.

Prep. (Rundell.) Take slices of cold meat, fry them quickly until brown, and put them into a dish to keep them hot. Then clean the pan from the fat; put in it greens and carrots (previously boiled and chopped small); add a little butter, pepper, and salt; make them very hot, and put them round the beef with a little gravy. Cold boiled pork is a better material for bubble and squeak than beef. In either case the slices should be very thin and lightly fried.

BUB'BLE FEVER‡. See PEMPHIGUS.

BU'CHU (-kū). The plant *dios'ma crena'ta* (which *see*).

BUCK'THORN. *Syn.* RHAM'NUS, L. The *rham'nus cathar'ticus* (Linn.). Berries (BAC'CÆ RHAM'NI, L.), cathartic; juice of the berries (SUC'CUS R., L.) is officinal in the B. P. See RHAMNINE, SYRUPS, &c.

BUCK'WHEAT. See WHEAT.

BUG. *Syn.* CI'MEX, L.; PUNAISÉ, Fr.; WANZE, Ger. A name popularly and very loosely applied to a vast number of insects that infest houses and plants; in *zoology*, hemipterous insects of the genus 'cimex,' of which there are many hundred species; *appr.*, the bed-bug.

Bug. *Syn.* BED'-BUG, HOUSE'-B., WALL-B., WALL'-LOUSE*, &c.; CI'MEX DOMES'TICUS, C. LECTULA''RIUS (Linn.), L.; PUNAISE, Fr.; BETTWANZE, HÄUSWANZE, Ger. An insect too well known in all the larger towns of Europe and America, and in the huts of squalid poverty everywhere, to require a description here. It is almost the only species of the bug-kind that has undeveloped wings. Its introduction to England is believed to have occurred soon after the great Fire of London (A.D. 1666). Human blood appears to be its favourite food; but it will also eat grain, seed, flour, dried paste, size, soft deal, beech, osier, &c. Cedar, mahogany, and the odorous and harder woods, are usually avoided by this insect. Aromatics, perfumes, and strong odours generally, are unfavorable to its propagation.

Exterm., &c. Various means have been adopted to prevent the accession, and to destroy or drive away, these enemies of "tired nature's sweet restorer, balmy sleep." Among the most certain of these is thorough cleanliness, and ventilation. The furniture brokers put articles infested with these insects into a room with doors and windows fitting quite close, and subject them to the fumes of burning sulphur or chlorine gas. In the small way, poisonous washes are commonly resorted to. For this purpose nothing is more effective than chloride of lime or chloride of zinc; the latter being preferable to the other on account of its being comparatively scentless.

The following mixtures are in common use, or have been recommended for this purpose:—

1. Corrosive sublimate (in powder) and hydrochloric acid, of each, 1 oz.; hot water, ¼ pint; agitate them together until the first is completely dissolved. It is applied with a paint-brush, observing to rub it well into the cracks and joints. This is the common 'bug wash' of the shops. It is a deadly poison!

2. As the last, but substituting 2 oz. of sal-ammoniac for the hydrochloric acid.

3. Oil of turpentine, 1 pint; camphor, 2 oz.; dissolve. Very cleanly and effective.

4. Tobacco-water, made by steeping 2 oz. of good shag in 1 pint of warm water, for a few hours.

5. Crude pyroligneous acid.

6. Coal-tar naphtha. This, as well as No. 3 (*above*) should never be used by candle-light, as it is excessively inflammable. When the

smell of the common naphtha is objectionable, benzol or benzine may be used instead. The celebrated nostrum vended under the name of "Insecticide" is said to be nothing but benzol.

7. Sulphurated potash (in powder), 6 oz.; soft soap, ½ lb.; oil of turpentine, ¼ pint, or q. s. to make a species of soft ointment. The odour of the last three (Nos. 5, 6, 7) is rather persistent and disagreeable; but they are very effective.

8. Strong mercurial ointment, soft soap, and oil of turpentine, equal parts, triturated together. Rather greasy and dirty.

9. Scotch or Welsh snuff, mixed with twice its weight of soft soap.

10. Sulphur, or squills, in impalpable powder, blown into the cracks or joints, or scattered in a fine cloud, by means of a hollow ball or balloon of vulcanised India rubber filled with it and furnished with a small wooden jet or mouth-piece, or in any other convenient manner. Very cleanly and effective. Dumont's 'Patent Vermin Killer,' as well as the whole host of imitations of it, is of this kind.

Obs. Out of the above list there is ample room for selection. The common practice is to take the bedstead, or other piece of furniture, to pieces, before applying them.

These pests exist only in dirty houses. A careful housewife or servant will soon completely destroy them. The surest method of destruction is to catch them individually when they attack the person in bed. When their bite is felt, instantly rise and light a candle and capture them. This may be troublesome, but if there be not a great number a few nights will finish them. When there is a large number, and they have gained a lodgment in the timbers, take the bed in pieces, and fill in all the apertures and joints with a mixture of soft soap and Scotch snuff. A piece of wicker-work, called a BUG-TRAP, placed at the head of the bed, forms a receptacle for them, and then they may be daily caught till no more are left. Oil-painting a wall is a sure means of excluding and destroying them. It has been asserted that these insects are so fond of narrow-leaved dittany or pepperwort (*lepidium ruderale*), that if a bunch of it be suspended near their haunts, they will settle in it, and may be thus easily captured. It is said to be commonly used as a bug-trap in some of our rural districts. Water, poured boiling from the spout of a kettle into the cracks and joints, is a cleanly and certain remedy, which we have often seen employed; so also is a jet of steam; they are both destructive to all insects, and will be found particularly so to beetles.

The proper time for attacking these pests is early in March, or shortly before they are revived from their dormant state by the warm weather. See INSECTS.

Har'vest Bug. See ACARI.

BU'GLE (bu'gl). An elongated cylindrical glass bead. See BEAD.

BUN'ION (-yŭn). A species of corn or swelling on the ball of the great toe, resulting from pressure, and irritation by friction. The treatment recommended for corns applies also to bunions; but in consequence of the greater extension of the disease, the cure is more tedious. A bunion may often be effectually stopped and removed by poulticing it, and, at the proper time, carefully opening it with a lancet. See CORNS.

BUN. A well-known kind of light, sweet cake.

Prep. 1. BATH-BUNS:—As 6, but adding a little candied lemon and orange peel, and putting a little grated peel and a few caraway comfits on the top of each.

2. CROSS-BUNS:—Flour, 2½ lbs.; sifted sugar, ½ lb.; coriander seeds, cassia, and mace, of each (powdered), q. s.; make a paste with butter, ½ lb.; (dissolved in) hot milk, ½ pint; work with three table-spoonfuls of yeast; set it before the fire for an hour to rise, then make it into buns and set them before the fire on a tin for half an hour; lastly, brush them over with warm milk, and bake them to a nice brown in a moderate oven.

3. MADEIRA-BUNS:—Butter, 8 oz.; 2 eggs; flour, 1 lb.; powdered sugar, 6 oz.; half a nutmeg (grated); powdered ginger and caraway seeds, of each, ½ teaspoonful; work well together, then add as much milk as required, and ferment; lastly, bake on tins in a quick oven.

4. PLAIN BUNS:—Flour, 2 lbs.; butter, ¼ lb.; sugar, 6 oz.; a little salt, caraway, and ginger; make a paste with yeast, 4 spoonfuls, and warm milk, q. s.; as before.

5. PENNY-BUNS:—To the last add of currants, well washed, ½ lb.; and water, stained by steeping a little saffron in it, q. s. to give a light yellow tinge to them.

6. RICH BUNS:—Fine flour, 3 lbs.; sugar, 1 lb.; butter, 2 lbs. (melted, and beat with); rose water, 4 oz.; currants, 1 lb.; yeast, ¼ pint; as before.

Obs. The great secret in producing good buns is, the use of sweet yeast and the best currants only, and thoroughly washing these last in a sieve or colander, to remove grit, before adding them to the dough.

BURG'LARIES. The common precautions of locks and bolts, alarum-bells and fire-arms, are frequently found useless in preserving houses from burglars; but a light in the upper part of the house, or a small dog on the ground-floor, with the means of running into a place of safety from its enemies, has been seldom known to fail. A combination of the two would undoubtedly be doubly effective. The bark of the dog, and the fear of detection by the approach of the light, would deter the majority of rogues of common pluck and feeling. A dog out of doors, and consequently accessible, however large and fierce, is easily pacified or silenced by men of the class referred to.

BURNS[1] and **Scalds.**[2] *Treatm.* When the injury is superficial and slight, a little creosote may be applied to the part. If a scald, the vesicle should be first pierced with a needle, or what is better, snipped with a pair of scissors, and the water which it contains should be then gently squeezed out. When creosote is not procurable, a liniment formed of equal parts of soft soap, basilicon ointment, oil of turpentine, and water, may be used instead. When the part feels very hot and painful, a poultice may be applied, on the surface of which a few drops of creosote, or of the liniment, should be spread with a knife. This treatment will generally succeed in allaying the pain. It may be followed by a dressing of spermaceti ointment, or any other like simple emollient or unctuous preparation. Creosote, contrary to what is commonly asserted, produces scarcely any smarting or pain; whilst it rapidly removes the burning sensation, and the charred surface soon assumes a dry scabby appearance, which, by dressing with simple ointment, soon comes off and leaves the part beneath in a sound and healthy state. If a poultice be applied it is best to keep it on until the next day. Plunging the part into very cold water immediately after the receipt of an injury of this kind, will frequently prevent any further remedy being required. In all cases cooling laxatives should be administered; and the diet should be rather low until the inflammatory symptoms subside.

BURN'ING-GLASS. See LENS.

BUTEA FRONDOSA, *Roxb.* (Ind. Ph.) *Syn.* BENGAL KINO TREE. *Habitat.* Common all over India.—*Officinal part.* The inspissated juice obtained from the stem by incision (*Buteæ Gummi, Kino Bengalensis, Bengal kino*). It occurs in the form of irregular shining fragments, seldom as large as a pea; more or less mixed with adherent pieces of grayish bark; of an intense ruby colour and astringent taste; soluble, but not freely so, in water and in alcohol. Its astringency is due to the presence of tannic and gallic acids.—*Prop. & Uses.* Similar to those of kino, for which it has been found an efficient substitute.—*Prep.* Same as those of kino.

BUT'TER. [Eng., Ger.] *Syn.* BUTY'RUM, L.; BEURRE, Fr.; BUTER, BUTERA, Sax. The fatty matter obtained from cream by churning it.

Manuf. The process of making butter by the common operation of churning is extremely simple, and is well known. The chief objects to attend to, are maintaining a proper temperature, and a certain degree of exposure to the air. Extreme cleanliness must also be observed; the churn and other utensils being frequently scalded out with water. When the butter is 'come,' it should be put into a fresh-scalded pan, or tub, which has been standing in cold water, cold water poured on it, and after it has acquired some hardness, it should be well beaten with a flat board until not the least taste of the buttermilk remains, and the water, which must be often changed, becomes quite colourless and tasteless. A little salt may then be worked into it; after which it may be weighed and made into 'forms,' which should then be thrown into cold water contained in an earthen pan provided with a cover. In this way nice and cool butter may be obtained in the hottest weather.

At *Dumbarton,* the newly separated butter is put into a clean vessel, and a corn sickle is drawn several times crosswise through it, to extract any hairs that may adhere to it. This operation is performed in very cold spring water, and is followed by thoroughly washing it therein. 10 oz. of salt are now added to every stone-weight of the butter, and well mixed in.

In *Devonshire,* the milk is generally scalded in copper pans over a charcoal or wood fire, and the cream collected as soon as it rises, or, and more frequently, when the whole has got cold. It is then churned in the usual way. On the small scale, the butter is commonly obtained from this cream by patiently working it with the hand in a shallow pan or tub. Without care the cream is apt to absorb some of the fumes from the charcoal, which impart a peculiar taste to the butter. This is the reason why some of the Devonshire butter has a slight smoky flavour. It may be removed by thorough washing in cold water. Of late years, in the large dairy-farms of Devonshire, covered flues, with openings to receive the bottoms of the pans, have superseded open fires, by which the danger of contamination from the fumes is removed.

Choice. Fresh butter has a pleasant odour and is of an equal colour throughout its substance. If it smells sour, the buttermilk has not been well washed out; and if it is streaked or veiny, it is probably mixed with stale butter or lard. A good way to try butter is to thrust a knife into it, which should not smell rancid and unpleasant when withdrawn. Rancid and stale butter, when eaten in quantity, is capable of producing dangerous symptoms.

Pur. The cheaper kinds of butter are frequently adulterated with common wheat-flour, oatmeal, pea-flour, lard, &c., as well as with a large quantity of salt and water. The trick is concocted between the Irish factors and the London dealers. The higher priced article is seldom mixed with anything beyond an excess of salt and water, notwithstanding the assertions of alarmists to the contrary. The presence of lard may be detected by the flavour and paleness of the colour. A little of the sample adulterated with the other substances named, if melted in a glass tube or phial, will separate into strata, which are very marked when cold.

[1] BURN, s. sing.; AMBUS'TIO, L.; BRÛLURE, Fr.; BRAND, BRANDMAHL, Ger.

[2] See SCALDS (under *S*).

Preservation. 1. Melt the butter in a stone-ware or a well-glazed earthen pan set in a water bath at a heat not exceeding 180° Fahr., and keep it heated, skimming it from time to time, until it becomes quite transparent; then pour off the clear portion into another vessel, and cool it as quickly as possible, by placing the vessel in very cold water or ice. This is the method employed by the Tartars who supply the Constantinople market. In this state it may be preserved perfectly fresh for 6 or 9 months, if kept in a close vessel and a cool place. This is the plan so strongly recommended by M. Thènard. Mr. Eaton states that butter melted by the Tartarian method, and then salted by ours, will keep good and fine-tasted for two years.

2. Saltpetre and white sugar, of each, 1 oz.; best Spanish great-salt (or Cheshire large-grained salt), 2 oz.; all in very fine powder; mix thoroughly, and add 1 oz. of this mixture to every lb. of butter, and thoroughly incorporate them together. The butter thus prepared is then to be tightly pressed into clean glazed earthenware vessels (or well-seasoned casks), so as to leave no vacuities. This plan is recommended by Dr. Anderson, who declares that "butter so prepared will keep in a cool place for years; and will bear a voyage to the East Indies, if packed (stowed) so as not to melt." It does not taste well before it has stood for three or four weeks, after which it acquires a rich marrow-like flavour, which no other butter ever possesses. A good method to preserve the butter from the air, is to fill the pots to within an inch of the top, then to lay on it some coarse-grained salt to the depth of a ¼ to ½ an inch, and lastly to cover each pot with a slate, plate, or other flat article. The salt by long keeping runs to brine, which forms an air-tight layer on the top of the butter, and may at any time be very easily removed by turning the pot on one side.

3. Fresh butter, 21 lbs.; salt, 1 lb.; saltpetre, 1 oz. These are the common proportions for the best salt butter of the shops.

4. Fresh butter, 18 lbs.; salt, 1 lb.; saltpetre, 1½ oz.; honey or fine brown sugar, 2 oz. Superior to No. 3.

Concl. remarks. It may be useful to know that *rancid butter* may be restored, or, in all cases greatly improved, by melting it in a water bath with some fresh-burnt and coarsely powdered animal charcoal (which has been thoroughly freed from dust by sifting), and straining it through clean flannel. A better and less troublesome method is to well wash the butter first with some good new milk, and next with cold spring water. Butyric acid, on the presence of which rancidity depends, is freely soluble in fresh milk.

The turnip-flavour, arising from the cows being fed on turnips or cabbages, is said to be removed by one or other of the following methods:—1. When the milk is strained into the pans, put to every 6 galls., 1 gal. of boiling water.—2. Dissolve 1 oz. of nitre in a pint of spring water, and put a ¼ pint of the solution to every 15 galls. of milk.—3. Keep back a ¼ pint of the sour cream when you churn, and put it into a well-scalded pot, into which you are to gather the next cream; stir that well, and do so with every fresh addition. Each of these methods come on good authority, but we are bound to say, that our own experience does not confirm their constant success. We have found that the addition of a handful of salt to the water used to wash the butter, is as good a plan as any.

Butter, Ancho'vy. From anchovies (boned and beaten to a paste), 1 part; butter, 2 parts; spice, q. s.

Butter, Clar'ified. Fresh butter melted in a water bath, allowed to settle, and the clear portion poured into an earthenware basin or pot, set in cold water, so as to cool it as quickly as possible, without allowing it to crystallise. It keeps a long time without becoming rank. See BUTTER, No. 1 (*antè*).

Butter, Hon'ey. Fine Narbonne-honey, 2 to 4 oz.; mixed with good butter, 1 lb. Used as a delicacy for children, and by the sick and aged.

Butter, Lem'on. See ORANGE BUTTER.

Butter, Melt'ed. This well-known sauce may be prepared of excellent quality as follows:—Beat up about 1 oz. of fine flour with 4 oz. of butter, in the cold, until they are evenly and thoroughly mixed, then add 4 or 5 tablespoonfuls of hot milk, put the whole into a small saucepan, and continue shaking it, all in one direction, until it simmers very gently; lastly, remove it from the fire, and pour it into the butter-boats for use. These last should be filled with hot water, and then emptied and wiped dry, before putting the melted butter into them. See SAUCES.

Butter, Or'ange. *Prep.* 1. From 6 eggs, 2 oz. of powdered sugar, and 4 oz. of butter, well beaten together with a little orange-flower water. Sometimes 1 or 2 oz. of blanched almonds, or of almond-paste, is added.

2. Butter, 1 lb.; syrup of orange peel, 4 oz. Both are eaten as a delicacy. LEMON-BUTTER is made in a similar manner.

Butter of An'timony*‡. Trichloride of antimony.

Butter of Caca'o. See Co'COA, and Co'COA-NUT OIL.

Butter of Nut'megs. Collected from the surface of the water in the still, after the distillation of the essential oil of nutmegs.

Butter of Ro'ses. Obtained by distilling damask roses. It separates slowly from the water in the receiver. It has little smell, and is hence used to dilute the odour of musk, ambergris, and civet.

Butter of Wax. Prepared by distilling bees'-wax. A factitious kind is also made.

Butter of Zinc*‡. Chloride of zinc.

BUTTER-MILK. The liquid that remains after the butter is separated from the cream.

Qual., &c. Butter-milk left from the

churning of sweet cream is not only very delicious, but exceedingly wholesome and nutritious. It is eaten with fruit, puddings, and cakes, and is said to possess the property of allaying the nervous irritability induced by excessive tea-drinking. It is an admirable beverage in rickets, diabetes, and many stomach affections. An American physician has recently asserted that it induces longevity. See MILK.

BUT'TONS. See BRASS, GILDING, &c.

BU'TYRATE. [Eng., Fr.] *Syn.* BU'TYRAS, L. A salt in which the hydrogen of butyric acid is replaced by a basic radical.

Butyrate of Barium. *Prep.* Saponify butter with a boiling solution of caustic alkali, and decompose the resulting soap by adding a solution of tartaric acid; filter and distil; neutralise the distillate with hydrate of barium, and evaporate; the first crystals that form are caprate of barium; the next, caproate of barium; and the last, butyrate of barium. This salt is very soluble in water, and hence is easily separated from the others.—*Use.* Chiefly for making butyric acid.

BUTYR'IC (-tĭr'-) *Syn.* BUTYR'ICUS, L.; BUTYRIQUE, Fr. Of or from butter.

BUTYR'IC ACID. $HC_4H_7O_2$. *Syn.* ACIDUM BUTYR'ICUM, L.; ACIDE BUTYRIQUE, Fr.; BUTTERSÄURE, Ger. An oily acid, first obtained by Chevreul, from butter.

Prep. From butyrate of barium or magnesium, by adding sulphuric acid in quantity not quite sufficient to decompose the whole of the salt; the clear liquid filtered, and distilled, yields butyric acid, from which the water may be removed by digestion with chloride of calcium.

Prop. A thin colourless liquid, of pungent rancid odour, and sour taste, miscible with water and alcohol. It boils and distils unchanged at 327° Fahr. Sp. gr. ·963. See ETHERS.

BU'TYRIN (-in). [Eng., Fr.] An oily substance existing in butter, and of which it forms the characteristic portion. It was discovered by Chevreul.

Prep. Keep clarified butter in a porcelain vessel, at a heat of 66°, for some days; carefully collect the oily portion which separates, mix it with an equal weight of alcohol of the sp. gr. ·796, and agitate it frequently for 24 hours; after repose pour off the clear portion, and evaporate it; treat the oily residuum with a little carbonate of magnesium, to remove free acid, and wash off the butyrate of magnesium, thus formed, with water; lastly, heat the remaining fatty matter in alcohol, filter, and evaporate, by a gentle heat; the residuum is butyrin.

BUX'INE (-ĭn). An alkaline substance, detected by M. Faure, in *bux'us semper'virens*, or the common box-tree.

CABB'AGE. *Syn.* BRAS'SICA, L.; CHOU, Fr.; KOHL, Ger. This common esculent, and all its numerous varieties, are merely cultivated specimens of the wild sea-cabbage of our coasts (*bras'sica olera'cea*, Linn.), one of an extensive and valuable genus of plants belonging to the *nat. ord.* Cruciferæ. After the potato, the cabbage is doubtless more extensively used by the masses of the people, than any other fresh vegetable. When young, and properly dressed, it forms an agreeable and wholesome addition to animal food, the grossness of which, it is said, it tends to correct. It should be eaten only when fresh gathered and fresh cooked; and the unconsumed portion, as well as the water in which it has been boiled, should be at once thrown away. Persons troubled with a weak digestion, or who have a tendency to flatulence, diarrhœa, or worms, would do well to avoid them. Their use is particularly serviceable in scurvy, and in numerous skin diseases.

It has been asserted that cabbages, cauliflowers, broccoli, celery, and several other culinary vegetables, may be preserved in a fresh state for some time, by cutting them so that they may have about two inches of stem left below the leaves, scooping out the pith as far down as a small knife will reach, and then suspending them perpendicularly by means of a cord, in an inverted position, in some cool situation, and daily filling up the bottom part of the stem with clean cold water. In this way it is stated that a supply of green vegetables may be readily obtained during a severe winter, and on ship-board. Other methods, including those usually adopted with the same object, are noticed under VEGETABLES (Culinary).

Cabbages, broccoli, &c., are dressed by simply throwing them into boiling water, and simmering them until tender. A few minutes is sufficient for this purpose. A pinch of salt of tartar, or of carbonate of soda, is commonly added to the water, to preserve the green colour of the vegetables.

CACHOU AROMATISÉ (kăshoo ărŏmătēzā') [Fr.] A mouth-lozenge intended to sweeten and perfume the breath. Preparations of this description are much used by smokers and bacchanals. The form under which they are generally prepared for sale, is that of 1½ to 2 gr. pills, neatly silvered. Originally they were composed chiefly of catechu and sugar, flavoured and perfumed with the stronger aromatics; but at the present day the catechu, from which they derive their name, is not unfrequently omitted. Their preparation is described elsewhere. See BREATH, LOZENGES, PASTILS, &c.

CAD'MIUM. Cd. [Eng., L.] *Syn.* KLAPRO'THIUM. A metal discovered by Stromeyer and Hermann, in the ores of zinc.

Prep. 1. (Stromeyer.) The cadmo-zincic ore is dissolved in an excess of dilute sulphuric or hydrochloric acid, by heat; a stream of sulphuretted hydrogen is passed through the solution, the resulting precipitate (sul-

phide of cadmium) dissolved in nitric acid, and the solution evaporated to dryness; the residuum is dissolved in water, the solution precipitated with carbonate of ammonium in excess, and the precipitate (carbonate of cadmium) collected, mixed with charcoal, and heated to redness in a crucible apparatus so arranged as to condense the fumes; the cadmium sublimes.

2. (Wollaston.) A solution of the ore obtained as above is placed in a platinum capsule, and a piece of metallic zinc is plunged into it. In a short time the cadmium is precipitated, and attaches itself to the sides of the capsule, when it is collected, washed, and dried.

3. (Herapath.) When zinc is obtained by distilling its ores, *per descensum*, the first portion of the metallic fumes evolved burn with a brownish flame, and deposit oxide of cadmium, which is subsequently reduced by distillation with charcoal. Thousands of pounds of cadmium are yearly wasted at the zinc works which might be easily collected in a similar manner.

Prop., &c. Resembles tin in most of its physical properties, being white, soft, and malleable. Sp. gr. 8·61. Stromeyer gives its melting-point as 442° Fahr., but Dr. Wood, an American chemist, states that the metal requires for its fusion nearly the same heat as lead, and gives it as about 600° Fahr. It volatilises at a somewhat higher temperature, giving off orange-coloured, suffocating fumes, which, when inhaled too freely, leave a disagreeable, sweetish, styptic sensation upon the lips, and a persistent brassy taste in the mouth, with constriction of the throat, heaviness in the head, and nausea. The alloys of cadmium are said to be brittle, by almost all who have treated of them, but Wood found that many were extremely tenacious, as, for instance, the combination of 2 parts of silver and 1 part of cadmium, which is perfectly malleable and very strong. The amalgam of equal parts of cadmium and mercury is also highly malleable. Like bismuth, cadmium has the property of promoting fusibility in certain alloys; thus, a remarkable fusible metal may be formed by melting together cadmium 1 to 2 parts, lead 2 parts, and tin 4 parts.

Tests. Its ores and salts are recognised as follows:—1. Mixed with carbonate of sodium, and exposed on a charcoal support to the reducing flame of the blowpipe, the charcoal becomes almost instantly covered with a reddish-yellow incrustation of oxide of cadmium, commonly forming a circle or zone.—2. Caustic soda and potassa give a white precipitate (hydrated oxide) in solutions containing cadmium, insoluble in excess of the precipitant.—3. Ammonia gives a similar white precipitate, freely soluble in excess.—4. The alkaline carbonates give white precipitates (carbonate of cadmium), insoluble in excess.—5. Sulphuretted hydrogen, and sulphydrate of ammonium, give a bright yellow precipitate (sulphide of cadmium), which is insoluble in dilute acid, alkalies, sulphides, and cyanide of potassium, but readily soluble in both hydrochloric acid and nitric acid, especially with heat.—6. The salts of cadmium are readily distinguished from those of arsenic, by the precipitated sulphide being insoluble in ammonia, and soluble in hydrochloric acid, and being capable of sustaining a white heat without subliming.

Cadmium, Car'bonate of. $CdCo_3$. *Syn.* CAD'MII CAR'BONAS, L. From a solution of sulphate or chloride of cadmium, and an alkaline carbonate; the precipitate being collected, washed, and dried by a gentle heat. A white powder.

Cadmium, Chlo''ride of. $CdCl_2$. *Syn.* HYDROCHLO''RATE OF CADMIUM, MU''RIATE OF CADMIUM; CAD'MII CHLORI'DUM, CAD'MII HYDROCHLO''RAS, L. *Prep.* 1. (Pure.) By dissolving carbonate or oxide of cadmium in hydrochloric acid, and crystallising by gentle evaporation. Prismatic crystals, very soluble in water.

2. (Turner.) By exposing the product of the last process to heat. Amorphous.

3. From crude cadmium or its oxide, and hydrochloric acid, as last.

Cadmium, I'odide of. CdI_2. *Syn.* HYDRI'ODATE OF CADMIUM; CAD'MII IODI'DUM, C. HYDRIO'DAS, L.

Prep. (Crookes.) Cadmium in filings 1 part, pure iodine 2 parts, are to be placed together in a capacious flask, with alcohol, sufficient to cover them. Action commences at once, attended with considerable evolution of heat; when it ceases, heat the mixture till it is colourless; then filter from a few grains of cadmium which will remain undissolved, evaporate and crystallise.

Uses. In photography this salt has lately been employed with great success for iodizing collodion. Being very stable, it is not decomposed, and the collodion iodized with it preserves its sensitiveness undiminished during many months. (See COLLODION.) In medicine it is used occasionally as a substitute for iodide of lead.

Cadmium, Ox'ide of. CdO. *Syn.* PROTOX'IDE OF CADMIUM; CAD'MII OXY'DUM, L. *Prep.* 1. (Hydrated.) From sulphate or chloride of cadmium, and a solution of caustic alkali; observing to well wash and dry the precipitate. A white powder, freely soluble in acids.

2. (Anhydrous.) By igniting the hydrated oxide, or the carbonate or nitrate of cadmium. That from the first two has a pale brown colour; that from the nitrate has a dark brown tint and a semi-crystalline appearance. The former has been proposed to be used as a pigment.

Cadmium, Sul'phate of. $CdSO_4$. *Syn.* CAD'MII SUL'PHAS, CAD'MIUM SULPHU'RICUM, KLAPRO'THRIUM SULPHU'RICUM, L. *Prep.* 1. From carbonate or oxide of cadmium and dilute sulphuric acid, as the chloride.

2. (Cottereau.) Oxide of cadmium, 1 oz.; sulphuric acid, q. s.; dissolve, evaporate, and crystallise.

3. (Pereira.) Sulphuric acid, 6½ parts; water, 15 parts; mix; add cadmium, 7 parts; dissolve, evaporate to dryness, redissolve in water, filter, and evaporate by a gentle heat, so that crystals may form.

Prop., &c. Efflorescent, rectangular, prismatic crystals; very soluble in water; tastes astringent. It is about 4 times as strong as sulphate of zinc, and is used in similar cases. *Dose.* 3 to 10 grs. *Externally* (½ to 3 or 4 grs. to water, 1 oz.); in specks of the eye, opacity of the cornea, chronic ophthalmia, &c. As an ointment, 10 to 12 grs. to lard, 1 oz.

Cadmium, Sul'phide of. CdS. *Syn.* CADMIUM YELLOW. This occurs native as GREENOCK'ITE. It may be prepared artificially, either by fusing its elements together, or by passing a stream of sulphuretted hydrogen through a solution of the chloride, nitrate, or sulphate. When prepared artificially, it is of a bright yellow or orange colour, and is of great value to the artist. It has been used in making fireworks. See FIRES, *Coloured.*

Cadmium Yellow. See SULPHIDE OF CADMIUM (*above*) and YELLOW PIGMENTS.

CÆSALPINA (GUILANDINA) BONDUCELLA. (Ind. Ph.) *Habitat.* Tropical portions of both hemispheres.—*Officinal part.* The seeds (*Bonducellæ Semina, Bonduc seeds*); of a somewhat irregular sub-spherical or ovoid form, usually from ⅝ to ⅝ of an inch in diameter, smooth, hard, and lead-coloured, and contain an amylaceous white nucleus, having a bitter taste. They contain a fixed oil, resin, and a bitter principle.—*Properties.* Tonic and antiperiodic.—*Therapeutic uses.* In intermittent fevers; also in debility, and other cases requiring tonics.—*Dose.* 10 to 15 grains twice daily.

COMPOUND POWDER OF BONDUC (*Pulvis Bonducellæ compositus*). Take of bonduc seeds, deprived of their shells and powdered, 1 oz.; black pepper, powdered, 1 oz. Mix thoroughly, and keep in a well-stoppered bottle. —*Dose.* 15 to 30 grs., three times a day.

CÆSIUM. [Eng., L.] Cæ. A metal belonging to the alkaline group, discovered by Bunsen in the mineral water of Durckheim by means of SPECTRUM ANALYSIS (which *see*), and so named by him from *cæsius*, grayish-blue, the colour of its characteristic ray.

CAFFE'IC ACID. *Syn.* CHLOROGE'NIC ACID. A white powder, discovered by Runge in coffee, in which it exists in combination with potassium (caffeiate of potassium), and caffeine, and is then very soluble in alcohol. Pfaff states that the aroma of coffee is dependent on the volatilisation, or, rather, the decomposition of this acid.

CAFFE'INE. $C_8H_{10}N_4O_2$. *Syn.* CAFFE'INA, THE'INE, GUARANINE'. A peculiar nitrogenised principle, discovered by Robiquet in coffee. It is, moreover, the essential principle of tea, of Paraguay tea, and of Guarana, infusions of which are used as beverages in different parts of the world. The proportion of caffeine to the pound was found by Liebig to be as stated below in the six descriptions of coffee named:—

Martinique	32	grains.
Alexandrian	22	„
Java	22	„
Mocha	20	„
Cayenne	19	„
St. Dominique	16	„

In Hyson tea it exists in the proportion of from 2·5 to 3·4 per cent.; and in gunpowder tea from 2·2 to 4·1. In Paraguay tea, or *maté* as it is called in Brazil, and in Guarana, it exists in the proportion of 3·6 per cent.

Prep. 1. Coarsely powdered raw or unroasted coffee, is boiled in water, and subacetate of lead added to the filtered decoction to throw down the extractive and colouring matter; the excess of lead is next precipitated with sulphuretted hydrogen, and the liquid filtered and evaporated by a gentle heat; the residuum is dissolved in boiling water, the solution agitated with freshly burnt animal charcoal, filtered, evaporated, and crystallised. By redissolving the product in hot alcohol, it may be obtained in white, shining, silky filaments, as the solution cools.

2. (H. J. Versman.) Quick-lime, 2 lbs.; water, q. s. to form a hydrate; raw coffee (bruised), 10 lbs.; mix, put it into a displacement apparatus, and cause alcohol of 80% to percolate through the mixture, until the fluid obtained no longer contains caffeine; the mass in the percolator is then roughly ground to powder, mixed with a fresh quantity of quick-lime, and the process of percolation repeated with fresh alcohol, as before. The spirit is next distilled from the mixed tinctures in a retort, and the residuum washed with a little warm water to remove the oil; the evaporation is then gently conducted until a crystalline mass is obtained, which is further freed from adhering oil by pressure between folds of blotting paper. It is purified by redissolving it in boiling water or hot alcohol, &c., as before.

3. (A. Vogel.) An extract of powdered coffee is made with commercial benzol; this being distilled off, leaves an oil and caffeine behind; the oil is then removed by a little ether or by hot water, from which latter liquid the alkaloid crystallises on cooling.

4. From a hot infusion of tea-leaves by treatment with subacetate of lead and sulphuretted hydrogen, as in process 1 (*above*).

Prop., &c. Soluble in 100 parts of cold water; freely soluble in hot water and in water acidulated with an acid; slightly soluble in cold alcohol; it fuses at 352° Fahr., tastes slightly bitter, and possesses feeble basic properties. With the sulphuric and hydrochloric acids it forms crystallisable compounds. The salts of caffeine may be made by dissolving it, to saturation, in the dilute acid, and evaporating the solution by a very gentle heat.

It forms splendid double salts with bichloride of platinum and terchloride of gold.

Uses. Caffeine has been recommended in those pains that affect only one side of the head (hemicrania); in doses of 1 to 3 grs. Its physiological action is very trifling, notwithstanding all that has been said to the contrary. Mr. Cooley took 20 grs. daily, of pure caffeine, for above a month, without experiencing any other effect than a very slight elevation of spirits after each dose, similar to that produced by a small quantity of spirits of sal-volatile. It has been used lately with doubtful success as an antidote to the poisonous effects of opium. See COFFEE, TEA, &c.

CAFFE'ONE. A brown, aromatic oil, formed during the roasting of coffee.

CAJ'EPUT OIL. See OILS (Volatile).

CAKES. A species of fancy bread or trifle familiar to every one.

Before proceeding to the actual operation of cake-making, the various materials which are to enter into their composition undergo a certain amount of preparation. For this purpose every article is got ready about an hour previously to its being wanted, and is placed before the fire, or upon a stove, that it may become gently heated. Without these precautions it is impossible to produce good cakes. The flour is thoroughly dried, and warmed. The currants are nicely washed in a hair sieve, wiped dry in a cloth, and then set before the fire. Before use, they are dusted over with a little flour. The sugar is rubbed to a fine powder, and passed through a sieve. The eggs are well beaten in a basin, and strained. The butter is melted by being placed in a basin set in hot water, and is afterwards well beaten up with a little warm milk. The lemon peel is cut very thin, and beaten in a mortar to a paste or powder, with lump sugar; or for common purposes, it is grated. The caraways, ginger, and other flavouring ingredients, are preferred in the form of fine powder, or are made into an essence, by digesting them in spirit of wine; the first is the most common method. The milk and water is made lukewarm. When all these things are ready and have stood a sufficient time, they are put into a pan, one after another, in the proper order, and well beaten together, by which the lightness of the cakes is considerably increased.

In plum cakes, as well as in some other varieties, a little yeast may be added after the butter, and the mass allowed to rise a little, and then again well kneaded, by which not only less butter and eggs may be used, but the products will be both lighter and more wholesome. Good stale bread, well soaked in hot milk or water, and then beaten to a paste, and passed through a fine sieve, forms an excellent thing to mix up the ingredients with, and produces a very light and nutritious cake. Cakes "wetted up" with milk are richer, but do not keep so well as those without it; they get stale sooner, and when in that state are far from agreeable to the palate. A kind of flour prepared from maize or Indian corn has been recently introduced to the notice of cooks, but it is better adapted for puddings than for cakes. See CORN-FLOUR.

Cakes are preferably baked on flat tins or in little "tin shapes," which should be first well buttered.

Cakes should be kept for store in tin canisters; wooden boxes, unless very well seasoned, are apt to give them an unpleasant taste. Brown-paper linings and wrappers should be avoided for the same reason. See BISCUITS, BREAD, BUN, ICING, STAINS, &c.

Cakes, Al'mond. *Prep.* 1. From sweet almonds (blanched and beaten to a smooth paste), flour and powdered sugar, of each, ½ lb.; 7 eggs, and the outside peel of 4 lemons (shredded small). The almonds, sugar, lemon peel, and eggs, are beaten together, until as white as sponge paste; the flour next worked in, and the paste put into buttered moulds, and baked in a slack oven, with 8 or 10 thicknesses of white paper under them and one or two over them.

2. Almonds, 1 lb.; sugar, ½ lb.; rose water or orange-flower water, ¼ pint; flour, ¾ lb.; 3 eggs; as above. Some persons ice these cakes.

Cakes, Ban'bury. *Prep.* From butter and dough fermented for white bread, of each, 1 lb., as in making puff paste, then rolled out very thin, and cut it into oval or triangular pieces, or other shapes. On these are placed a mixture of currants and moist sugar, equal parts, wetted with a little wine or brandy, and the paste being closed up, they are placed on a tin with the closed side downwards, and baked. A little powdered sugar, flavoured with candied peel (grated), or essence of lemon, is sifted over them as soon as they come out of the oven. In the common cakes of the shops, the brandy is omitted, and lard is used for butter, and less of it.

Cakes, Bath. *Prep.* From butter, ½ lb., flour, 1 lb., 5 eggs, and a cupful of yeast; when risen, add powdered sugar, 4 oz., and caraways, 1 oz. Bake them on tins.

Cakes, Cheese. *Prep.* 1. Curdle some warm new milk with rennet, drain the curd in a linen bag, and add ¼ of its weight, each, of sugar and butter, 6 eggs, some grated nutmeg, and a little orange flower or rose water.

2. (*Almond Cheese Cakes.*) To the above add as much blanched almonds, beaten to a smooth paste, as there is butter, and an equal weight of macaroni.

3. (*Lemon Cheese Cakes.*) To the first form add lemon peel (grated fine), or essence of lemon, q. s.

Cakes, Di'et. *Syn.* DIET BREAD. *Prep.* 1. Dissolve sugar, 1 lb., in milk, ½ pint; add 6 eggs, and whisk the mixture to a full froth, then cautiously stir in flour, 1 lb., beat it for ¼ hour, and immediately bake it in a quick

oven. It may be baked whole or divided into small cakes.

2. From fine flour and powdered sugar, equal parts; 6 eggs; and the juice and rind (grated) of 1 lemon.

Cakes, Drop. *Prep.* Eggs, 1 dozen; rose-water, 1 table-spoonful; powdered sugar, ½ lb.; fine flour ½ lb.; and caraways, ½ oz. Drop it on wafer paper, and bake as before.

Cakes, Gin'ger. *Prep.* Sugar, 1 lb.; powdered ginger, 4 oz.; flour, 2 lbs.; water, 1 pint; butter, ½ lb.; candied orange peel, 8 caps (grated).

Cakes, Lem'on. *Prep.* Flour and sugar, of each, 1 lb.; eggs, 1 dozen; grated peel and juice of 4 lemons; whisk the eggs to a bright froth, then gradually add the rest.

Cakes, Marl'borough. *Prep.* Beat 8 eggs and 1 lb. of pounded sugar ¾ hour; then add fine flour, 1 lb.; and caraway seeds, 2 oz.

Cakes, Plain. *Prep.* 1. From flour, 4 lbs.; currants, 2 lb.; butter, ½ lbs.; caraway seeds, ¼ oz.; candied lemon peel (grated), 1 oz.; yeast, ¼ pint; milk, q. s. Let it rise well before baking.

2. Baker's dough, 2 lbs.; currants, 1 lb.; butter, ¼ lb.; 3 eggs; milk (hot), ¼ pint.

3. (Rundell.) Baker's dough, 4 lbs.; butter and moist sugar, of each, ¼ lb.; caraway seeds, a small handful. Well work it together, pull it into pieces the size of a golden pippin, and work it together again. This must be done three times, or it will be in lumps, and heavy when baked.

4. (*Rich.*) Equal weights of flour, butter, sultana raisins, eggs, currants, and brown sugar, mixed up with milk, and seasoned with candied peel, nutmeg, &c., and baked in a quick oven. This resembles "pound cake."

Cakes, Plum. *Prep.* 1. (*Good.*) From butter, ½ lb.; dry flour, 3 lbs.; Lisbon sugar, 8 oz.; plums and currants, of each, ¾ lb.; and some pimento, finely powdered; to be "wetted up" with 3 spoonfuls of yeast, and a Winchester pint of new milk (warmed); bake on a floured tin half an hour.

2. (*Excellent.*) From fresh butter, sifted sugar, flour, and currants, of each, 1 lb.; 18 eggs; powdered spices, 2 oz. (viz., cloves, mace, cinnamon, nutmeg, and allspice); sliced almonds, 4 oz.; raisins (stoned and chopped), ½ lb.; and a large glass of brandy; bake in a hot oven. When sufficiently baked, let the oven cool, and afterwards put in the cake and allow it to remain for several hours to dry. (Rundell.)

3. (*Rich.*) Take fresh butter and sugar, of each, 1 lb.; flour, 1½ lb.; currants, 2 lbs.; a glass of brandy; sweetmeats and peels, 1 lb.; sweet almonds, 2 oz.; 10 eggs; allspice and cinnamon, of each, ½ oz.; bake in a tin hoop in a hot oven for 3 hours, and put 12 sheets of paper under it to keep it from burning. (Mackenzie.)

Cakes, Port'ugal. *Prep.* From flour, powdered sugar, and fresh butter, of each, 1 lb.; 10 eggs; currants, ½ lb.; and a little white wine; bake in small tins only half filled.

Cakes, Pound. *Prep.* 1. As plum cake; but using 1 lb. each of all the ingredients, except the spices.

2. Using equal parts of sugar, flour, currants, and sultana raisins, and half that quantity each of butter, brandy, and candied peel, with spices as required.

Cakes, Queen. *Prep.* From about 1 lb. each of dried flour, sifted sugar, washed currants, and butter, with 8 eggs; the whole beaten for an hour, made into a batter, and baked in little tins, teacups, or saucers, only half filled. A little fine sugar is frequently sifted over them. Nutmeg, mace, and cinnamon are also sometimes added.

Cakes, Rat'ifia. *Prep.* Beat ½ lb. of sweet, and 1 oz. of bitter almonds, in fine orange, rose, or ratifia water; mix in ½ lb. of pounded sugar; add the whites of 4 eggs (well beaten); set it over a moderate fire in a preserving-pan; stir it one way until it is pretty hot, and when a little cool, form it into small rolls, and cut it into thin cakes; shake some flour lightly on them, give each a light tap, put them on sugar papers, sift a little sugar on them, and put them into a very slack oven.

Cakes, Rout. *Prep.* From flour, 2 lbs.; butter, sugar, and currants, of each, 1 lb.; 3 eggs; ½ pint of milk; 2 glasses of white wine; and 1 glass of brandy; drop them on a tin plate, and bake them.

Cakes, Savoy. *Prep.* From flour and sifted sugar, of each, 1 lb.; 10 eggs; and the rind of a lemon (grated); form a batter by degrees, put it into moulds, and bake in a slack oven.

Cake, Seed. *Prep.* 1. (*Plain.*) From flour, ¼ peck; sugar, ½ lb.; allspice, ¼ oz.; melted butter, ½ lb.; a little ginger; milk, ½ pint; yeast, ¼ pint; add seeds or currants; and bake an hour and a half.

2. (*Good.*) To the preceding add of butter and sugar, of each, ½ lb., and wet it up with milk previously mixed with 6 eggs.

3. (*Rich.*) Take of flour, 1½ lb.; butter and sugar, of each, 1 lb.; 8 eggs; 2 oz. of caraway seeds, 1 grated nutmeg, and its weight in cinnamon. Bake 2 hours in a quick oven.

4. (*Scotch.*) Nine eggs; sugar and butter, of each, ½ lb.; mix well together, then add a little cinnamon, nutmeg, and cloves; ½ oz. of caraway seeds; ½ lb. of candied citron; ¼ lb. of candied orange peel; ½ lb. of blanched almonds (pounded fine); flour, 3 lbs.; and brandy, ¼ pint.

Cakes, Shrews'bury. *Prep.* From flour, 3 lbs.; sugar, 1 lb.; a little cinnamon and nutmeg; 3 eggs; a little rose water; and melted butter enough to make it into a dough.

Cakes, So'da. *Prep.* 1. From flour, 1 lb.; bicarbonate of soda, ¼ oz.; sugar and butter, of each, ½ lb.; make a paste with milk, and add candied orange, lemon, or citron peel, or the fresh peels grated, q. s. to flavour.

2. To flour, 1 lb.; sugar and butter, of each,

2 oz.; candied peel, ½ oz.; sesquicarbonate of soda, 3 drs.; milk, q. s.

Obs. An equal weight of carbonate of magnesia, used instead of the soda, also makes good cakes. Both are suitable to delicate stomachs, especially in dyspepsia, with acidity.

Cakes, Sponge. *Prep.* From 8 eggs; lump sugar, ¾ lb.; flour, ½ lb.; water, ¼ pint; the yellow peel of a lemon; mix as follows:—Put the lemon peel into the water; when about to make the cake, put the sugar into a saucepan, pour the water and peel on it, and let it stand by the fire to get hot. Break the eggs into a deep earthen vessel that has been made quite hot; remove from the heat, whisk for a few minutes; make the sugar and water boil up, and pour it very gradually boiling-hot over the eggs; continue to whisk them briskly until they become thick and white; add the flour (quite warm), stir it lightly in, put the paste into tins lined with white paper, and bake them immediately in a moderately hot oven.

Cakes, Tea. *Syn.* BENTON CAKES. *Prep.* From flour, 1 lb.; butter, 4 oz.; and milk, q. s.; bake on a hot hearth or slow oven plate.

2. To the last, add 2 table-spoonfuls of yeast.

Cakes, Tip'sy. *Prep.* Small sponge cakes steeped in brandy, and then covered with grated almonds and candied peel; or almonds (cut into spikes) are stuck in them. They are commonly piled on a dish, surrounded with a custard, and covered with preserves drained as dry as possible.

Cakes, Wigg. *Prep.* From ½ pint of warm milk; ¾ lb. of fine flour; and 2 or 3 spoonfuls of light yeast. Afterwards work in 4 oz. each of sugar and butter; make it into cakes, or wiggs, with as little flour as possible, add a few caraway seeds, and bake them quickly.

Cakes. (In *medicine*.) Cakes have been used as a form of administering medicinal substances to children, but have not been extensively employed in this country for the purpose, unless by quacks, and in domestic practice. In preparing them, the active ingredients are added in such proportions to the common materials of a sweet cake, that one or two, as the case may be, are sufficient for a dose. See GINGERBREAD, WORM-CAKES, &c.

CAL'AMINE. See ZINC (Carbonate of).

CALCINA'TION. The operation of burning or roasting any solid body to expel its more volatile parts, as the conversion of chalk into lime by the expulsion of carbonic anhydride. The roasting of the ores in the first stage of the Welsh process of copper smelting and in the Silesian mode of extracting zinc is technically termed CALCINATION.

The method of conducting the process of calcination depends on the nature of the body operated on. Many substances, for delicate experiments, are calcined over a spirit lamp in a platinum spoon or crucible; others, in iron vessels or earthen crucibles, placed in a common furnace. When the action of the air proves injurious, as in the manufacture of charcoal, the process is performed in close vessels or chambers. In some cases the fuel is mixed with the articles, and they are both burnt together, as in the manufacture of lime, the roasting of ores, &c. The process of drying salts, or driving off their water of crystallisation by heat, is also frequently called CALCINATION; thus we have calcined copperas, alum, &c.

CALCI''NER. A reverberatory furnace used for the calcination of metallic ores, particularly those of COPPER and ZINC (which *see*).

CAL'CIUM. [Eng., L.] Ca. The metal of which LIME is an oxide. Though it is a chemical curiosity when isolated, it is one of the most abundant substances in nature, forming a very large portion of the crust of the earth. It occurs in combination with fluorine as fluor-spar; with oxygen and carbonic acid as chalk, limestone, and marble; and with oxygen and sulphuric acid as gypsum. The metal was first obtained from lime by Sir H. Davy, in 1808; but little was known of its properties until Dr. Matthiessen formed it by the electrolytic decomposition of the chloride of calcium.

Prep. 1. By the action of a powerful voltaic current upon a paste of pure lime in contact with mercury, as in the original method of preparing barium.

2. By the electrolysis of chloride of calcium in a state of fusion.

3. (Caron.) Fused chloride of calcium in powder, 300 parts; distilled zinc, finely granulated, 400 parts; sodium, in small pieces, 100 parts; the whole placed in a crucible and heated to redness in an ordinary furnace. The action is very feeble at first, but after some time zinc flames arise. The heat must now be moderated, to prevent the volatilisation of the zinc, but at the same time it must be maintained as high as possible. When the crucible has remained in this state for about a quarter of an hour it may be withdrawn. On cooling, a metallic button will be found at the bottom. This alloy of zinc and calcium, which generally contains from 10 to 15% of the latter metal, must be placed in a coke crucible and heated until the whole of the zinc is driven off. The alloy should be in pieces as large as possible. When proper precautions have been observed, a button of CALCIUM is obtained, only contaminated with the foreign metals contained in the zinc.

Prop., &c. The metal belongs to the group which includes BARIUM, STRONTIUM, and MAGNESIUM; it is of a light yellow colour; is rather harder than lead, and very malleable. It melts at a red heat. It tarnishes in a day or two, even in dry air, and in contact with moist air it breaks up like ordinary lime. Its sp. gr. is 1·55.

Tests. Salts of calcium in solution produce a white precipitate with carbonate of

ammonium; it becomes far less voluminous on heating the solution, and dissolves very readily in hydrochloric acid. Sulphuric acid, when added to concentrated solutions, gives an immediate white precipitate; if the solution is not concentrated, the precipitate may separate gradually, in minute crystals; and if it is very dilute, no precipitation will take place, because sulphate of lime is soluble in about 500 times its weight of water. With neutral solutions, even when very dilute, oxalate of ammonium gives a copious white precipitate, soluble in most dilute acids.

Calcium, Bro'mide of. $CaBr_2$. *Syn.* CAL'CII BROMI'DUM, L. *Prep.* (Magendie.) To a solution of bromide of iron add hydrate of calcium in slight excess; filter, evaporate to dryness, redissolve in water, and again filter, and evaporate.

Calcium, Chlo''ride of. $CaCl_2$. *Syn.* CAL'CII CHLORI'DUM (B. P.). *Prep.* Hydrochloric acid and water, of each, 10 fl. oz.; chalk, 5 oz.; evaporate the solution until the salt becomes solid, and dry the residue at about 400° F.

It is obtained in solution as a residuum in making several preparations of ammonia, as the liquor and carbonate, and in making carbonic acid by the action of hydrochloric acid on marble. The residuum is concentrated and set aside to crystallise, or evaporated to dryness.

Prop., Uses, &c. This salt crystallises in colourless, striated, hexagonal prisms, terminated by very acute points. It is very soluble in alcohol and water, the latter even at 32° dissolving more than its own weight, and at 60° three or four times its weight of this salt. When heated, the crystals undergo watery fusion. When dissolved in water, they produce great cold; and hence are frequently employed as an ingredient in FREEZING MIXTURES. These crystals contain nearly half their weight of water. They are very deliquescent, passing readily into the liquid state, and forming what used to be called oleum calcis, or oil of lime. The anhydrous chloride is hard and friable; slightly translucent; totally and readily soluble in water, and, like the crystallised salt, very deliquescent. In the laboratory chloride of calcium, either fused or merely dried, is continually used for drying gases and for absorbing the water from ethereal and oily liquids in organic analysis. The unfused is now generally preferred for this purpose, as it is more porous than the fused. The salt is also used in the rectification of alcohol, and to form a bath for heating stoneware stills and other apparatus liable to be cracked on the sand bath. As a chemical reagent, it is employed chiefly in detecting certain organic acids. As a medicine, it has been given in some scrofulous and glandular diseases. *Dose.* 10 to 20 grs. See SOLUTIONS.

Calcium, Flu'oride of. CaF_2. *Syn.* HYDROFLU'ORATE OF LIME. This occurs native as the mineral called fluor-spar. It is found in beautiful crystals in the lead mines of Alston Moor and Derbyshire, and in the concretionary crystalline masses known as Blue John or Derbyshire spar at Castleton. It may be prepared by the action of hydrofluoric acid upon lime, as directed under FLUORIDE OF BARIUM.

Calcium, I'odide of. CaI_2 *Syn.* HYDRI'ODATE OF LIME; CAL'CII IODI'DUM, CALCIS HYDRIO'DAS, L. *Prep.* 1. (Magendie.) From a solution of protiodide of iron and hydrate of calcium, as directed under iodide of barium.

2. Dissolve lime or carbonate of lime in hydriodic acid.

Prop., Uses, &c. It is a deliquescent salt, easily soluble in water, and has a bitterish taste. It has been used in scrofulous affections, internally, in doses ranging from ½ to 2 grs., thrice daily, and externally in ointments containing 2 drs. or less to the oz.

Calcium, Ox'ide of. See LIME.

Calcium, Phos'phide of. *Syn.* PHOSPHU'RET OF LIME; CAL'CII PHOSPHURE'TUM, C. PHOSPHI'DUM, L. *Prep.* By passing the vapour of phosphorus over lime (in small fragments) heated to redness in a porcelain tube. A brownish substance, supposed to be a mere mechanical mixture of phosphide and phosphate of calcium. Thrown into water, it suffers instant decomposition, and phosphuretted hydrogen gas escapes.

Calcium, Sulphides of. Calcium forms with sulphur at least three different compounds:—

1. **Calcium, Protosul'phide of.** CaS. *Prep.*—*a.* From sulphate of lime, exposed at a high temperature to a stream of hydrogen gas.—*b.* From dried gypsum, 25 parts; lampblack or finely powdered charcoal, 4 parts; calcined together at a strong heat in a covered crucible.

2. **Calcium, Bisulphide of.** CaS_2. *Prep.* From sulphur and quick-lime, equal parts; water, q. s.; slake the lime, add the sulphur, and boil until a solution is obtained, which on cooling deposits crystals.

3. **Calcium, Pentasulphide of.** CaS_5. *Prep.* As the last, but increasing the quantity of sulphur, and continuing the boiling for a longer period. Little is known about it.

4. **Calcium, Commercial Sulphuret of.** *Syn.* COMMERCIAL SULPHIDE OF CALCIUM. *Prep.*—*a.* As 1, *b* (*above*).

b. Sulphur, 1 part; hydrate of lime, 3 parts; water, 2½ pints; boil it until it solidifies on cooling, then pour it out on a cold marble slab, and when solid break it into pieces and preserve it in a well-corked bottle.

c. (Guibourt.) Quick-lime, 7 parts; sulphur, 4 parts; mix, and heat the compound for about 2 hours in a covered crucible.

d. (Cottereau.) Quick-lime, 2 parts; sulphur, 1 part; water, 5 parts; as 4, *b* (*above*).

Obs. The precise composition of the last three preparations is uncertain. They are acrid, caustic, stimulant, and diaphoretic. *Dose.* 1 to 3 grs. Sulphide of calcium has been used as a *depilatory* by applying it made into a paste with water, and washing it off in

about ½ of an hour. Made into an embrocation, it has been strongly recommended in gout, scabies, &c. Its solution yields pure sulphur on the addition of hydrochloric acid.

CALCULA'TIONS (Useful). 1. *To find the Value of a Dozen Articles.* Take the price in pence as shillings, and if there are any farthings in the price, add threepence for each. Thus 2*s.* 8*d.*, or 32 pence per yard, is £1 12*s.* per dozen.

2. *To find the Value of One Hundred Articles.* For every farthing take as many pence and twice as many shillings. Thus, 1¼*d.* each, is—5*d.*, and 10*s.* = 10*s.* 5*d.* per hundred.

3. *To find the Value of a Pound at any price per Ounce.* Take the price in farthings as shillings, and divide by three. Thus, 5¼*d.* per ounce, is 21 farthings; taken as shillings, 21 ÷ 3 = 7*s.* per pound.

4. *To find the Value of an Ounce at any price per Pound.* Take the shillings as farthings, and multiply by three. Thus, at 6*s.*—6 × 3 = 18 farthings, or 4½*d.* per ounce.

Obs. By reversing Nos. 1 and 2, the price of a single article or pound may be found from the price per dozen or hundred. For several other calculations, useful in domestic economy, chemistry, &c., see BREWING, DECIMALS, EQUIVALENTS, MEASURES, PER-CENTAGE, WEIGHTS.

CAL'CULUS. *Syn.* STONE. In *medicine*, a hard concretion formed within the animal body by the deposition of matters which usually remain in solution. The concretions most commonly formed are those formed in the kidneys or bladder, and termed *urinary calculi*, and those formed in the gall-bladder or biliary ducts, which are called *biliary calculi*. Both of these give rise to very painful symptoms, and may even threaten life.

CAL'ENDAR. *Syn.* CALENDA'RIUM, L.; CALEN'DRIER, FR. A table of all the days of the year, arranged in the order of days and weeks, to which are generally added certain astronomical indications and dates of great civil and religious events. The most remarkable calendars are the *Hebrew Calendar*, the *calendar of the Greeks*, the *Roman*, or *Julian calendar*, the *Gregorian calendar* (now adopted by all Christian peoples except the Greeks and Russians), and the *French Republican calendar*, which, having remained in force about thirteen years, was abolished by Napoleon I on the 1st of January, 1806.

Calendar, Perpet'ual. A table which furnishes the general indications necessary to construct a calendar for any year, and to resolve, without error, many difficulties connected with the verification of dates.

CAL'ENDERING. The process of finishing by pressure the surface of linen or cotton goods. It is usually performed by passing the fabric between cylinders pressed together with great force. It is necessary that one of the cylinders, at least, shall be of a material combining considerable hardness with a slight degree of elasticity; for this purpose the paper cylinder is used. It is made by forcibly compressing a number of circular discs of thick pasteboard, each with a square hole in the centre, upon an iron axis, so as to form a solid cylinder, which is turned perfectly smooth and true in a lathe. The paper cylinder usually works against a hollow roller of copper or iron, heated by steam or metallic heaters. Before the final rolling in the calendering machine the fabric is lightly smoothed by passing over warm cylinders. Cotton goods are starched, and a fictitious appearance of stoutness is sometimes given to them by employing starch thickened with plaster of Paris, porcelain clay, or a mixture of these. Watering is a beautiful effect produced by means of a hot cylinder with a pattern raised upon it. Glazing is produced by combined rubbing and pressure, the rollers being made to move with unequal velocities, so that one side of the fabric is rubbed as well as pressed by the roller whose surface moves with the greater speed. A copper cylinder is preferred for glazing, and is made so hot that if the machine stops it burns the goods. The old method of glazing consisted in burnishing the surface of the fabric with a polished flint.

CAL'ICO. See COTTON.

CAL'ICO PRINTING. The art of producing figured patterns upon calico, by means of dyes and mordants topically applied by wooden blocks, copper-plates, or engraved cylinders. The goods are either directly printed in colour, or receive their patterns by being run through a colouring matter or mordant, when the dye is only produced upon that portion of the ground previously prepared for it. Of late this system of dyeing has been extended to silks and woollens.

The mordants are thickened with some glutinous substance, as flour, starch, or gum, to render them adhesive and to prevent their spreading.

The following are the principal styles of calico-printing, each requiring a different method of manipulation:—

In the *madder, fast colour*, or *chintz style*, the mordants are applied to the white cloth, and the colours are brought out in the dye bath. This is the method commonly followed for "permanent prints."

In the *padding* or *plaquage style*, the whole cloth is passed through a bath of some particular mordant, and different mordants are afterwards printed on it before submitting it to the dye bath. By this means the colour of the ground and pattern is varied. Like the last, it is much used for gown pieces, &c.

In the *reserve* or *resist-paste style*, white or coloured figures are produced, by covering those parts with a composition which resists the general dye afterwards applied to form the ground of the pattern. In this style the dye bath is indigo, or some other substantive colour.

The *discharge*, or *rongeant style*, is the reverse of the preceding; it exhibits bright figures on a dark ground, which are produced by printing with acidulous or discharge mordants after the cloth has been passed through the colouring bath.

Steam-colour printing, consists in printing the calico with a mixture of dye extracts and mordants, and afterwards exposing it to the action of steam.

Spirit-colour printing, is a method by which brilliant colours are produced by a mixture of dye extracts and solution of tin, called by the dyers "spirits of tin."

Pigment printing, consists in applying such colours as ultramarine, magenta, or aniline purple, to the cloth, and fixing them by such agents as casein, albumen, or solution of India rubber. This style of printing has been developed to a great extent since the introduction of the splendid mauves and purples obtained from aniline.

For further information on this subject, the reader is referred to Ure's 'Dictionary of Arts, Manufactures, and Mines,' and O'Neill's 'Dictionary of Calico Printing and Dyeing,' where he will find the several processes of calico printing fully treated on, and most ably and accurately described. To enter largely into the subject in this work might amuse the reader, but would be of no practical value; as calico printing is an art only practised on the large scale, and by men who obtain their whole knowledge of it in the laboratories and printing rooms of the factories.

CAL'OMEL. See MERCURY (Chlorides of).

CALOTRO'PIS PROCE'RA.
CALOTRO'PIS GIGAN'TEA. } (Ind.Ph.) *Syn.* MUDAR.—*Habitat.* One or other of these species, everywhere in India.—*Officinal part.* The root-bark, dried (*Calotropis cortex*). Small, flat or arched pieces, brownish externally, yellow-grayish internally, peculiar smell, and mucilaginous, nauseous, acrid taste. Its activity appears to reside in a peculiar extractive matter named *mudarine*.—*Properties.* Alterative tonic; diaphoretic, and, in large doses, emetic.—*Therapeutic uses.* In leprosy, constitutional syphilis, mercurial cachexia, syphilitic and idiopathic ulcerations, in dysentery, diarrhœa, and chronic rheumatism, it has been used with alleged benefit.

Powder of Mudar. (*Pulvis Calotropis.*) Take of the roots of mudar, collected in the months of April and May from sandy soils, a sufficiency; carefully remove, by washing, all particles of sand and dirt, and dry in the open air, without exposure to the sun, until the milky juice contained in it becomes so far inspissated that it ceases to flow on incisions being made in it. The bark is then to be carefully removed, dried and reduced to powder. Preserve in well-corked bottles.—*Dose.* As an alterative tonic, 3 grains, gradually increased to 10 grains or more, thrice daily. As an emetic, from ½ to 1 drachm.

CAL'OTYPE. See PHOTOGRAPHY.

CALUM'BA. *Syn.* CALUMBÆ RADIX, B. P. CALUM'BA-ROOT; KALUMB, Hind. The root of a plant of Eastern Africa, extensively used in *medicine* as a stomachic and mild tonic. *Dose.* 10 to 20 grains, three or four times a day. The botanical name of this plant is *Jateorhiza palmata*, or *Cocculus palmatus*. See CALUMBINE (*below*); also INFUSIONS and TINCTURES.

CALUM'BA WOOD. This wood, which is used as a tonic by the Cingalese, is not the produce of the true calumba plant, but of *Menispermum fenestratum*. It contains the alkaloid BERBERINE (which *see*).

CALUM'BINE. *Syn.* CALOM'BINE, CALUM'BINA. A bitter substance discovered by Wittstock in calumba root.

Prep. 1. Digest calumba root (in coarse powder) in water acidulated with acetic acid; express, filter, boil to one half, again filter, add carbonate of calcium, in slight excess, and evaporate to dryness in a water bath; reduce the residuum to powder, and digest it in boiling alcohol; the latter will deposit crystals of CALUMBINE on cooling.

2. (Wittstock.) Evaporate tincture of calumba root (made with rectified spirit) to dryness; dissolve the residuum in water, and agitate the solution with an equal bulk of ether; after repose for a short time, decant the ethereal portion, distil off most of the ether, and set the liquid aside to crystallise.

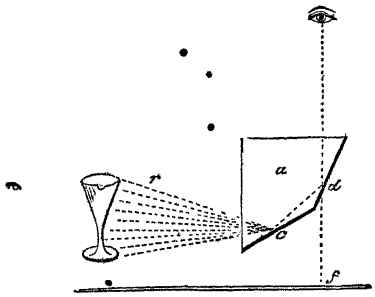
Prop., &c. Impure calumbine occurs as a yellow-brown mass; when pure, it forms rhombic prismatic crystals or delicate white needles; it is only slightly soluble in alcohol, ether, and water; 40 parts of boiling rectified spirit take up only 1 part of calumbine. Its best solvent is acetic acid; it is also soluble in acidulated and alkalised water. Neither nutgalls nor metallic salts affect its solution. Concentrated sulphuric acid dissolves it, and assumes first a yellow, and then a red colour. Its properties indicate that weak vinegar or sour wine would be the best menstruum for extracting the medicinal virtues of calumba root. *Dose.* 1 to 3 grs. twice a day as a tonic and stomachic, in dyspepsia, debilitated stomach, bilious vomiting, &c.; and in the later periods of dysentery and diarrhœa.

CALX. This term was formerly applied to the residuum of the combustion of any substance; or to any substance which had been exposed to a strong heat. See CALCINATION, LIME, &c.

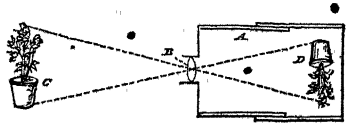
CAMBOGE'. See GAMBOGE.

CAM'ERA LU'CIDA. [L. and Eng.] When a ray of light (*r*) falls upon a quadrangular glass prism (*a*), it is bent by two reflections (at *c* and *d*), and thrown upwards where it may be received by the eye, to which it will appear described on the table or sheet of paper (*f*), glaced to receive it. The point of a pencil used to trace any object on the paper can also be seen, and by its means the picture can be

easily copied. When the prism is mounted on a stand, and a thin brass plate with a small hole through it for the eyepiece adjusted thereto, it forms the CAMERA LUCIDA of the opticians. The image may be magnified or lessened by placing a lens, so as either to intercept the rays before they strike the prism, or before they reach the eye. An ingenious person will readily be able to set up this instrument, than which a more useful one cannot exist.



CAM'ERA OBSCU''RA. [L. and Eng.] An optical instrument for producing upon a screen the image of a field of view more or less extensive. It was invented by Baptista Porta in the 16th century. The principles and construction of the camera obscura may be thus described:—A convex lens (*B*), is placed in a hole admitting the light into a darkened box or chamber (*A*), which, falling on a white ground (*D*), produces an inverted picture of every object within its range. The image thus formed may be restored to its natural position, by allowing the rays of light to pass through two lenses instead of one, or by receiving the rays on a mirror placed at an angle of 45°, when the image will be thrown on the floor in its original position. The picture may be viewed through an oblong aperture cut in the box, or the experiment may be performed in a darkened room, by placing the lens in a hole in the shutter, and allowing the image to fall on the wall, or on a sheet of white paper stretched to receive it.



In the simplest form, when intended for taking views or portraits, the image is thrown upon a mirror placed at an angle of 45°, and resting on the bottom of the box, by which means it is thrown upwards against a plate of glass, also placed at a similar angle. On this is laid a piece of semi-transparent tracing paper, on which the object is distinctly seen painted, and may be traced out with a pencil. When the camera is used in photography, slides are provided to retain the sensitive paper in the proper position in the box or dark chamber to receive the image, and the whole apparatus is adjusted with screws, and slides of the most delicate description. Achromatic glasses are also employed. See PHOTOGRAPHY.

CAM'PHINE. The name given by the trade to rectified oil of turpentine when sold for burning in lamps, in order that purchasers may not be aware of the inflammable character of the liquid. Since the introduction of the hydro-carbon oils from coal, shale, and petroleum, camphine has been little used for burning. To rectify the turpentine, it is passed in vapour through a solution of caustic potash, soda, or lime; or through sulphuric acid.

CAM'PHOR. $C_{10}H_{16}O$. *Syn.* CAM'PHIRE, LAU'REL CAM'PHOR; CAMPHO'RA, B. P. A crystalline substance found in many plants; though only obtained in large quantities from two, namely, *Camphora officinarum* and *Dryobalanops aromatica*. The first, commonly known as the laurel camphor tree of China and Japan, yields the camphor of commerce; the latter, the Sumatra or Borneo camphor, and the peculiar fluid known as liquid camphor.

It is found that several of the essential oils, by carefully distilling off about one third their volume, yield a species of camphor. By collecting this, and redistilling the remainder of the oil 2 or 3 times, a further quantity of camphor may be obtained. Oil of rosemary, treated in this way, yields about 10½ of camphor; oil of sweet marjoram the same; oil of sage yields 13½; oil of lavender, 25½. By keeping the oils loosely corked, and in a cool place, they produce a larger portion of this camphor. Aniseed camphor is the congealable portion of oil of aniseed, separated from the liquid oil, which it resembles in odour and flavour.

Camphor, Am'ber. See PYRETINE (Crystallised).

Camphor, Com'mercial (Crude). The produce of the laurel camphor tree, brought to Europe chiefly from China and the island of Formosa, in the form of grayish grains, aggregated into crumbling cakes.—*Prep.* The Chinese and Japanese extract the camphor by cutting the wood into small pieces, and boiling it with water in iron vessels, which are covered with large earthen capitals or domes, lined with nice straw. As the water boils, the camphor is volatilised along with the steam, and condenses on the straw.

Camphor, Commercial (Refined). *Syn.* WHITE CAMPHOR; CAMPHO'RA, B. P. *Prep.* 100 parts of crude camphor are mixed with 2 parts each of quick-lime and animal charcoal, both in powder, and the mixture is placed in a thin, globular, glass vessel, sunk in a sand bath. The heat is then cautiously applied, and the vessel gradually and carefully raised out of the sand as the sublimation goes on. When the process is complete, the

subliming vessel is removed and allowed to cool.

Obs. The whole process of refining camphor requires great care and experience to ensure its success. If conducted too slowly, or at a heat under 375° Fahr., the product is found to be flaky, and consequently unsaleable, without remelting or subliming. An improvement on the common method, is simply to sublime the above mixture in any convenient vessel furnished with a large and well-cooled receiver, and to remelt the product in close vessels under pressure, and to cool the liquid mass as rapidly as possible.

Prop., &c. A white, semi-crystalline solid, very volatile at common temperatures; freely soluble in alcohol, ether, bisulphuret of carbon, benzole, oils, and acetic acid, and sufficiently so in water (about 1¼ gr. to 1 oz.), to impart its characteristic smell and taste; 100 parts of alcohol (sp. gr. ·806) dissolve 120 parts of camphor; concentrated acetic acid dissolves twice its weight of camphor; average sp. gr. ·990. It fuses at 347°, boils at 400° Fahr., and when set fire to, burns with a bright flame. It evaporates slowly at ordinary temperatures, and crystallises on the inside of bottles. While floating on water it undergoes a curious rotatory movement.

Uses, &c. Camphor is sedative, narcotic, anodyne, diaphoretic, and anaphrodisiac. *Dose.* 2 to 10 grs. in the form of pill or bolus, or made into an emulsion with yolk of egg, mucilage, or almonds. In overdoses it is poisonous. The best antidote is opium or wine, preceded by an emetic. It is also used externally in ointments, liniments, and embrocations.

Camphor is frequently put into wardrobes and clothes-trunks, to keep away insects; it is used to make the white stars and fire of the pyrotechnist; and by the varnish-maker, to increase the solubility of copal and other gums. Mixed with six times its weight of clay, and distilled, it suffers decomposition, and yields a yellow, aromatic, volatile oil, smelling strongly of thyme and rosemary, which is much used by the wholesale druggists and perfumers to adulterate some of the more costly essential oils, and by the fancy soap-makers to scent their soaps.

Camphor may be beaten in a mortar for some time, without being reduced to powder, but if it be first broken with the pestle, and then sprinkled with a few drops of rectified spirit of wine, it may be readily pulverised. By adding water to an alcoholic or ethereal solution of camphor, this drug is precipitated under the form of an impalpable powder of exquisite whiteness.

Tests. Pure camphor is entirely soluble in rectified spirit, oils, and strong acetic acid; a fragment placed on a heated spoon or in a warm situation, will wholly disappear, and the evolved fumes will be highly fragrant (camphoraceous), and be free from an acid or terebinthinate odour. In an alcoholic solution of natural camphor, ammonia gives but a slight precipitate, which is dissolved on shaking the mixture; a similar solution of artificial camphor under the like treatment gives a flocculent precipitate, which remains undissolved. See FACTITIOUS CAMPHOR (*below*).

Camphor, Facti″tious. *Syn.* HYDROCHLORATE OF TUR′PENTINE, HYDROCHLORATE OF CAMPHENE, ARTIFICIAL CAMPHOR. Prepared by passing dry hydrochloric acid gas into pure oil of turpentine, cooled by a freezing mixture or pounded ice. After a time a white, crystalline mass is formed, which must be drained, and dried by pressure between folds of bibulous paper. It may be purified by solution in alcohol.

Prop., &c. It has a camphoraceous taste and odour; burns with a greenish, sooty flame, and when blown out evolves a terebinthinate odour; heated a little above the boiling-point of water, slight fumes of hydrochloric acid gas are perceptible. See CAMPHENE.

Camphor, Hydrochlo″rate of. *Syn.* MU″RIATE OF CAMPHOR; CAMPHO′RÆ HYDROCHLO″RAS, L. By passing hydrochloric acid gas over camphor, in small fragments, until it ceases to be absorbed.

Camphor, Liq′uid. *Syn.* CAMPHOR OIL; O′LEUM CAMPHO′RÆ, L. A pale yellowish, limpid fluid, which exudes from *Dryobalanops aromatica*, a tree growing in Sumatra and Borneo, when deep incisions are made in the trunk. It is supposed that the crystalline SUMATRA CAMPHOR (see *below*) is deposited from this fluid. The liquid camphor has somewhat the odour of CAJEPUT OIL, and might, no doubt, be beneficially employed for the same purpose. It is sometimes imported into Europe.

Camphor, Ni′trate of. *Syn.* CAMPHOR OIL; O′LEUM CAMPHO′RÆ FACTI″TIUM, L. Prepared by dissolving camphor in nitric acid, in the cold.

Camphor, Sul′phite of. From camphor and sulphurous acid gas, as hydrochlorate of camphor.

Camphor, Suma′tra. *Syn.* BOR′NEO CAMPHOR, HARD C., DRAGON'S BRAIN PERFUME. Obtained from *Dryobalanops aromatica*, being found in natural fissures or crevices of the wood. It resembles ordinary camphor in most properties, but its odour is not of so diffusible a nature. This kind is not seen in European commerce.

CAMPHOR CAKES. See BALLS (Camphor).

CAMPHOR′IC ACID. $H_2C_{10}H_{14}O_4$. *Syn.* ACIDUM CAMPHOR′ICUM, L. *Prep.* From camphor, 1 part; and nitric acid (sp. gr. 1·33), 4 parts; distilled together in a glass retort, with a gradually increasing heat, until vapours cease to be evolved; the camphor that has volatilised is then added to that in the retort, along with 4 or 5 parts more of nitric acid, and the process repeated again and again, until 20 parts of acid have been consumed, when crude camphoric acid crystallises out of the remaining liquor on cooling. The crystals

are purified by washing with cold distilled water, solution in boiling water, and evaporating the solution until a pellicle forms; crystals of pure camphoric acid are formed as the liquid cools.

Prop., &c. Small, colourless, lamellar or acicular crystals; acid; bitter; fusible at 158° Fahr.; sparingly soluble in water; soluble in alcohol; alcoholic solution not precipitated by water, which distinguishes camphoric acid from benzoic acid. Its salts are called CAMPHORATES. The soluble camphorates may be made by digesting the carbonate or hydrate of the metal in a hot solution of the acid, and the insoluble camphorates by double decomposition. By distillation, camphoric acid yields a colourless, crystalline, neutral substance, which has been improperly called anhydrous camphoric acid.

CAM'WOOD. This dye-stuff resembles Brazil wood in its properties, and is used in a similar manner.

CAN'ADA BALSAM. *Syn.* BAL'SAMUM CANADEN'SE, TEREBINTH'INA CANADEN'SIS, L. A thick, viscid oleo-resin obtained from the *Abies balsamea* (Lindley), a tree of common growth in Canada and the State of Maine. It is much employed as a medium for mounting microscopic objects. When pure, it is perfectly transparent, has an agreeable odour (not terebinthinate), and is wholly soluble in rectified oil of turpentine, with which it forms a beautiful glassy and colourless varnish, much used for preparing a semi-transparent copying paper.

Canada Balsam, Facti"tious. *Syn.* BALSAMUM CANADENSE FACTI"TIUM, L. *Prep.* 1. Yellow resin, 3 lbs.; oil of turpentine, 1 gal.; dissolve, and add essence of lemon, 2 drs.; oil of rosemary, 1½ dr.

2. To the last add of nut oil, 1 pint. Both are sold in the shops for Canada balsam.

CAN'DIES. See CANDYING.

CAN'DLES. Candle-making, once a rude and noisome trade, is now a first-class chemical manufacture, and as it is generally carried on in large works under the superintendence of men trained in the laboratory, a detailed account of the numerous processes included in it would be out of place here. We will, however, briefly describe the principal kinds of candles now in use, and give a few particulars respecting their manufacture. Candles are either dipped, moulded, or rolled. The cheaper sorts of tallow candles are formed by the first process, and wax candles by the last; all the other kinds are moulded. The moulds are tubes of pewter, well polished on the inside, eight or more being fitted into a frame, the upper part of which forms a trough to receive the melted candle material. When in the moulds the candles are inverted; in other words, the bottom of each mould corresponds to the top of the candle. The wick passes through a small hole at the lower extremity of the tube, and is held in the axis by a little bar placed across the top. At the factories of Price's Patent Candle Company the frames of moulds are ranged close together in long benches, and are filled with hot candle material from cars running along little railways above them. When quite cold the candles are withdrawn. The plan of pulling them out one by one with the aid of a bodkin has been superseded at the factories above mentioned, by the ingenious device of blowing them out with compressed air.

The wicks of ordinary tallow candles are made of the rovings of Turkey skein-cotton, 4 or more of which, according to the intended thickness of the wick, are wound on a reel, from which they are again run off, and cut into the proper lengths. Of late years the wicks of the best candles have been made in such a way that they do not require snuffing. This object is effected by causing the wick to bend over, and its end to fall outside the flame, where it is exposed to the oxygen of the air. This bending over is variously brought about.—1. By twisting the wick with one strand shorter than the rest, which, being slightly stretched during the moulding of the candle, contracts again and bends the wick when the fat melts. 2. By plaiting the cotton into a flat wick, which naturally takes the required curve. Such a wick is generally dipped in a solution of borax, which preserves it from being acted upon by the flame except at its extreme point at the edge of the flame. A very fine wire is sometimes included in the plaited wick. 3. In Palmer's patent two-wicked candles, which were formerly much used in lamps, the wicks are saturated with subnitrate of bismuth ground up with oil; they are then twisted tightly round a wire, which is withdrawn after the candle is moulded. In burning, the ends gradually untwist and stand out of the flame on either side. Other devices are said to be employed.

Candles, Com'posite. Mould candles formed of a mixture of the hard fatty acid obtained from palm oil and the stearine of cocoa-nut oil. They were introduced in 1840. Other compositions are occasionally used, such as a mixture of spermaceti and hard white tallow, to which a little bleached resin is added.

Candles, Med'icated. These have been proposed as a convenient means of diffusing the active principles of certain volatile substances through the atmosphere, and for complete and partial fumigations. They are seldom employed in England.

Candles, Mercu"rial. From the red sulphide or the gray oxide of mercury mixed with wax, and a wick of cotton inserted therein. Recommended by Mr. Colles for partial mercurial fumigation. They are burnt under a glass funnel with a curved neck, the upper orifice of which is directed to the diseased part.

Candles, Par'affin. From the beautiful translucent substance paraffin (which *see*). These candles surpass all others in elegance,

and are entirely free from odour and greasiness. The light produced by 98 lbs. of paraffin candles is equal to that of 120 lbs. of spermaceti, or 138 lbs. of wax, or 144 lbs. of stearic, or 155 lbs. of the best composite candles (Letheby). They are sometimes delicately tinted with red, mauve, violet, crimson, and rose colour. The Belmontine Candles of Price's Patent Candle Company are formed of the paraffin of Rangoon tar.

Candles, Spermace'ti. From spermaceti (which *see*). These are very delicate in appearance, but rather expensive. They burn well, but as the melting-point of spermaceti is low, 120° Fahr., they will not bear carrying about in the hand without guttering. They are generally adulterated with stearic acid or hard white tallow.

Candles, Stear'ic. Under this head we may place the various sorts of candles moulded from the hard fatty acids of both animal and vegetable origin. The principal sources whence British manufacturers derive their acids are tallow, palm oil, and cocoa-nut oil. The processes employed for separating them are generally described under Stearic Acid. Candles formed of the fatty acids can now be prepared so as to imitate and almost rival those of wax and spermaceti; and they are quite as cheap as the nearly obsolete mould candles formed of common tallow. They are extremely hard; they do not grease the hands, and they burn away brightly and steadily, without giving off any offensive odour. Uncoloured, they are snowy white, but a yellow tint is frequently given them by gamboge.

Candles, Tal'low. From ordinary tallow or from tallow which has been freed from much of its oleic acid by pressure. These have so unpleasant an odour and are so apt to gutter, that they will probably ultimately disappear from use. They are, however, sold at so low a price, that among the lower classes they must long retain their hold. For dip candles the wicks are immersed in melted tallow, and after rubbing with the hands, are placed straight and allowed to harden, after which they are arranged upon the "broaches" ready for dipping. For mould candles, the last operation is omitted. Great care is taken to select a cotton that yields the least possible quantity of ash after burning.

In the process of "dipping," the "dipping cistern" being filled with tallow of a proper temperature from the boiler, one of the broaches covered with wicks is placed upon the end of the "dipping beam," and pressed down gently into the melted fat; it is then withdrawn, the bottoms of the candles just touched against a board placed on one side of the cistern for the purpose, and the frame removed to the rack. This operation is repeated until the candles acquire a sufficient size, when they are finally cooled, sorted, weighed, and strung in pounds for sale.

The mould candles once in common use were made of the finer kinds of tallow only; a mixture of 3 parts of sheep, with 1 part of ox suet, being preferred. See Wax.

CAN'DLESTICKS. Metallic, earthenware, and porcelain candlesticks, snuffers, and snuffer-stands, are recommended to be cleaned by pouring boiling hot water on them (previously placed in an earthen pan), and, after wiping them quite dry with a cloth, to clean them with a piece of wash leather; those made of silver, or of plated copper, may be finally polished with a little plate powder; those of white metal, with a little whiting or fine chalk, and those of brass, with a little rotten-stone or one of the polishing pastes. For articles of this kind, made of bronze and papier maché, the water should be used only hot enough to melt the tallow, and they should be only gently dabbed or rubbed off with a very soft cloth or leather. The common practice of placing candlesticks before the fire to melt off the grease is injudicious, as the solder or japan about them is almost certain to be injured. Hence the common annoyance of damaged or "crippled" candlesticks in houses where there are careless servants.

CAN'DYING. When the object is simply to form a confection or sweetmeat, imbued with the aroma, flavour, or medicinal property of any substance, candies are generally prepared by simply boiling lump sugar with a sufficient quantity of the infusion, decoction, tincture, expressed juice, or sometimes even the powder of the particular article, until a portion taken out and cooled becomes quite solid, when it is either poured out on a marble slab, or into tin, marble, or paper moulds, dusted with powdered lump sugar.

When the object is to preserve the form and character of the vegetable in the candy, the substance is boiled in water until soft, and then suspended in concentrated syrup (in the cold), until they become transparent; after which they are either dried in a current of warm air, or in a stove, at a heat not exceeding 120° Fahr. The syrup must be kept fully saturated with sugar by reboiling it once or twice during the process.

Another method occasionally employed by confectioners for almonds and the like is to put the substances into a syrup boiled until it forms a small thread between the opening fingers, and to stir the whole until it is nearly set. See Sugar Boiling.

The following are the principal candied articles kept at the shops:—

Candied Al'monds. From blanched almonds, roasted and halved.

Candied Angel'ica. *Prep.* 1. From the root. Boil the fresh roots (after slicing them and removing the pith) in water, to deprive them of part of their bitterness and aroma; then drain them and put them into syrup boiled to a full candy height, and boiling hot; let them remain until nearly cold, when they may be taken out and carefully dried.

2. From the stems. From the tender stems, stalks, and midribs of the leaves, as last. Used as a sweetmeat and dessert. It is said to be cordial, stomachic, tonic, and aphrodisiac.

Candied A'pricots. From the fruit, scarcely ripe, either whole or cut into quarters, immersed in the syrup (hot), without any further preparation.

Candied Cit'rons. From the peels.

Candied Erin'go. From the roots, slit and washed.

Candied Gin'ger. From the roots of green ginger.

Candied Hore'hound. From a strong decoction or infusion of the root, and lump sugar, 1 pint to 8 or 10 lbs. may be used. Boil the mixture to a candy height, and pour it whilst warm into moulds or small paper cases well dusted with finely powdered lump sugar; or pour it on a dusted slab and cut it into squares.

Candied Lem'on Peel. As Candied Citron.

Candied Or'ange Flow'ers. From the flowers deprived of their cups, stamina, and pistils (2 oz. to each lb. of sugar), as Candied Almonds, but poured out on a slab.

Candied Or'ange Peel. From the peel of the Seville orange, or common orange, as Candied Citron.

Candied Su'gar. See SUGAR BOILING.

The following are articles of a more special character.

Candy, Car'away. 1. From caraway seeds (in fine powder), ½ oz.; sugar, 1 lb.

2. Oil of caraway, 1 dr.; sugar, 1 lb.

Candy, Diges'tive. *Syn.* LIVE-LONG CANDY. *Prep.* 1. Rhubarb and bicarbonate of soda, of each, 1 dr.; ginger, ½ dr.; cinnamon, 20 grs.; (all in fine powder;) heavy magnesia, 1 oz.; powdered sugar, 2 oz.; mucilage of tragacanth, q. s. to form a lozenge mass; to be divided into small squares of 18 or 20 grs. each.

2. As the last, but adding finely powdered caraways, 1 dr.; oil of caraway, 15 drops; and sugar, 1 oz. Both are used as heartburn and digestive lozenges.

Candy, Gin'ger. *Prep.* 1. From ginger (in coarse powder), 3 oz.; boiling water, 1¼ pint; macerate in a warm place for 2 hours, strain, add lump and moist sugar, of each 5 lbs., and boil to a candy.

2. Ginger (in very fine powder), 1 oz.; powdered sugar, 2 lbs.; syrup, q. s. to make a paste. Stomachic and carminative.

For various sweetmeats which might come under the head of CANDY, see CONFECTIONS, DROPS.

CAN'NON METAL. See GUN METAL.

CANTHARIDES. *Syn.* SPANISH FLIES, BLISTERING F., LYTTÆ; CANTHAR'IS, B. P. The *Cantharis vesicatoria* of Latreille, commonly known as the *Spanish fly*, is an insect of the order *Coleoptera;* it abounds in the south of France, Spain, and Italy; and has spread into Germany and the south of Russia. When alive it exudes a strong fetid and penetrating odour.

Pur., &c. These insects should be preserved in well-closed bottles or tin canisters. The addition of a few drops of oil of cloves, or of strong acetic acid, or even a few cloves in substance, will preserve them unchanged for a length of time in closed vessels. The best proof of their goodness is the smell. The powder is constantly adulterated. The plan of the wholesale druggists is to sort out the most worthless flies for powdering, and to compensate for their deficiency of vesicating power, by adding 1 lb. of euphorbium to every 12 or 13 lbs. of flies. When a superior article is required, liquorice powder is added (4 or 5 lbs. to every 14 lbs.), along with about 1 lb. of euphorbium, and sufficient blue black or charcoal to turn the yellow of the liquorice to a greenish colour. The best mode of detecting this adulteration is by the microscope.

Ant. An emetic of sulphate of zinc, followed by the stomach-pump, if necessary. The vomiting may be promoted by copiously drinking warm bland diluents, such as broth, linseed tea, milk, &c. Friction on the spine, with volatile liniment and laudanum, and the subsequent administration of draughts containing musk, opium, and camphorated emulsion, have been strongly recommended.

Tests. By the microscope, very minute particles may be discovered in the stomach and intestines, on a post-mortem examination. Orfila thus found particles of cantharides in a body that had been interred nine months.

Uses, &c. Spanish flies are used externally, to raise blisters, and internally, as a stimulant and diuretic, generally in the form of tincture. In excess they produce strangury, bloody urine, satyriasis, delirium, convulsions, and death. See TINCTURES, VESICANTS, &c.

CANTHARI'DIN. $C_5H_{12}O_2$ Isomeric with picrotoxin. This substance is found in, and is the vesicating principle of, the Spanish fly, Chinese blistering fly, and other coleopterous insects. *Prep.* Pulverised cantharides are allowed to remain in contact for 24 hours with twice their weight of chloroform, in a displacement apparatus. The chloroform is then drained off, and finally displaced by alcohol, and the solution is left to evaporate. The cantharidin crystallises out, saturated with green oil. In order to purify the cantharidin it is laid on bibulous paper, which absorbs the greater part of the oil, and then crystallised out of a mixture of alcohol and chloroform (Procter).

Prop. Prismatic crystals, melts at 200° C., volatilises in white fumes, which strongly irritate the eyes, nose, and throat, and condenses in rectangular prisms. Cantharidin is insoluble in water, but soluble in alcohol, ether, chloroform, acetic acid, and in the fixed and volatile oils. Its solution in any of the liquids above mentioned possesses vesicating proper-

ties, which, however, is not exhibited by solid cantharidin.

CAOUT'CHOUC. *Syn.* INDIA RUBBER, ELASTIC GUM. India rubber is the concrete juice of the *Ficus elastica, Siphonia elastica,* the *Urceola elastica,* and many other tropical plants. The fresh milky juice is spread over moulds of unbaked clay, and is then exposed to the heat and smoke of a fire, or torches, to dry it, whence it derives its dark colour. Successive coats of juice are laid on, and the operation of drying repeated, until the bottles acquire sufficient thickness. When it has become thoroughly hard and dry, the clay is beaten out. In this form it is commonly imported.

Prop., &c. The general properties of India rubber, as well as its numerous applications, are well known. The fresh juice has a cream-like appearance and consistence, is coagulated by heat, and is miscible with water, alcohol, and wood naphtha; sp. gr. 1·012 to 1·041; it yields from 18% to 45% of solid caoutchouc, either by heat or evaporation. By excluding it from the air, it may be preserved unchanged for a considerable period.

Solid caoutchouc has a sp. gr. ranging between ·919 and ·941; it melts at 248° Fahr. into a viscid mass, which does not again harden on cooling; it is unaltered by chlorine, hydrochloric acid, sulphurous acid, fluosilicic acid, ammonia, caustic alkaline lyes (even when boiling), and most similar substances; nitric acid and sulphuric acid act on it only by long contact when concentrated. Some specimens of caoutchouc are harder than gutta percha itself, and equally inelastic, whilst others never perfectly solidify, but remain in a condition resembling that of birdlime or printers' varnish.

The best solvents of caoutchouc are rectified sulphuric ether (which has been washed with water to remove alcohol and acidity), chloroform, bisulphide of carbon, a mixture of bisulphide of carbon and absolute alcohol (94 of the first to 6 or 7 of the last), and caoutchoucin. All these liquids dissolve India rubber rapidly in the cold, and leave it unaltered on evaporation. The first two, are, however, too expensive to be generally employed. The others have a disagreeable odour, but are much cheaper than the rest, and possess the advantage of leaving the film of caoutchouc in a firmer and stronger condition than other solvents. Pyrogenous oil of turpentine is another cheap and good solvent. Benzol, rectified mineral or coal-tar naphtha, crude petroleum, and oil of turpentine, dissolve India rubber by long digestion and trituration, (with heat,) otherwise they merely form with it a glutinous jelly that dries very slowly and imperfectly, leaving it much reduced in hardness and elasticity. The fats and fixed oils also readily dissolve caoutchouc (with heat), forming permanently glutinous solutions or pastes; so also do most of the volatile oils, but the solutions with the majority of them dry with difficulty.

One of the most remarkable properties of India rubber is the great amount of heat which is disengaged during its condensation by pressure or in the exercise of its elasticity. During the process of kneading the raw caoutchouc in the "masticators," the cold water thrown in to reduce the temperature soon becomes boiling hot. When no water is added, a temperature so high is often reached as to occasion the melting of the rubber. This is particularly the case during the process of "dry kneading" with quick-lime. A tube 2¼ inches in diameter, impactly secured, was subjected to a force of 200 tons. The result was a compression amounting to 1-10th; great heat was evolved, and the excessive elasticity of the substance caused a flywheel weighing five tons to recoil with alarming violence. Mr. Brockedon states that he succeeded in raising the temperature of an ounce of water 2° in about fifteen minutes by collecting the heat evolved by the extension of a small thread of caoutchouc. He refers this effect to the change in specific gravity, and contends that the heat thus produced is not due to friction, because the same amount of friction is occasioned in the contraction as in the extension of the substance, and the result of this contraction is to reduce the caoutchouc thus acted upon to its original temperature.

The edges and surfaces of India rubber are readily and perfectly joined by mere contact and intense pressure. On the small scale, the edges may be moistened with ether, naphtha, oil of turpentine, or some other solvent, or by long boiling in water, and immediately pressed tight together, and held in contact for some time.

Elastic tubes are readily formed of India rubber, by cutting it into uniform slips of proper thickness, and winding them round rods of polished glass or metal, so that the edges are in close contact or "overlapping." A piece of tape is then wound round outside it, and the whole boiled in water for 2 or 3 hours, after which time the edges will be found to be sufficiently adherent. A better plan is to immerse the "rubber" in a mixture formed of bisulphide of carbon, 95 parts, and rectified spirit, 5 parts, until it swells into a pasty mass, which may then be moulded into any desired form, or passed through the die of a tubing machine. For chemical purposes, brewing, &c., vulcanized India-rubber tubing has now taken the place formerly occupied by the unprepared material.

The once celebrated "Mackintoshes" are made by spreading two or more coats of a paste made of caoutchouc and rectified coal-tar naphtha over the surface of the stuff or cloth, and when it has become partially dry, pressing two such surfaces evenly together by passing the goods between a pair of cylinders or rollers. The articles are then placed in a stove room for the composition to harden, and to remove the odour of the naphtha. Of

late years, vulcanized or mineralized rubber (coloured) has been used for this purpose, and being spread on the outside of the stuff instead of the inside, forms an ornamental and thoroughly waterproof material.

India-rubber thread is prepared by stretching it (previously cut into coarse filaments) to 5 or 6 times its length in boiling water or hot air, in which state it is allowed to cool slowly. This process is repeated again and again, until it reaches 16,000 or 17,000 times its original length, when it is glazed by agitating it with powdered sulphur, or French chalk. This thread is readily joined or "pieced," as it is called, by paring the ends obliquely with a pair of scissors or a knife, and then pressing the clean ends strongly together with the fingers. When the coarse filaments from the cutting machine are simply stretched with the moistened thumb and finger in the act of "reeling" to about 8 or 9 times their length, they are said to be "inelasticated," and are ready to be made into elastic braces, elastic web, and other like elastic tissues and fabrics, in the braiding machine.

Caoutchouc, Vul'canized. *Syn.* VULCANIZED INDIA RUBBER, MINE'RALIZED I. R., SUL'PHURETTED I. R. The discovery of the singular action of sulphur and the mineral sulphides on caoutchouc was made by Mr. Charles Goodyear, of New York, in 1842, at which date the manufacture of vulcanized India rubber may be said to have commenced. In 1843 Mr. Thomas Hancock patented a process for vulcanized India rubber in these countries, founded on that of Mr. Goodyear. A sheet of caoutchouc immersed in melted sulphur absorbs a portion of it, and at the same time undergoes important changes in many of its leading characteristics. So prepared, it is no longer affected by changes of temperature; it is neither hardened by cold nor softened by any heat insufficient to destroy it. It loses its solubility in the solvents of ordinary caoutchouc, whilst its elasticity is greatly augmented, and has become permanent.

The same effect is produced when sulphur is kneaded into caoutchouc in a masticator, or by means of powerful rollers, as well as when common solvents (naphtha, spirit of turpentine, &c.) are charged with a sufficient amount of sulphur, in solution, to become a compound solvent of the rubber. In these cases articles may be made of any required form before heating them for the change of condition, technically termed "vulcanization." It is necessary, however, for this purpose, that the form should be carefully maintained both before and during the exposure to the heat.

"A vulcanized solid sphere of 2½ inches in diameter, when forced between two rollers ¼ inch apart, was found to maintain its form uninjured. In fact, it is the exclusive property of vulcanized caoutchouc to be able to retain any form impressed upon it, and to return to that form on the removal of any disturbing force which has been brought to act upon it." (Brockedon.)

Caoutchouc combines with from 12% to 15% of sulphur; the quantity of sulphur added to the naphtha paste should not, therefore, exceed 10% or 12% of its weight.

The temperatures for vulcanization by the common method range from 320° to 330°; and the period required is one hour or more, according to the temperature. A much lower temperature is, however, sufficient, if the duration of the exposure is much extended, or the compound mass is softened with any of the common solvents of India rubber.

The process of sulphuring, or mineralization, is differently conducted in different manufactories. Under Mr. Burke's patent, oxysulphide or amorphous sulphide of antimony (formed by decomposing a solution of crude antimony in a lye of potash or soda, with hydrochloric acid) is employed. This powder he combines with either India rubber or gutta percha, or mixtures of them, by kneading in a "masticator" for 2 or 3 hours, and after strong compression in a mould whilst still warm, he exposes the mass to a steam heat ranging from 250° to 280° Fahr. The block, so prepared, is afterwards cut into sheets, &c. The advantages possessed by the product are, that it possesses no unpleasant odour, nor does the sulphur effloresce on its surface, as in ordinary vulcanized India rubber.

Under Mr. Christopher Nickel's patent (1849) 1 part of sulphur is kneaded with 6 parts of caoutchouc, and then pressed into moulds, as before. He also vulcanizes rubber by exposing it in a cylinder heated in a steam jacket to the fumes of sulphur or to sulphuretted gases, given off from a retort connected with the apparatus. The rubber thus prepared he next subjects to hydraulic pressure in moulds, at a temperature ranging between 220° and 250° Fahr.

Small articles or sheets of India rubber may be extemporaneously vulcanized at common temperatures by simple immersion, for a minute or two, in a mixture of bisulphide of carbon, 97½ parts, and protochloride of sulphur, 2½ parts; after which they must be well washed first in weak alkaline lye, and next in pure water. Mr. Parkes employs 100 instead of 97½ parts of the bisulphide. This method is termed "cold sulphuring."

An excellent method of vulcanization, recommended by Mr. Parkes, particularly applicable to small articles, consists in immersing them for about 3 hours in a close vessel containing a solution of polysulphide of potassium at 25° Baumé (sp. gr. 1·197), and of the temperature of 240° Fahr. It is afterwards washed in an alkaline lye, then in pure water, and dried.

Among the many applications of vulcanized India rubber those connected with its elasticity and its enormous contractile power when extended are particularly striking. Under

Mr. E. Smith's patent, "torsion springs" for roller blinds, door springs, clock springs, carriage springs, &c., are made of it. Mr. Hodges, in another patent, has availed himself of the same property as a new mechanical power. Short lengths of caoutchouc, which he terms "vulcanized power purchases," are successively drawn down from or lifted to a fixed bearing, and attached to any weight which it is required to raise; when a sufficient number of these power purchases are fixed to the weight, their combined elastic force lifts it from the ground. Thus, 10 purchases of the elastic strength each of 50 lbs. raise 500 lbs. Each purchase is 6 inches long, and contains about 1½ oz. of vulcanized caoutchouc. These 10 purchases, if stretched to the limit of their elasticity (not of their cohesive strength), will lift a weight exceeding 650 lbs.

The same principle has been applied to relieve and equalise the strain on ships' cables, especially where several boats are towing one vessel; and as a projectile force. A number of power purchases, attached to the barrel of a gun constructed to project harpoons, will exert a power, if suddenly relieved, proportioned to their aggregate forces. By similar contrivances balls may be projected 200 yards or more, and a charge of No. 4 shot can be thrown 120 yards. A bow, in which the string alone is elastic (the reverse of the usual form), has been contrived which throws a 30-inch arrow 170 yards.

The last great improvement in the manufacture of caoutchouc is the discovery that by continuing the process of vulcanization for a longer time at an increased heat and under pressure, a hard black substance is obtained, which can be turned in a lathe like ebony. This substance has already been applied to an extraordinary number of uses. See VULCANITE.

An exceedingly useful combination of cork and India rubber has lately been introduced. See KAMPTULICON.

Caoutchouc, Facti″tious. See CONSOLIDATED OIL.

CAOUTCHOUCIN. An extremely light fluid obtained by distilling India rubber.

Prep. (Barnard's patent process.) A highly volatile fluid, discovered by Mr. Barnard. India rubber or caoutchouc, as imported, cut into small lumps, containing about 2 cubic inches each, is thrown into a cast-iron still, connected with a well-cooled worm-tub (any flat vessel with a large evaporating surface will do, the entire top of which can be removed for the purpose of cleaning it out); and heat is applied in the usual way, until the thermometer ranges to about 600° Fahr., when nothing is left in the still but dirt and charcoal. The dark-coloured fetid oil which has distilled over is next rectified along with ⅓rd its weight of water, once or oftener; and at each rectification becomes brighter and paler, until at about sp. gr. ·680 it is colourless, and slightly volatile. The product is then shaken up with nitro-hydrochloric acid, or chlorine, in the proportion of a ¼ of a pint of the acid to 1 gallon of the liquid. To enable the dirt to be the more easily removed from the bottom of the still, common solder, to the depth of about ½ an inch, is trown in.—*Prod.* 80%.

Prop., &c. Mixed with alcohol, caoutchoucin dissolves gums and resins, especially copal and India rubber, at the common temperature of the atmosphere, and it speedily evaporates, leaving them again in the solid state. It mixes with the oils in all proportions. It has been used in the manufacture of varnishes, and for liquefying oil paints, instead of turpentine. It is very volatile, and requires to be kept in close vessels. According to the researches of Himly, Gregory, and Bouchardat, the caoutchoucin of Barnard consists of several liquids, some of which have the composition of olefiant gas, and others that of oil of turpentine.

CA″PERS. The flower buds of various species of *Capparis*, particularly *C. spinosa*, caper tree, preserved in vinegar. They are chiefly imported from Spain, Italy, and the South of France, where the caper tree is largely cultivated for the purpose. The flower-buds are picked daily, and thrown into a cask of strong pickling vinegar, until it becomes full, when it is sold to the dealers by the collector. The former sort them into different sizes by means of copper sieves, in a similar way to that adopted for lead shot and gunpowder. In this way they are divided into *nonpareilles, capuchins, capotes, seconds*, and *thirds*, of which the former, or smallest, are regarded as the best; but much depends upon the quality of the vinegar.

The lively green colour of capers, so much valued by the ignorant, arises chiefly from the presence of copper derived from the sieves used in sorting them. In many cases, copper coin, as sous and halfpence, are added for the purpose. Thus the eye is gratified at the sacrifice of the stomach, and an insidious poison introduced into the system, simply to give an unnatural appearance to a condiment which tastes better without it. See COPPER.

CAPILLAIRE′. [Fr.] Simple syrup, or a concentrated solution of sugar in water, flavoured with orange-flower water, or some other similar aromatic. The name was originally given to a mucilaginous syrup, prepared by adding to an infusion of maiden-hair (*Adiantum capillus Veneris*) some sugar and orange-flower water.

CAP′NOMOR. See KAPNOMOR.

CAP′RIC ACID. $HC_{10}H_{19}O_2$. *Syn.* RU″TIC ACID; ACIDUM CAP′RICUM, L. An acid discovered by Chevreul, and obtained by decomposing caprate of barium with dilute sulphuric acid, or primarily by the saponification of butter or cocoa-nut oil, when it appears combined with butyric, caproic and caprylic acids. It is

also procured by acting upon oleic acid or oil of rue with nitric acid.

Obs. When butter is saponified with caustic potassa or soda, and the resulting soap decomposed by adding an acid, in excess, and distilling the mixture, the four acids above named pass over into the receiver, in combination with water. The mixed acids may be separated by saturating them collectively with baryta, and by taking advantage of the unequal solubility of the newly formed barium salts. The less soluble portion (equal to about $\frac{1}{10}$th of the dry mass) contains capric and caprylic acid; the larger and more soluble portion, butyric and caproic acid. On the same plan, the two groups are resolved into their separate acids. These acids are deprived of their uncombined water by means of chloride of calcium. It is advisable to employ the term rutic acid, as the older term is easily confounded with caproic and caprylic.

Prop. Capric or rutic acid crystallises in fine needles, which fuse at 86° Fahr., giving out an odour resembling that of a goat. It is sparingly soluble in boiling water.

Prep. (Miller.) Castor oil is saponified by means of potassa or soda, and afterwards an excess of the hydrated alkali is added, amounting to one half the oil used. The mass is heated in a retort, and an oily liquid covered with water distils over. This oily liquid, which is the octylic alcohol, is rectified several times with potassa until the residue is no longer coloured brown.—*Prop.* A colourless liquid, of powerful aromatic odour; insoluble in water, but dissolving readily in acetic acid, ether, and alcohol. Its boiling-point is 356° Fahr., its sp. gr. ·823. The caprylate of ethyl, erroneously termed caprylic ether, is a colourless liquid, with an agreeable odour of pineapples.

CAP'SICINE is the name given to an alkaloid obtained from the *capsicum* or Cayenne pepper. It has a burning taste, and when quite pure crystallises. It forms crystallisable salts with acetic, nitric, and sulphuric acids.

CAP'SICUM. [L. and Eng.] *Syn.* CHIL'I, RED PEPPER. A gen. of plants belonging to the natural order *Solanaceæ*, species of which yield the fruits which are used to form *Cayenne pepper* and *Chili vinegar*. The officinal capsicum of B. P. is the fruit of the species *C. fastigiatum*. See PEPPERS, TINCTURES, VINEGARS.

CAP'SULES. This term is now commonly applied to small egg-shaped or spherical vessels, in which medicines are placed, for the purpose of covering their nauseous taste, at the time of swallowing them. They are commonly made of gelatin, mixtures of sugar and gelatine, or animal membrane.

Capsules, Gel'atin. *Prep.* 1. By dipping the bulbous extremity of an oiled metallic rod into a strong solution of gelatin. When the rod is withdrawn, it is rotated, in order to diffuse the fluid jelly equally over its surface. As soon as the gelatinous film has partially hardened, it is removed from the mould and placed on pins, furnished with suitable heads, and fixed on a cork table. When sufficiently dry, the capsules are placed upright in little cells, made in the table to receive them, and the liquid with which they are to be filled is then introduced by means of a small glass tube. They are next closed by dropping some of the melted gelatin on the orifice of each. Six parts of gelatin, and one part of sugar, are now the common proportions.

2. (Simonin.) Oval balls of wax, of the requisite size, are prepared by pouring wax into a wooden mould, consisting of two parts, and arranged for the reception of a row of these balls. These are afterwards stuck on iron needles, affixed to rods of convenient size, in rows. The balls are now uniformly coated all at once by dipping in the usual manner, then removed from the needles, and are next placed with the needle holes downwards, on a gently heated plate, when the wax flows out, and a round capsule is left behind.

Capsules, Gel'atin and Su'gar. *Prep.* (Giraud.) Gelatin, 6 parts; solution of gum and simple syrup, of each, 1 part; water, 5 parts; melt in a water bath, remove the scum, and proceed as before.

Capsules, Glut'en. These, which form the subject of a French patent, are said to be formed of the gluten of wheat flour, a substance which is insoluble, although softened, by water. We have placed these capsules for twenty-four hours in warm water, and found them, at the expiration of that time, still unbroken, the enclosed medicine being completely enveloped. The mode of preparation is kept secret.

Capsules, Mem'branous. *Syn.* ORGAN'IC CAPSULES. From gut-skin moistened and stretched over an oiled bulb of glass or metal, and filled in the common way. These have been patented, but they do not appear to be an improvement on the common capsule of gelatin.

Obs. The common capsules usually hold about 10 or 12 grs. of balsam of copaiba. Those of the shops, in nine cases out of ten, are filled with adulterated copaiba, and at least 4-5ths of them are filled with train oil or linseed oil, to which a few drops only of the balsam are added.

Balsam of copaiba (capivi) and oil of cubebs, or a mixture of them, castor oil and cod-liver oil, are the substances most usually administered in this way. *Baccæ copaiferæ factitiæ* are officinal in the Ph. Castr. Ruth. Ratier has proposed to grease them and administer them per anum. Ricord has strongly recommended capsules of copaiba, coated with extract of rhatany, as much superior to the common ones of copaiba alone, in the treatment of gleet and gonorrhœa. They may be easily prepared by either of the following methods:

1. By immersing, for an instant, the com-

mon capsule in a mixture of extract of rhatany (newly prepared from the root), 3 parts; syrup of moist sugar, 1 part; mucilage of gum Arabic, 1 part; melted together in a water bath.

2. By forming the bodies of the capsules with the above mixture or composition, instead of with gelatin, and then following the same manipulations as for the manufacture of the common gelatin capsules.

These capsules are said to sit well upon the stomach, the tone of which they contribute to improve, and to act with greater certainty than those made of copaiba and gelatin alone.

CAR'AMEL. A dark-brown product obtained by heating sugar. It is formed during the roasting of all materials containing sugar, such as coffee and malt. It is much used for colouring soups, wines, spirits, and other liquids.

Caramel, Crude. *Syn.* SPIRIT COLOURING, BURNT SUGAR. *Prep.* From cane sugar, by heating it to from 410° to 428° Fahr., as long as aqueous vapour is formed; dissolving the product in water, and concentrating the solution by evaporation.

Caramel, Pure. *Prep.* 1. (Graham.) Crude caramel, obtained as above, is placed on a parchment-paper dialyser. The undecomposed sugar and certain intermediate compounds diffuse out with considerable facility, and what ultimately remains on the dialyser possesses five times the colouring power of the original crude caramel, weight for weight. See DIALYSIS.

2. (Peligot.) Add strong alcohol to a filtered aqueous solution of crude caramel until it ceases to produce a precipitate; collect the precipitate, which is caramel, on a filter, wash with alcohol, and dry. Graham recommends that the product should be dissolved and precipitated four or five times, or till the mass thrown down, from being plastic at first, becomes pulverulent.

3. (J. J. Pohl.) Cane sugar is heated in a spacious metallic vessel by means of an oil bath to 410° or 419° Fahr. as long as aqueous vapours escape, the mass being occasionally stirred with a spatula. The mass is then finely powdered and digested with alcohol for two or three hours; the digestion is repeated until the fluid no longer tastes bitter.

Prop. A solution containing 10% of purified caramel is gummy, and forms a tremulous jelly on standing. Evaporated *in vacuo*, it dries up into a black shining mass soluble in water; but if the solution be evaporated to dryness by the heat of a water bath, the whole matter is rendered insoluble in hot or cold water. A very small proportion of caramel suffices to give a rich sepia tint to water.

CAR'AT. A weight of 4 grains used in weighing diamonds, which are spoken of as of so many carats weight. Among assayers, a carat is a weight of 12 grains; but more commonly a proportional weight or term, representing the number of parts of pure gold in 24 parts of the alloy; pure gold being spoken of as of 24 carats fine. It is commonly the 24th part of the "assay pound," and is nominally subdivided into 4 assay grains, and these again into quarters. See ASSAYING.

CAR'AWAY. *Syn.* CARAWAY SEED; SEMENA CARUI, L.; CARUI, B. P. The fruit of the *Carum Carui* (Linn.), an umbelliferous plant, common in England and other parts of Europe. These fruits, commonly called "seeds," form an agreeable and useful aromatic and carminative, and are especially esteemed in the flatulent colic of children. They are also largely employed as an adjuvant or corrective in various officinal preparations; and as a flavoring ingredient in cakes, biscuits, cordials, confectionery, &c. See ESSENCES.

CARBAZOTIC ACID. See PICRIC ACID.

CARBOL'IC ACID. $H.C_6H_5O$. *Syn.* PHENYLIC ACID, PHENIC ACID, PHENOL, PHENYLIC ALCOHOL, HYDRATE OF PHENYLE, HYDRATED OXIDE OF PHENYLE. A powerful antiseptic substance obtained from coal-tar oil.

Prep. Crude, heavy coal oil is agitated with milk of lime, allowed to stand, and the aqueous portion separated from the undissolved oil and decomposed by hydrochloric acid. The oily liquid obtained is purified by distillation.

1. Crude coal oil is distilled in a retort furnished with a thermometer, and the portion which passes over when the heat ranges between 300° and 400° Fahr., is collected apart, and mixed with a hot saturated solution of caustic potassa; after standing for some time, a semi-crystalline pasty mass forms, from which the supernatant liquid is decanted; the pasty mass is now agitated with a small quantity of water until dissolved; the solution thus formed separates into two portions, the denser of which contains carbolate of potassa; this being separated by decantation, is decomposed by hydrochloric acid. The solution of carbolic acid which rises to the surface is digested with chloride of calcium, to remove water, and purified by distillation; the distillate, by refrigeration, furnishes crystals of the acid, which must be drained, dried, and preserved from the air.

2. From salicylic acid. Mix intimately together equal weights of salicylic acid and powdered glass; introduce the mixture into a good German retort, and heat on a sand bath, gradually raising the heat till it becomes red hot at the bottom. The vapour is condensed in any convenient receiver. If the materials are perfectly dry, it solidifies to a mass of crystals as soon as it condenses, but if there be a trace of water present it remains liquid. The slower it distills over, the lighter will be the colour, while if a high temperature be employed it comes over nearly black. It may be rendered colourless and anhydrous by rectification over quick-lime.

Of late years the manufacture of carbolic

acid has increased to a great extent, and is generally found in a pale yellow clear solution, instead of as a dark hazy liquid. The pure anhydrous acid is in long, colourless, prismatic crystals, often, however, on keeping turning a beautiful pink, rose, or crimson, and which rapidly deliquesce in moist air, becoming converted into a colourless refractive liquid, having a faint odour of roses and tar. Carbolic acid is poisonous, and is a powerful antiseptic.

Uses. The extraordinary antiseptic properties of carbolic acid have long been known, but its extended use has been delayed, owing to the difficulty experienced in obtaining it in considerable quantities. It is now, however, principally owing to the labours of Dr. F. Crace Calvert, produced on a large scale, and this chemist has proposed its application to many valuable purposes. As a medical agent, it seems to have all the useful properties of creosote in an exalted degree, with some peculiar actions of its own, and is being applied with marked success in the Manchester Royal Infirmary and similar institutions, in cases of chronic diarrhœa, obstinate vomiting (even after creosote has failed), and as a disinfecting wash for ill-conditioned ulcers and gangrenous sores. It has also been applied successfully in cases of foot-rot, a disease which annually carries off large numbers of sheep. It has been employed for the preservation of gelatin solutions and preparations of size made with starch, flour, and similar materials, and of skins and other animal substances. It appears to act strongly as an antiferment, and Dr. Calvert states that it is one of the most powerful preventives of putrefaction with which he is acquainted. Commercial creosote is frequently nothing more than hydrated carbolic acid.

CAR'BON. C. *Syn.* CARBO'NIUM, CAR'BO, L.; CHARBON, Fr.; KOHLENSTOFF, Ger. An elementary or simple non-metallic solid body, very widely diffused through nature. Its purest and rarest form is that of the diamond. Nearly pure, it occurs very abundantly in the forms of graphite and anthracite. In combination with oxygen, as carbonic acid, it exists in the atmosphere and in the waters of most springs, also in limestone, marble, chalk, and dolomite. Combined with hydrogen, it enters largely into coal, peat, and lignite. It is an essential constituent of organic matter, and hence it has been termed the "organic element." Charcoal, lamp-black, and coke, are more or less pure forms of carbon. By strongly igniting lamp-black in a covered crucible, the element is obtained sufficiently pure for most chemical purposes.

It is best obtained purest by burning a jet of pure olefiant gas in an atmosphere of pure chloride, collecting the amorphous carbon deposited, and igniting *in vacuo* at a red heat.

Forms several chlorides, sulphides, &c., of which the following are the chief:—

Carbon, Protochloride of. Obtained from the sesquichloride by subliming it repeatedly through a tube filled with fragments of glass heated to redness. A transparent colourless liquid, with aromatic odour.

Carbon, Sesquichloride of. C_2Cl_6. Obtained by exposing Dutch liquid with chlorine, in a glass vessel, to the direct rays of the sun, taking care to renew the chlorine as long as it is absorbed. The liquid is ultimately converted into the sesquichloride of carbon, which is a white, crystalline, volatile substance.

Carbon, Oxychloride of. $COCl_2$. *Syn.* CHLO'ROCARBON'IC ACID, PHOSGENE GAS, CHLORIDE OF CARBONYL. Equal measures of carbonic oxide and chlorine are exposed to the direct rays of the sun; they combine, and become condensed to half their volume. It is a colourless, suffocating gas, which is immediately decomposed by water into carbonic and hydrochloric acids.

Carbon, Sulphide of. CS_2. *Syn.* BISULPHIDE OF CARBON, CARBON DISULPHIDE, SULPHURET OF CARBON. Bisulphide of iron (iron pyrites), 5 parts, and fresh dry charcoal, 1 part, are heated together in a stoneware retort, furnished with a glass tube, having the end bent, and passing nearly to the bottom of a bottle or receiver filled with pounded ice. The bisulphide of carbon collects at the bottom of the receiver, and is then purified from adhering moisture and sulphur by distilling it, at a low temperature, from fused chloride of calcium.

By passing the vapour of sulphur over fragments of charcoal, heated to bright redness in a porcelain tube, and collecting the product as before.

Prop., Uses, &c. A colourless, pungent, fetid liquid, having the sp. gr. 1·27. It is exceedingly volatile, boiling at 118·5° Fahr., and has never been frozen. It is highly inflammable, burning with a pale-blue flame, and giving off sulphurous and carbonic acid gases. It freely dissolves sulphur, phosphorus, and several other substances, and by spontaneous evaporation deposits the first in beautiful crystals. The solution of phosphorus is much used in electrotyping objects, which are coated with a conducting film by its means. Its refractive power is remarkably high, and on this account it is employed to fill hollow lenses for spectroscopes and other optical instruments. It produces intense cold by its evaporation. A spirit thermometer, having its bulb covered with cotton, if dipped into this fluid and suspended in the air, rapidly sinks from 60° to 0°, and if put into the receiver of an air-pump it will fall to —81° Fahr. A mixture of sulphide of carbon and solid carbonic anhydride forms almost the most powerful frigorific agent known. Sulphide of carbon is now prepared on the large scale, and extensively employed as a solvent.

It is stated that the odour of sulphide of carbon can be readily removed by allowing it to stand over mercury or corrosive sublimate for some time, and then redistilling.

CAR'BONATE, a salt in which the hydrogen

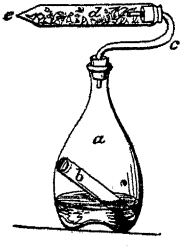
of (hypothetical) carbonic acid (H_2CO_3) is replaced by a metal or other basic radical.

Prep., &c. The processes by which the commercial carbonates and many others are prepared are described under the respective bases. Most of the earthy carbonates are found abundantly in nature. In general, the salts of this class may be formed by adding an alkaline carbonate to a salt of the metal in solution by double decomposition.

Prop. The carbonates of the alkalies are soluble in water; those of the other bases are for the most part insoluble, except the water is highly charged with carbonic acid. From most of them carbonic anhydride or anhydrous carbonic acid can be easily expelled by heat.

Tests. The carbonates are easily distinguished by the following reactions:—They dissolve with effervescence in hydrochloric acid, and in most other acids; in some cases a gentle heat is required to promote the disengagement of the gas.—The gas evolved in the last, passed into lime water and baryta water, occasions white precipitates, which redissolve in acids with effervescence, and after the solution has been boiled are not reprecipitated by liquor of ammonia.—Chloride of calcium and chloride of barium give white precipitates in solutions of the neutral alkaline carbonates, but in solutions of the alkaline bicarbonates only after ebullition; and the precipitates are readily soluble with effervescence in acetic acid.

Estim. The quantity of the metal in an alkaline or earthy carbonate may be easily determined by the ordinary volumetric methods of alkalimetry (which *see*), and the quantity of carbonic acid, by the method of Fresenius and Will (see ALKALIMETRY). The apparatus figured below, or preferably that shown in the article on ALKALIMETRY, may be used instead of the more complicated contrivance of the German chemists.



(*a.*) Flask containing the sample of carbonate for examination, stopped by a closely fitting cork, through which passes the bent tube (*c*).
(*b.*) A small tube, sufficiently long to maintain a slanting position without falling, filled with sulphuric or hydrochloric acid.
(*c.*) A bent tube, connecting the flask with (*d*).
(*d.*) Horizontal tube, filled with small fragments of fused or dried chloride of calcium, with a fine orifice at the extremity (*e*).

With the apparatus above, which is that commonly used, a weighed sample of the carbonate to be examined is placed in the flask (*a*) along with a little water, and the small tube (*b*), filled with either sulphuric or hydrochloric acid, is carefully introduced. The cork, with its chloride of calcium tube (*d*), is then fitted to the flask, and the whole apparatus very accurately weighed.

On inclining the apparatus the acid escapes over the side of the small tube, and mixing with the liquor in the flask, expels the carbonic acid of the carbonate, which is then dried by passing over the chloride of calcium. After effervescence has ceased, heat should be applied to the bottom of the flask, until it be filled with steam, to expel the carbonic gas it contains. The loss of weight gives the weight of the carbonic acid gas that was contained in the sample. The quantity of carbonic acid in the carbonates of the metals that do not contain water, may be determined by heating them to redness in a platina crucible.

CARBONIC ACID. H_2CO_3. True carbonic acid has not yet been obtained in any satisfactory condition, although the solution of carbonic anhydride (often called carbonic acid), or anhydrous carbonic acid, is generally regarded as such. It forms with bases an important series of salts, called the carbonates, by double decomposition.

CARBONIC ANHYDRIDE. CO_2. *Syn.* CARBONIC ACID, CARBON DIOXIDE, FIXED AIR, CHOKE DAMP; ACIDE CARBONIQUE, Fr.; KOHLEN SÄURE, Ger. A compound formed by the chemical union of carbon and oxygen.

Hist. Van Helmont recognised carbonic acid as a peculiar gas. Dr. Black, in 1757, proved that it was a constituent of limestone, and gave it the name of fixed air; he also showed that the causticity of alkalies depended on its absence. Bergmann first described it as an acid, applying to it the term aërial acid. Lavoisier, in 1776, established its true nature, and gave it the name it now bears. Faraday, in 1823, by pressure at an extremely low temperature, reduced carbonic acid to a liquid, and a few years later Thilorier and Brunel obtained it in the solid form.

Nat. hist. Carbonic acid is a constituent of the atmosphere, its presence being essential to the existence of vegetable life on the globe. It issues from the earth in many situations, as the Grotto del Cane in Italy, the Valley of Poison in Java, and near the Lake of Laach in Germany. It gives to many mineral springs their sparkling brilliancy, and is held in solution by all natural waters. Combined with the bases, lime and magnesia especially, it exists in large quantities in the crust of the earth. It is the chief product of combustion, and one of the products of fermentation. It is always being exhaled by animals in the process of respiration, and in smaller quantities by plants at night or in the shade. It forms the terrible "choke-damp" or "after damp" of the coal mines. It is the gas dis-

engaged during the effervescence of soda water and other aërated drinks, and the cause of the freshness of newly drawn beer.

Prep. Hydrochloric acid, 1 part, diluted with water, 4 or 5 parts, is poured upon fragments of white marble, previously placed in a suitable generating apparatus.[1]

Carbonic acid is rapidly evolved, and may be collected, with some loss, over water in the pneumatic trough. If required dry, the gas must be passed over fragments of fused chloride of calcium, placed in a large tube, or through a small quantity of concentrated sulphuric acid, and collected by displacement or over mercury.

From oil of vitriol, 1 part; water, 6 parts; and chalk or whiting, 1¼ part; mixed in a suitable vessel, applying agitation.

Prop. Under ordinary conditions, carbonic acid is a colourless, non-inflammable, irrespirable gas, possessing a slightly pungent odour, and an acidulous taste. Water absorbs its own volume of this gas, and by pressure may be made to take up enormous quantities, forming carbonated or aërated water. Its sp. gr. is 1·520, hence it may be poured from one vessel to another like water. By a pressure of thirty atmospheres at 32° Fahr., it is liquefied, the pressure required decreasing as the temperature gets lower. At —94° Fahr. it solidifies into a vitreous transparent mass.

Carbonic acid, even when greatly diluted with air, cannot be inhaled without insensibility following. An atmosphere containing more than its natural quantity of the gas (1 part in 2500 parts, by measure) acts upon the system as a narcotic poison, hence the danger of overcrowded rooms. It is a non-supporter of combustion, at once extinguishing a lighted candle, gas-jet, or even a piece of burning phosphorus, when these are placed in a jar of the gas.

Tests. It feebly reddens litmus paper, extinguishes the flame of a burning taper, and forms a white precipitate in aqueous solutions of lime and baryta, which is soluble in acetic acid. By the last test, a very small quantity of this gas may be easily detected in the atmosphere of rooms, &c. A lighted candle is generally used to test an atmosphere suspected to contain carbonic acid; but it is found that air that will support combustion will contain sufficient of this gas to cause insensibility.

Ant., &c. The patient should be immediately removed into the open air, and placed on his back with the head slightly raised. Cold water should be dashed over the body, hot water or mustard poultices applied to the feet, and ammonia (carefully) to the nostrils. Brandy-and-water and other stimulants may be administered. Continued friction on the surface of the body is also very useful. If the patient has ceased to breathe, artificial respiration should be attempted. This may be done by gently pressing down the ribs, and forcing up the diaphragm, and then suddenly withdrawing the pressure. The inhalation of air, mixed with very little chlorine gas, has also been recommended. Wells, cellars, or other underground apartments, containing carbonic acid in poisonous quantities, may be freed from this gas by pumping it out, in the same way as water, observing to allow the suction hose to fully reach the floor or bottom of the place. Fresh slaked lime or milk of lime, copiously thrown in, will have a like effect, by absorbing the gas. Free ventilation, whenever it can be established, is, however, not only the cheapest, but the most efficient remedy. See ASPHYXIA.

[1] A large flask, provided with a bent glass tube for conveying the gas, and a tube-funnel for introducing the acid, is the most convenient form of apparatus. A tubulated retort may be used, but the generating flask or bottle is to be preferred.

CARBON'IC OXIDE. CO. *Syn.* PROTOXIDE OF CARBON, CARBON MONOXIDE, GA'SEOUS OXIDE OF CARBON; OXY'DUM CARBON'ICUM, L. A gaseous compound of carbon and oxygen, containing less oxygen than is contained in carbonic acid.

Prep. 1. From carbonic acid gas passed over fragments of charcoal, heated to redness in a tube of porcelain or iron.

2. From crystallised oxalic acid, gently heated with 5 or 6 times its weight of strong sulphuric acid in a glass retort.

3. From ferrocyanide of potassium in fine powder, and 8 or 10 times its weight of concentrated sulphuric acid, heated together in a glass retort.

Obs. All the processes except the last give a mixture of carbonic acid and oxide. It is therefore necessary to pass the gas through a caustic alkaline solution or milk of lime, to deprive it of carbonic acid. It may then be passed over dried chloride of calcium, to deprive it of moisture. It may be collected either over mercury or water, as the latter absorbs very little of this gas.

Prop. Carbonic oxide is colourless, inodorous, neutral, inflammable, and irrespirable. It is extremely poisonous, 1% mixed with air being sufficient to cause dangerous drowsiness. The deaths produced by the combustion of charcoal in close rooms are now attributed to this gas. The *antidotes*, &c., are the same as for poisoning from inhaling carbonic acid.

CAR'BURETTED HY'DROGEN. See HYDROGEN.

CARD'AMOM. *Syn.* CARD'AMUM; CARDAMO'MUM, B. P. The seed or fruit of the *Elettaria Cardamomum* forms the officinal cardamom. It is warm, pungent, carminative, and stomachic, and is largely used as a condiment in the East, and in Europe as an adjuvant in other medicines. Several kinds of cardamoms used medicinally and as spices are produced by the genus *Amomum*, belonging to the natural order *Zingiberaceæ*, the Ginger family.

CAR'MINATIVES. Medicines that allay flatulency and spasmodic pains. Among the

principal carminatives are ANISEED, CARAWAY SEED, CARDAMOMS, CASSIA, CINNAMON, GINGER, PEPPERMINT, and the PEPPERS. To these may be added ARDENT SPIRITS, and most of the AROMATIC ESSENCES and TINCTURES. See MIXTURES, PATENT MEDICINES, &c.

CAR'MINE, *Syn.* CARMINE RED, VEGETABLE SCARLET; CARMI'NUM, L. A beautiful red pigment prepared from the cochineal insect.

Prep. The preparation of carmine is little understood, but success in its manufacture depends less on any mystery connected with the process than on the employment of the purest water and the best materials, and the exercise of moderate care, dexterity, and patience. The following forms will produce carmine of the richest hues down to ordinary and common, according to the skill possessed by the manipulator.

1. (*Madame Cenette's process.*) Cochineal (in powder), 2 lbs., is boiled in pure river water, 15 galls., for 2 hours, when refined saltpetre (bruised), 3 oz., is added to the decoction, and the whole boiled for 3 or 4 minutes longer; salt of sorrel, 4 oz., is next added, and the boiling again renewed for 10 or 12 minutes; the heat is now removed, and the liquid allowed to settle for about 4 hours, after which time it is decanted with a syphon, into shallow plate-like vessels, and set aside for three weeks. At the end of this time the film of mould which has formed on the surface is dexterously and carefully removed, without breaking it or disturbing the liquid beneath it. The remaining fluid is next very carefully removed with a syphon, and the adhering moisture, as far as possible, drained off, or sucked up with a pipette. The residuum, which is the carmine, is dried in the shade, and possesses extraordinary lustre and beauty.

2. (*Alwon* or *Langlois process.*) Powdered cochineal, 1 lb., is boiled in river water, 4 galls., for 10 minutes, when carbonate of soda, ¾ oz., dissolved in water, 1 pint, is added, and the whole again boiled for ½ hour longer; when the decoction is cold, alum (in fine powder), ¾ oz., is thrown in, and the liquid agitated rapidly until it is entirely dissolved; after 20 minutes' repose, it is decanted into another vessel, and clarified by heating it with the whites of 2 eggs; the perfectly clear liquid is then allowed to repose for 40 minutes or longer, when it is decanted, and the carmine which it has deposited is collected, drained on a filter, and dried on shallow plates covered with silver paper. The product by either of the above processes varies from 9½ to 10% on the weight of the cochineal employed in them.

3. (*China* or *Spirit process.*) Cochineal, 1 lb., is boiled for 15 minutes, in water, 3 galls., powdered alum, 1 dr., is next added, and the whole again boiled for 5 or 6 minutes; when the liquid has become cold, the clear portion is decanted, and again heated, and solution of tin (spirits of tin), cautiously dropped in until all the carmine is precipitated; it is collected, drained, and dried, as before. *Prod.* 1½ oz.

3. (*French process.*) From cochineal (in powder), 1 lb., boiled for 15 minutes, in water, 3 galls.; cream of tartar (in powder), 1 oz., is then added, the boiling further continued for 10 minutes, and powdered alum, 1½ oz., thrown in; after another 2 minutes' boil, the heat is withdrawn, and in 5 or 6 minutes more, the clear portion is decanted into porcelain vessels, which are set aside until the carmine falls down.

4. (*German process.*) Powdered cochineal, 1 lb., water, 4 galls.; boil 15 minutes, add powdered alum, 1 oz.; boil 3 minutes longer, remove the heat, allow the liquor to settle for 5 minutes, pour off the clear portion into porcelain or earthenware vessels, and set them aside for 3 or 4 days. The carmine is found deposited on the bottom of the vessel, and must be now carefully drained and dried, as before. The decanted liquor yields more carmine by standing in fresh vessels. *Product.* About 1½ oz.; besides ½ oz., or more, of an inferior quality obtained as a second deposit.

5. (*English process.*) From cochineal, 1 lb., and carbonate of potash, ½ oz., boiled in water, 7 galls., for 15 minutes; the vessel is then removed from the fire, and powdered alum, 1 oz., added; the liquor is then well agitated and allowed to settle for about 15 minutes longer; the clear liquid is next decanted into a clean copper, and isinglass, ½ oz., dissolved in water, 1 pint (and strained), added; as soon as a coagulum forms upon the surface, the heat is removed, and the liquid is strongly agitated with a bone or silver spatula, after which it is allowed to repose for 20 or 30 minutes. The deposited carmine must be drained and dried, as before.

Obs. The best black cochineal is generally used for the preparation of carmine. For ordinary qualities, spirits of tin (bichloride) is added to the decoction as a precipitant, and the liquid being put into suitable vessels (wash-hand basins answer very well), a deposit of carmine slowly takes place. Neither exposure to solar light nor artificial heat is advisable during the drying, but the latter must nevertheless be effected with all possible expedition. Hence, the finer shades of carmine can only be successfully made during certain states of weather; as in very hot weather the liquid rapidly sours or ferments, and the deposit is more or less dissolved; whilst in dull, damp weather, it is difficult to dry the precipitate sufficiently, which is then apt to become mouldy, and to lose colour. The researches of Pelletier and Caventou tend to show that the solution of tin used as a precipitant, should be at the maximum of oxidation or chlorination, to produce the richest shades of carmine. That first deposited is, in all cases, the most beautiful, and the quality gradually deteriorates as the process proceeds, 6 or 7 drs. only of carmine

of the very finest quality can hence be obtained from 1 lb. of cochineal.

Prop., &c. Pure carmine is a very light, lustrous, scarlet powder, entirely soluble in ammonia, a test by which its purity is readily determined. Mr. Warren De la Rue says the pure colouring principle of cochineal is carminic acid. By digesting ammonia on carmine, until all the colour is taken up, filtering and adding acetic acid and alcohol, till the whole is precipitated; and lastly, carefully washing the precipitate with spirit of wine, at proof, and drying in the shade, carmine of the richest and most lustrous hue, may be obtained even from samples of inferior quality.

Uses, &c. As a pigment in velvet and miniature painting, and for tinting artificial flowers, and as rouge for the complexion. The powdered cochineal (carmine grounds), from which the coloured liquor (liquid rouge, carmine liquor), has been decanted, is used by the paper stainers, and both are used in the preparation of carminated lake.

Blue Carmine. See INDIGO.

Liq'uid Carmine. *Syn.* FLUID CARMINE, LIQUID ROUGE, CARMINE INK. *Prep.* 1. A solution of carmine in ammonia water, or spirits of hartshorn. Very rich and beautiful.

2. The residual liquor of the process of making carmine. Inferior. The first is used in velvet and miniature painting, and for tinting artificial flowers; the second for common purposes, as a stain or wash.

Pur'ple Carmine. See MUREXIDE.

CARMIN'IC ACID. $C_{14}H_{14}O_8$. *Prep.* (W. De la Rue.) The powdered insect, after treatment with ether to remove the fat, is digested in water. The decoction of cochineal is precipitated by adding a solution of acetate of lead, and the impure carminate of lead thus formed, after being washed with water, is suspended in water, and decomposed by a stream of sulphuretted hydrogen; the whole process is repeated with the decanted solution, so obtained; the second solution is then evaporated to dryness (*in vacuo* over sulphuric acid), dissolved in absolute alcohol, digested on some washed crude carminate of lead (to separate a little phosphoric acid), and, lastly, mixed with ether (to precipitate some nitrogenised matter); the residuum obtained by careful evaporation (*in vacuo*) is pure carminic acid.

Prop., &c. A purple-brown mass, yielding a rich-red powder; it is freely soluble in water and alcohol; slightly soluble in ether; and without decomposition in oil of vitriol; it is feebly acid; its salts are termed carminates, only two or three of which have been examined. According to Mr. De la Rue, this acid constitutes the pure colouring matter of cochineal.

CAROT'INE. $C_{18}H_{24}O$. A crystalline, copper-red substance, obtained from the root of the *Daucus carota* (*sativa*) or garden carrot. It is tasteless; odourless; neutral; fusible; inflammable; insoluble in ether and water; slightly soluble in alcohol; and very soluble in the mixed and volatile oils.

CAR'PETS. Considerations of cleanliness and economy demand a few words on carpets and hearth-rugs. We are assured by an experienced person, that before proceeding to sweep a carpet, a few handfuls of waste tea-leaves should be sprinkled over it (say some five or six minutes before). A stiff hair broom or hair brush only should be employed, unless the carpet be very dirty, when a whisk or carpet-broom may be used first, followed by another made of hair, to take off the loose dust. The frequent use of a stiff "carpet-broom" (those made of cane or birch are here alluded to), soon wears off the beauty of the best carpet. An ordinary clothes-brush, or a clean one, resembling the dirt brush used for shoes, is best adapted for superior carpets. When carpets are very dirty, they should be cleaned by shaking and beating. "If you must have a carpet, take it up two or three times a year, instead of once. A dirty carpet literally infects the room: if you consider the enormous quantity of organic matter from the feet of people coming in, which must saturate it, this is by no means surprising." (Miss Nightingale.) In laying down carpets, it is very advisable, at first, to cover the floor beneath them with large sheets of thick paper, so as to prevent dust from rising between the boards. Old drugget, sacking, matting, or any similar substance, will effect the same purpose, and will, moreover, materially increase the durability of the carpet, by preserving it from the contact of the hard floor.

BRUSSELS CARPETS may be cleaned with ox-gall (1 pint to a pailful of water), and a scrubbing-brush and floor-cloth; afterwards rinsing them in fresh water applied in the same way. They should be previously perfectly freed from dust by beating, and should be nailed down before commencing the above operations. Great care should be taken to rub them as dry as possible with a clean dry floor-cloth. A small portion only should be done at a time, and a dry windy day selected for the purpose. A carpet treated in this manner will be greatly refreshed in colour, particularly the greens.

KIDDERMINSTER CARPETS will scarcely bear the above treatment without becoming so soft as to get speedily dirty again. This may in some measure be prevented, by brushing them over with a hot weak solution of size in water, to which a little alum has been added. Curd soap, dissolved in hot water, may be used instead of ox-gall, but it is more likely to injure the colours, if produced by false dyes. When there are spots of grease on the carpeting, they may be covered with curd soap, dissolved in boiling water, and rubbed with a brush until the stains are removed, when they must be cleaned with warm water as before. The addition of a little gall to the soap renders

it more efficacious. Some persons employ a mixture of soap, fuller's earth, and turpentine, for the same purpose. Benzol rapidly removes the grease stains, and may be advantageously substituted for preparations of soap.

CAR'RAGEEN. *Syn.* I''RISH MOSS; CHON'DRUS, L. The *Chondrus crispus* of botanists, a well-known alga or seaweed. It contains a large proportion of a peculiar jelly, called carrageen'in or pect'in. This may be purified by agitation with dilute alcohol and filtration. The jelly forms an agreeable article of diet. It is used to a limited extent for thickening colours in calico printing. In *medicine*, carrageen is used in the form of a jelly and decoction as a demulcent, and is often prescribed in pulmonary complaints. See FIXATURE, PASTE, SYRUP.

CAR'ROT. *Syn.* CARO'TA, L. The seed is carminative and diuretic; the expressed juice of the root is anthelmintic. Scraped raw carrot is sometimes employed as a stimulant application to sore nipples; the boiled root as a poultice to sores and tumours. As an article of food, unless young and well dressed, carrots are rather indigestible.

CAR'THAMIN. $C_{14}H_{16}O_7$. *Syn.* PURE ROUGE, SAF'FLOWER CARMINE, SAFFLOWER LAKE. The red colouring matter of *Carthamus tinctorious* or safflower, formerly much used as a dye, particularly in the form of pink saucers for dyeing stockings.

Prep. 1. Safflower, exhausted by washing it with water (or with water acidulated with acetic acid), is dried, coarsely pulverised, and the powder digested in a weak solution of carbonate of sodium; pieces of clean white cotton or calico are then immersed in the solution, and acetic acid gradually added in slight excess; the cotton is next washed, dried, and digested in a fresh quantity of dilute solution of carbonate of sodium, and agitation employed until the whole of the colour is again dissolved; the new solution is filtered and slightly super-saturated with citric acid (or acetic acid); the carthamin, which falls down in rich carmine-red flocks, is lastly washed with cold distilled water, and dried.

2. Washed safflower (dried and powdered), any quantity; aqueous solution of carbonate of sodium (containing 15% of carbonate), q. s. to form a thick paste; after some hours press out the red liquor, nearly neutralise it with acetic acid, put in cotton as before, and add acetic acid in slight excess; the next day remove the cotton and wash it in water holding in solution 5% of carbonate of sodium, until the colour is dissolved out, after which precipitate with citric acid, as before.

Prop., &c. An amorphous, brilliant, greenish powder; nearly insoluble in water, soluble in alcohol, forming a gorgeous purple solution, and in weak alkaline lyes, giving an equally beautiful red one.

CAR'THAMUS. *Syn.* SAF'FLOWER. In *botany*, a genus of composite plants, the most important species of which is *Carthamus tinctorius*, the safflower. The florets of this yield a beautiful pink dye (see *above*), and are sometimes used to adulterate hay saffron. The "cake saffron" of the shops consists entirely of safflower and mucilage. The fruits, commonly called "seeds," yield by expression the useful oil known in India as Koosum oil.

CARUM (PTYCHOTIS) AJOWAN. Ind. Ph. *Syn.* AJWAIN or OMUM PLANT. *Habitat.* Tropical Africa? Much cultivated in India. —*Officinal part.* The fruit (*Fructus Ptychotis, Ajwain fruit*). Occurs in the form of minute umbelliferous fruits, which, examined with a lens, are seen to be covered with prominent tubercles, extremely aromatic, evolving, when rubbed, a strong odour resembling that of common thyme. Taste somewhat bitter, and very pungent. Its virtues reside in a volatile oil.—*Properties.* Valuable stimulant, carminative, and antispasmodic.—*Therapeutic uses.* In flatulence, flatulent colic, atonic dyspepsia, and diarrhœa, it is a remedy of much value.

OIL OF AJWAIN, or OMUM (*Oleum Ptychotis*). The oil obtained by distillation from the fruit. Recently prepared, colourless, but soon acquires a yellowish tinge. It has the odour of the fruit, and an acrid burning taste. Sp. gr. about 0·88.—*Dose.* 1 to 3 drops on sugar or in emulsion.

AJWAIN, or OMUM WATER (*Aqua Ptychotis*). Take of ajwain fruit, bruised, 20 oz.; water, 2 galls. Distil a gallon.—*Dose.* 1 to 2 fluid ounces. A valuable carminative; also useful in disguising the taste of disagreeable drugs, especially castor oil, and obviating their tendency to cause nausea and griping.

CARYOPH'YLLIN. $C_{10}H_{16}O$. *Syn.* CLOVE CAMPHOR, CLOVE RESIN. A crystalline substance, isomeric with ordinary camphor, which deposits from oil of cloves in needles.

CARYOPH'YLLUS. See CLOVE.

CASCARIL'LA. *Syn.* CASCARILLÆ CORTEX (B. P.), L. The bark of *Croton eleutheria* or the seaside balsam, a tree growing in the Bahamas and Jamaica. It is an aromatic bitter, stomachic, and tonic.—*Dose.* 10 grs. to 30 grs., in the form of powder, infusion, or tincture; in diarrhœa, dysentery, dyspepsia, low fevers, intermittents, &c.

CASCARIL'LINE. *Syn.* CASCARIL'LINA. *Prep.* (Duval.) Cascarilla is exhausted with cold water, by percolation, precipitated with acetate of lead, and the filtrate treated with sulphuretted hydrogen; the filtered liquid, after agitation with animal charcoal and filtration, is gently evaporated to dryness. The powder is redissolved in boiling alcohol and crystallised by very slow or by spontaneous evaporation. It has a bitter taste, and an alkaline reaction; its aqueous solution is unaffected by the ferric salts and tincture of galls.—*Dose.* 1 to 3 grs.; in dyspepsia, &c.

CASE-HARD'ENING. *Syn.* STEEL SURFACING. The operation of giving a surface of

steel to iron goods. Tools, fire-irons, fenders, keys, &c., are usually case-hardened.

Process. 1. The goods (finished in every respect but polishing) are put into an iron box, and covered with animal or vegetable charcoal, and "cemented" at a red heat, for a period varying with the size and description of the articles operated on; these, when taken out, are hardened by plunging into water, or oil, if they are of a delicate nature.

2. (Moxon.) Cow's horn or hoof is baked or thoroughly dried, and pulverised; to this is added an equal quantity of bay salt, and the whole is made into a paste with stale chamber-lye, or white wine vinegar; the iron is covered with this mixture, and bedded in it, in loam, or inclosed in an iron box. In this form it is laid on the hearth of the forge to dry and harden, then it is put into the fire, and blown till the lump has a blood-red heat (no higher). It is hardened as before,

3. Coat the goods with a paste made of a concentrated solution of prussiate of potash and loam; then expose them to a strong red heat, and when it has fallen to a dull red, plunge the whole into cold water.

4. The goods, previously polished and finished, are heated to a bright red and rubbed or sprinkled over with prussiate of potash. As soon as the prussiate appears to be decomposed and dissipated, the articles are plunged into cold water.

Obs. The process of case-hardening has been well conducted when the surface of the metal proves sufficiently hard to resist a file. The last two plans are a great improvement upon the common method. By the topical application of prussiate of potash (ferrocyanide of potassium) any part of a piece of iron may be case-hardened, without interfering with the rest.

Case-Hardening Powders. *Syn.* CASE-HARDENING COMPOSITIONS. 1. Prussiate of potash, dried and powdered.

2. Prussiate of potash, 3 parts; sal-ammoniac, 1 part; mix.

3. Sal-ammoniac and bone-dust, of each, 2 parts; prussiate of potash, 1 part. (See *above*.)

CA'SEIN. *Syn.* CA'SEUM, CA'SEIN, LACT-ALBU'MEN, ALBUMEN OF MILK. The nitrogenous principle of milk. Cheese made from skimmed milk and well pressed, is nearly pure caseine. (Liebig.)

Prep. 1. The curd obtained by adding dilute sulphuric acid to milk is well washed and dissolved in carbonate of soda. It is allowed to stand for 24 hours, to let the oil rise to the surface, and when this is properly skimmed off, the caseine is precipitated by an acid. The process is repeated a second time, and the coagulum digested with alcohol and ether, and dried. With all these precautions the caseine still contains some saline matter which cannot be removed.

2. Milk is coagulated by hydrochloric acid, and the curd then well washed with dilute acid, and finally with pure water. The curd so prepared is dissolved by digestion at 110° Fahr., with a large quantity of water; the solution, after filtration, is coagulated with carbonate of ammonia; the coagulum is washed with water, ether, and alcohol, and finally dried.

Prop., &c. Coagulated caseine is readily dissolved by the alkalies and alkaline carbonates. The most remarkable property of caseine is its coagulation by certain animal membranes, as in the process of cheese-making, with rennet. See LACTARIN.

CASKS. The care and management of casks is an important affair in a large establishment. It is found that they last longest when stored either in a dry situation, or in one uniformly very moist. Continual variations from the one to the other speedily rot them. As soon as casks are emptied they should be bunged down quite air-tight, with as much care as if they were full, by which means they will be preserved both sweet and sound. Should any of the hoops become loose, they should be immediately driven up tight, which will at once prevent the liability of their being lost or misplaced, as well as the casks fouling or becoming musty from the admission of air. For this purpose, those out of use should be occasionally hauled over and examined.

Numerous plans are adopted for CLEANING and PURIFYING CASKS, among which are the following:—

1. Wash them well out with oil of vitriol, diluted with an equal weight of water.

2. Wash them first with a little chloride of lime and warm water, and then with water soured with oil of vitriol.

3. Match them with sulphur, or with sulphur mixed with a little saltpetre.

4. Unhead them and whitewash them with fresh milk of lime, made pretty strong. This plan is commonly followed for brewers' vats.

5. Remove the heads, and char the insides of the staves by the aid of a fire of shavings, kindled within them.

6. A simpler, safer, and more effectual method of charring them than the last, is to wash the dry casks out with strong oil of vitriol (sp. gr. 1·854). This not only purifies the surface of the staves, but penetrates into all the cracks, some of which might escape the action of the fire.

7. Steam has lately been applied to the insides of casks, with great advantage. High-pressure steam is driven in at the bung-hole, at the same time that the cask is violently agitated (a heavy chain having been previously put into it), until all the dirt and bad smell is removed.

8. A lye of pearlash or soda, mixed with milk of lime, as well as strong hot brine, and other similar liquors, have been adopted by some persons, and are highly spoken of.

9. The coopers boil the staves for gin casks

in a strong lye of alum before placing them together, to prevent their colouring the spirit, but washing with oil of vitriol is a better plan.

10. Some persons fill musty casks with water, and add 3 or 4 lbs. of coarsely powdered fresh burnt charcoal, and agitate well for a few days.

Obs. In all the above processes the greatest care must be taken to scald, or soak and well rinse out the casks after the treatment described. See BREWING UTENSILS, MATCHES, &c.

CAS'SAREEP. The expressed juice of the sweet cassava, concentrated by heat and flavoured with aromatics. It is used in the West Indies as a condiment. (See *below.*)

CAS'SAVA. A poisonous shrub cultivated in the West Indies, and in many parts of South America, for the sake of the starchy matter contained in its roots. It belongs to the natural order *Euphorbiaceæ*, and is known to botanists under the names *Manihot utilissima* (Pohl), *Janipha manihot* (Humboldt), and *Jatropha manihot* (Linn.), the former being that now generally adopted. The name "bitter cassava" is commonly given to it in the West Indies, to distinguish it from another species of the same genus, *Manihot aipi* (Pohl), which, from having no poisonous properties, is named the "sweet cassava." The roots of both species yield the starch, but those of the poisonous plant are the richer.

The roots, after being well washed and scraped, are rasped or grated, and the pulp thus formed is subjected to strong pressure, to expel the poisonous juice which it contains. The compressed pulp is next thoroughly dried over the fire, being constantly stirred the whole time, by which any remaining portion of the noxious juice is either volatilised or decomposed. It now forms CASSAVA MEAL. When it is further prepared by grinding, it forms FINE CASSAVA MEAL, or CASSAVA FLOUR. When the compressed pulp is baked on a hot plate, it forms CASSAVA BREAD or CASSAVA CAKES, the flavour of which greatly resembles that of Scotch oat-cakes. See TAPIOCA.

CAS'SIA. In *botany*, a genus of the natural order *Leguminosæ*, including several important medicinal plants. The "purging cassia," *Cassia fistula* (Linn.), produces pods containing a soft, blackish pulp. (See *below*, also SENNA.)

Cassia Pulp. *Syn.* CASSIA PRÆPARA'TA, CASSIÆ PULPA (B. P.), L. *Prep.* The cassia (pods or fruit), broken lengthwise, are macerated in sufficient distilled water to cover them, for six hours, constantly stirring; and the purified pulp strained through a hair sieve, and evaporated to the consistence of a confection in a water bath.—*Dose.* As a mild laxative, 1 to 2 drs.; as a purgative, ½ oz. to 1½ oz.

CAS'SOLETTES (Scented). See PASTILLES and PERFUMERY.

CAS'TOR. *Syn.* CASTO''REUM, L. (B. P.). "The follicles of the prepuce of the *Castor fiber* or *beaver*, filled with a peculiar secretion." (Ph. L.) "A peculiar secretion from the præputial follicles." (Ph. E. and D.) It is often sophisticated; a fraud readily detected by the "absence of the membranous partition in the interior of the bags, as well as by the altered smell and taste." (Ure.) Russian castor, which is very rare, may be distinguished by a tincture of 1-16th part in alcohol, being of the colour of deep sherry, while that with American castor is of the colour of London porter. (Pereira.)—*Dose.* 1 to 2 drs. or more, in powder or made into pills; in nervous and spasmodic affections, especially in hysteria, epilepsy, and other like diseases of females.

CAS'TORIN. *Syn.* CASTORIN'A, CASTOREUM CAMPHOR. When castor is cut into small pieces and boiled in about 6 times its weight of alcohol, crystalline substance (*castorin*) is deposited by the filtered tincture in cooling. By re-solution in alcohol, it may be obtained under the form of colourless, prismatic, acicular crystals.

Obs. Genuine Russian castor, although the most expensive, must be employed in the above process, as scarcely any castorin can be obtained from the American variety.

Prop., &c. Castorin has the odour of castor, and a coppery taste; it is inflammable, and is soluble both in ether and hot alcohol.

CAS'TOR OIL. See OILS.

CASTS. In preparing casts and moulds with gelatin, wax, fusible metal, and similar substances, it is important to use them at the lowest temperature compatible with fluidity; as when only a few degrees hotter, the water which adheres to the things from which the casts are taken, is converted into vapour, and produces bubbles. Fusible metal may be allowed to cool in a teacup until just ready to set at the edges, and then poured into the moulds. In this way beautiful casts from moulds of wood, or of other similar substances, may be procured. When taking impressions from gems, seals, &c., the fused alloy should be placed on paper or pasteboard, and stirred about till it becomes pasty, from incipient cooling, at which moment the gem, die, or seal, should be suddenly stamped on it, and a very sharp impression will then be obtained.

CATALEP'SY. *Syn.* TRANCE; CATALEP'SIS, CATALEP'SIA, L. A disease in which the organs of sense and motion cease to exercise their functions, and the heart and lungs feebly perform their offices, and in a scarcely perceptible manner. The paroxysm generally comes on without previous warning, and its duration varies from a few minutes to several days, and if medical reports are to be credited, sometimes for a much longer period. Dr. Cullen seriously affirms that this disease is always counterfeited.

Treat. Ammoniacal stimulants applied to

the nostrils, and spirituous liquors injected into the stomach, with general friction of the body, and free access to pure air, are the best remedies. Electricity and galvanism should also be had recourse to, when the necessary apparatus is at hand.

CAT'APLASMS. See POULTICES.

CAT'ARACT. An opaque condition of the lens of the eye. It is a common cause of blindness. It can only be cured by a surgical operation.

CATARRH'. *Syn.* CATARRH'US, L. The "cold in the head," or "cold on the chest," of domestic medicine. Influenza is a severer form of this complaint, and has been called epidemic catarrh.

The common symptoms of catarrh are a copious discharge from the eyes and nose, a hoarseness, and generally a cough, more or less severe. The exciting causes are sudden changes of temperature, and exposure to currents of cold air while the body is heated; hence the frequency of colds in hot and changeable weather.

Treat. A light diet should be adopted, and animal food and fermented and spirituous liquors should be particularly avoided. Some mild aperient should be administered; and when the symptoms are severe, or fever or headache is present, small diaphoretic doses of antimonials, accompanied by copious draughts of diluents, as barley water, weak tea, or gruel, should be taken. This treatment, except in very bad cases, will generally effect a cure.

CAT'ECHIN. *Syn.* CATECHU'IC ACID, RESINOUS TAN'NIN. When cubical gambir, or catechu, in powder, is treated with cold water, a portion remains undissolved. This is catechin. By repeated solutions in alcohol, it may be obtained under the form of white, silky, acicular crystals.

Prop., &c. Catechin strikes a green colour with the salts of iron, but does not precipitate gelatin. When dissolved in caustic potassa, and the solution exposed to the air, it absorbs oxygen, and japonic acid is formed. If, instead of caustic potassa, carbonate of potassa is employed, it is converted into rutic acid.

CAT'ECHU. *Syn.* CAS"HEW, CUTCH, GAM'BIR; CAT'ECHU (Ph. L. E. & D.), TER'RA JAPON'ICA, L.; CACHOU, Fr. "The extract from the wood of *Acacia Catechu*, or from the leaf of *Uncaria Gambir*." (PALE CATECHU, Catechu Pallidum, B. P.) Also of the "kernels of *areca catechu*; probably, too, from other plants." (Ph. E.) The term is now applied to several extracts similar in appearance and properties to that of *Acacia Catechu*.

There are several varieties of catechu known in commerce, of which the principal are—

CATECHU, BOMBAY. Firm, brittle, dark brown, of a uniform texture, and a glossy, semi-resinous, and uneven fracture. Sp. gr. 1·39. Richness in tannin, 52½.

CATECHU, BENGAL. Rusty brown colour externally; porous, and more friable than the preceding. Sp. gr. 1·28. Richness in tannin, 49·5½.

CATECHU, MALABAR. Resembles the last in appearance, but is more brittle and gritty. Sp. gr. 1·40. Richness in tannin, 45·5½.

Of the above varieties the first is the one generally employed in medicine, and which commonly passes by the name of catechu. The second popularly passes under the name of *terra Japonica* (Japan earth), from the old belief that it was of mineral origin.

CATECHU, PALE, is prepared at Singapore and in the Eastern Archipelago. It generally occurs in cubical reddish-brown pieces, porous, bitter, and astringent in taste. Entirely soluble in boiling water; the solution, when cold, is not rendered blue by iodine. Of 100 parts, only 60 are dissolved by cold water, and the solution is bright. Thirty parts of isinglass precipitate the whole of the astringent matter.—*Test.* Sp. gr. 1·39. "The pale catechu being already in the Edin., the B. P. 1864, retained it with the black; but the black is the one adopted by all other pharmacopœias, and is preferred in the arts and manufactures; it is well known to be far superior to the pale in astringency, and is always to be had of good quality; it is therefore a matter of surprise and regret that it has been rejected from the 'British Pharmacopœia.'" (Squire.)

Estim. It is often of importance to the tanner and dyer to determine the richness of this article in tannic acid or tannin. The following are two simple methods:—

1. Exhaust a weighed sample (in powder) with ether, and evaporate by the heat of a hot-water bath. The product, which is the tannin, must then be accurately weighed.

2. Dissolve the sample (in powder) in hot water, let it cool out of contact with the air, filter, and add a solution of gelatin, as long as a precipitate falls. The precipitate, after being washed and dried at a steam heat, contains 40% of tannin.

Uses, &c. Catechu is extensively employed in medicine, both internally and externally, as an astringent. It is used to flavour British brandy, and by the tanners as a substitute for oak bark. With it the dyer produces, inexpensively, many of his most pleasing browns. Alum mordants are mostly employed in dyeing with catechu. "The salts of copper with sal-ammoniac cause it to give a BRONZE COLOUR, which is very fast; the proto-chloride of tin, a BROWNISH YELLOW; the per-chloride of tin, with the addition of nitrate of copper, a DEEP-BRONZE HUE; acetate of alumina, alone, a REDDISH BROWN, and with nitrate of copper, A REDDISH-OLIVE GRAY; nitrate of iron, a DARK-BROWN GRAY. For dyeing a GOLDEN COFFEE-BROWN, it has entirely superseded madder; 1 lb. of it being equivalent to 6 lbs. of this root." (Ure.)—*Dose.* 10 grs. to 30 grs.

in solution, in water, or made into a bolus, or sucked as a lozenge.

CAT'GUT. The prepared and twisted intestines of animals. *Prep.* The guts, taken whilst warm from the animal, are thoroughly cleaned, freed from adherent fat, and well rinsed in pure water. They are next soaked for about 2 days in water, after which they are laid on a table and scraped with a copper-plate, having a semicircular notch, beginning the operation at the smaller end. In this way the mucous and peritoneal membranes are removed. The guts are then put into fresh water, and soaked until the next day, when they are again scraped, the larger ends cut off, and after well washing, again steeped for a night in fresh water, and then for 2 or 3 hours in a weak lye of pearlash or potash (2 oz. to the gal.). They are lastly washed in clean water, and passed through a polished hole in a piece of brass to smooth and equalise their surface; after which they are twisted, and sorted, according to the purposes for which they are intended. For many purposes the prepared gut is dyed or sulphured, and rubbed with olive oil. It improves by age. Red or black ink, or any of the simple dyes or stains, are used to colour it.

Uses, &c. Catgut is employed in several of the arts. The strings of harps, violins, &c., are formed of this material. Whipcord is made from catgut, which is sewed together while soft with the filandre or scrapings, after which it is put into a frame and twisted. Bowstrings for hatmakers are made out of the largest intestines, 4 to 12 of which are twisted together, until the cord is extended to 15 to 25 feet in length. It is then rubbed perfectly smooth and free from knots, half dried, sulphured twice, again stretched and sulphured, and lastly, dried in a state of tension. Clock-makers' cords are made of the smallest intestines, in a similar manner.

The best fine catgut is made at Venice or Rome, from the intestines of thin, sinewy sheep. That made in England is formed from the fat sheep killed for the shambles, and is, hence, inferior. Coarse catgut, for turning lathes, &c., is made from the intestines of horses, cut into 4 or 5 strips, by forcing a ball furnished with projecting knives placed cross-wise along them. These strips are next twisted, dried, and rubbed smooth with fish skin. Gutta percha and vulcanized India rubber are now applied to many of the purposes formerly exclusively occupied by catgut.

CATHAR'TICS. See PURGATIVES.

CATHAR'TIN. The purgative principle of senna, first noticed by Lassaigne and Fenuelle. A strong aqueous infusion of senna leaves is evaporated to the consistence of a syrup, out of contact with the air; this fluid extract is then digested in alcohol or rectified spirit, and the tincture, after filtration, is evaporated to dryness by a gentle heat.

Prop., &c. A reddish-coloured, uncrystallisable mass; having a peculiar odour, and a bitter, nauseous taste; freely soluble in both water and alcohol, and strongly cathartic. Two or three grs. cause nausea, griping, and purging. It has been proposed to employ it, combined with aromatics, as a cathartic.

CATH'ETERS. Small tubes introduced into the bladder for the purpose of drawing off its contents. They may be regarded as hollow bougies.

Prep. 1. A piece of smooth catgut, or steel wire, bent to the proper shape, is coated with melted wax. When cold, it is dipped repeatedly into an ethereal solution of India rubber, until a sufficient thickness is obtained, after which it is dried by a gentle heat, and then boiled in water to melt out the wax, and to allow the catgut to be withdrawn. A solution of India rubber in bisulphide of carbon is now generally employed instead of an ethereal solution.

2. From slips of India rubber, as directed under BOUGIES.

3. A smooth tissue of silk is woven over a bent wire, and then coated with a surface of India rubber, or elastic varnish, and finished off as before. See BOUGIES.

CAU'DLE. Gruel enriched by various additions.

Prep. 1. Thick oatmeal gruel mixed with about one half its weight of good mild ale (made hot), and as much sugar, and mace, nutmeg, or ginger, as will make it agreeable.

2. To the last add an egg, well beaten.

3. Sugar, 3 or 4 lumps; hot water, a tablespoonful; dissolve; add 1 egg; beat well together; further add a glass of wine and a little nutmeg or ginger; mix well, and stir the mixture into good gruel (hot), ¾ pint.

Uses, &c. A nourishing and restorative mixture during convalescence, much used among certain classes after accouchement. It is an excellent domestic remedy for colds, &c., unaccompanied with fever; for which purpose it should be taken on retiring to rest at night, preceded by a dose of castor oil during the day.

CAUS'TIC. *Syn.* CAUS'TICUM, ESCHAROT'ICUM, L. A substance that corrodes or destroys the texture of organised bodies. This action is popularly termed "burning."

The principal caustics are nitrate of silver, caustic potassa, a mixture of caustic potassa and quick-lime, sulphate of copper, red oxide of mercury, verdigris, tincture of sesquichloride of iron, chloride of zinc, chloride of antimony, nitric acid, acetic acid, and carbolic acid.

Use. Caustics are employed to remove excrescences, morbid growths, granulations, &c., as corns, warts, and proud flesh; and to open issues, abscesses, &c. The first, second, and fourth are applied by gently rubbing them on the part previously moistened with water; the third is commonly made into a paste, with

rectified spirit or glycerin, before application; red oxide of mercury and verdigris (in the form of powder) are often sprinkled over foul and indolent ulcers; whilst the acids and other liquid caustics are applied with a feather, camel-hair pencil, or glass rod. The same applies to the liquid preparations below. In all cases care should be taken to confine the application to the affected part.

Caustic, Ammoni'acal. See OINTMENTS, and GONDRET'S CAUSTIC (*below*).

Caustic, Antimo"nial. *Syn.* CAUSTICUM ANTIMONIA'LE, L. Chloride of antimony.

Caustic, Arsen'ical. *Syn.* CAUSTICUM ARSENICA'LE, C. ARSENIO'SUM, C. A. COMPOSI'TUM, L. *Prep.* 1. See PLUNKET'S CAUSTIC.

2. (Cutan. Hosp.) Calomel, 2½ oz.; red sulphide of mercury, 1 dr.; arsenious acid, 1 dr. to 2 drs.

3. (Van Mons.) Arsenious acid, 6 drs.; dragon's blood, 2 drs.; animal charcoal, 1½ dr.; cinnabar, 3 oz.

4. (Ratier.) Arsenious acid, 1 part; kino, 8 parts; cinnabar, 16 parts. The ingredients of the last three must be separately reduced to fine powder, and then carefully mixed. They are favorite applications on the Continent, in cases of cancer, cancerous sores, obstinate lepra, &c. They are either dusted over the part, or are made into a paste with mucilage or the saliva, and applied like an ointment on a piece of rag or lint; due caution being observed, and the effects watched. The last is much used in the French hospitals.

Caustic, Canquoin's. See ZINC CAUSTIC (*below*).

Caustic, Canthar'ides. *Syn.* CAUSTICUM CANTHARI'DIS, L. *Prep.* 1. Powdered cantharides made into a paste with concentrated acetic acid.

2. (Cutan. Hosp.) Tannin, 1 oz.; cantharides (powdered), 2 oz.; strong acetic acid, 8 oz.; digest a week, and strain. Blisters.

Caustic, Common. See POTASSA (Fused), and POTASSA WITH LIME.

Caustic, Duville's. *Prep.* 1. Aloes, 5 oz.; proof spirit, 10 oz.; oil of vitriol, 6 oz.; mix.

2. Aloes (in powder), 2½ oz.; rum, ½ pint; mix, and the next day add, oil of vitriol, 1 oz. A favorite caustic in veterinary practice; especially in foot-rot.

Caustic, Filho's. *Prep.* From caustic potassa, 2 parts; quick-lime (in powder), 1 part; melt together in a ladle, mix well, and pour it into small leaden tubes, the size of a large swan-quill. When cold, coat each piece with melted bees' wax, to exclude the air. *Used* as a strong caustic in veterinary practice. It is applied like nitrate of silver.

Caustic, Golden. *Syn.* CAUSTIC OF CHLORIDE OF GOLD; CAUSTICUM AUR'EUM, C. AUR"II CHLOR'IDI, L. *Prep.* 1. (Recamier.) Terchloride of gold, 6 grs.; nitro-hydrochloric acid, 1 oz.; dissolve.

2. (Legrand.) As the last, but using nitric acid. Both are recommended as caustics in syphilitic, scrofulous, and scorbutic ulcers, cancerous growths, &c.; applied by means of a dossil of lint.

Caustic, Gondret's. *Syn.* GONDRET'S AMMONI'ACAL CAUSTIC; POMMADE DE GONDRET, Fr.; CAUSTICUM AMMONIACA'LE, L. *Prep.* 1. See AMMONIACAL OINTMENT.

2. (Original formula.) Almond oil, 2 drs.; suet, 4 drs.; lard, 6 drs.; melt together in a wide-mouthed bottle, cool a little, add solution of ammonia, 12 drs.; and agitate until cold. A powerful rubefacient and counter-irritant; used to produce an immediate revulsion. If covered with a compress, it raises a blister in 4 or 5 minutes.

Caustic, I'odine. *Syn.* CAUSTICUM IODIN'II, L. *Prep.* (Lugol.) Iodine and iodide of potassium, of each, 1 part; water, 2 parts; dissolve. *Used* in similar cases to iodine paint, and to scrofulous growths and ulcers.

Caustic, Lu"nar. *Syn.* LA'PIS INFERNA'LIS, L. *Prep.* 1. Nitrate of silver fused and formed into sticks by pouring it into moulds.

2. (E. R. Squibb.) Nitrate of silver fused with a small quantity of chloride of iron, and formed into sticks or points. The chloride of iron gives toughness to the caustic.

Caustic, Mercu"rial. *Syn.* CAUSTIC OF NITRATE OF MERCURY; CAUSTICUM AC'IDI HYDRAR"GYRI NITRA'TIS, C. H. DEUTRONITRATIS, L. From mercury, 1 part; commercial nitric acid, 2 parts; dissolve.

2. (Cutan. Hosp.) Mercury, 1 part; nitric acid (sp. gr. 1·5), 2 parts.

3. (P. C.) As No. 1, but evaporating the solution to ⅔ths its weight. These liquids are applied with a pencil or lint, in scrofulous and syphilitic ulcers and eruptions, and in lupus, psoriasis, lepra, and other obstinate skin diseases; but their use requires great care.

4. (With arsenic.—Cutan. Hosp.) Mercury, ½ oz.; nitric acid, ½ oz.; arsenious acid, ½ dr.; as before.

Caustic, Ni'tric. *Syn.* SOLID'IFIED NITRIC ACID; CUASTICUM NI'TRICUM, L. *Prep.* (Dr. Rivallie.) Concentrated nitric acid is gradually dropped on a piece of lint, placed in a saucer or glass; as soon as the lint is gelatinised, it is pressed into a suitable shape with a glass rod, and applied to the part; it must be removed in 15 minutes. In cancerous tumours, fungoid growths, &c.

Caustic, O"piated. *Syn.* CAUSTICUM OPIA'TUM, L. *Prep.* 1. Common caustic (potassa with lime), 4 drs.; powdered opium, 1 dr.; soft soap, q. s. to make a paste. Applied to fungous ulcers.

Caustic, Plunket's. Upright crowfoot and lesser spear-wort, of each, 1 oz.; sulphur, 5 scrup.; white arsenic (in very fine powder), 1 dr.; beat to a smooth paste, form it into balls, and dry them in the sun. In cancer; a portion of one of the balls is reduced to powder, which is mixed up with yelk of egg, and applied on a piece of bladder.

Caustic, Poten'tial. Fused caustic potassa.

Caustic, Recamier's. See GOLDEN CAUSTIC.

Caustic, Sulphu''ric. *Syn.* CAUSTICUM SULPHU''RICUM, C. AC'IDI SULPHU''RICI, L. *Prep.* 1. Plaster of Paris made into a paste with oil of vitriol.

2. Saffron, lint, or unsized paper, soaked in oil of vitriol, and triturated to a plastic mass.

Caustic, Zinc. *Syn.* CAUSTIC OF CHLORIDE OF ZINC, DR. CANQUOIN'S CANCER CAUSTIC; CAUSTICUM ZINC'I, C. Z. CHLORID'I, L. *Prep.* 1. (Dr. Canquoin.)—*a.* From cloride of zinc, 1 dr.; flour, 2 drs.; made into a stiff paste with water, q. s.

b. From chloride of zinc, 1 dr.; flour, 3 drs.; water, q. s.; as the last.

c. From chloride of zinc, 1 dr.; flour, 4 drs.; water, q. s.; as before.

d. From chloride of zinc, 2 drs.; chloride of antimony, 1 dr.; flour, 5 drs.; as before.

2. (Alex. Ure.) As above, but substituting plaster of Paris for the flour there ordered.

Uses, &c. As a caustic in cancer, lupus, skin-marks (*nævi*), &c. It is formed into small cakes or wafers not exceeding 1 or 2 lines in thickness, one of which is applied to the part, and allowed to remain on from 6 to 12 hours, when it is removed, and the part covered with a poultice. It produces an eschar, often exceeding a quarter of an inch in depth. The chlorides must be in the form of powder, and well mixed with the flour previously to adding the water. The last (No. 1, *d*) is recommended in nodulated cancerous tumours.

CAUS'TICS (Ve'terinary). In *veterinary practice*, any of the substances enumerated in the foregoing list may be employed; but nitric acid, sulphuric acid, carbolic acid, chloride of zinc, and nitrate of silver, are those most commonly used. See VETERINARY MEDICINES.

CAV'IARE. *Syn.* CAV'IAR, CAV'IALE. The salted roe of several species of sturgeon. It is much esteemed by the Russians, as well as by some other nations of northern Europe, and is occasionally eaten as a delicacy in this country. It is, however, very oily, indigestible, and unwholesome.

CAYENNE'. See CAPSICUM, PEPPERS.

CEDAR-WOOD (Oil of). See OILS.

Cedar-Wood (Tincture of). See TINCTURES.

CE'DRAT. See LIQUEURS.

CE'DRENE and CE'DROLA. The oil of cedar-wood, by careful distillation, is separable into two substances—a solid crystalline compound (*cedrola*), and a volatile liquid hydrocarbon (*cedrene*). The first may be converted into the other by distillation with phosphoric anhydride.

CEL'LULOSE. See LIGNIN.

CEMENT'. *Syn.* CEMENT'UM, L. Any substance which, when applied to the surfaces of other bodies, causes them to adhere together when placed in contact. Those referred to below are amongst the most useful preparations of this class. The term cement is also applied by builders and architects to several species of mortars and like compositions employed either to unite stones and bricks into masses, or as a protective covering against the weather or water, or to make statues, cornices, and similar ornamental articles.

In general, the thinner the stratum of interposed cement, the stronger is the junction of the surfaces operated on. This caution is necessary, as in their anxiety to unite broken articles persons generally defeat themselves, by spreading the cement too thickly on the edges of the fracture; whereas the least possible quantity should be used, so as to bring the edges as close as possible together.

Cement, Al'abaster. 1. From plaster of Paris (in fine powder), made into a cream with water, and at once applied.

2. Yellow resin, 2 parts; melt and stir in plaster of Paris, 1 part.

3. Yellow resin, bees' wax, and plaster of Paris, equal parts.

4. Resin, 8 parts; wax, 1 part; melt and stir in plaster of Paris, 4 parts, or q. s.

5. Sulphur or shell-lac, melted with sufficient plaster of Paris or colouring matter to give the desired shade. *Used* to join or mend pieces in alabaster, white marble, Derbyshire spar, porphyry, and other like substances; and to fill up cracks, supply chips out of corners, &c. The last four are applied hot, the surfaces to be united having been previously warmed.

Cement, Architect'ural. 1. From paper (reduced to a smooth paste by boiling it in water), sifted whiting, and good size, equal parts, boiled to a proper consistence.

2. Paper paste, size, and plaster of Paris, equal parts; as before.

Obs. This is a species of papier-maché. It is used to make architectural ornaments, busts, statues, columns, &c. It is very light, and receives a good polish, but will not stand the weather unless it is well varnished or painted.

Cement, Arme'nian. *Syn.* DIAMOND CEMENT, PERSIAN C., TURKISH C., JEWELLERS' C. The jewellers of Turkey, who are mostly Armenians, have a singular method of ornamenting watch-cases, &c., with diamonds and other precious stones, by simply gluing or cementing them on. The stone is set in silver or gold, and the lower part of the metal made flat, or to correspond with the part to which it is to be fixed; it is then gently warmed, and the glue is applied, which is so very strong that the parts thus cemented never separate. This glue will strongly unite pieces of glass and china, and even polished steel, and may be applied to a variety of useful purposes.

Prep. 1. (Original Armenian formula; Eton.) Dissolve five or six bits of gum mastic, each the size of a large pea, in as much rectified spirit of wine as will suffice to render it liquid; and, in another vessel, dissolve as much isinglass, previously a little softened in water (though none of the water must be used), in French brandy or good rum, as will make a two-ounce phial of very strong glue, adding

two small bits of gum galbanum or ammoniacum, which must be rubbed or ground till they are dissolved. Then mix the whole with a sufficient heat. Keep the glue in a phial closely stopped, and when it is to be used set the phial in boiling water.

2. (Keller's ARMENIAN CEMENT.) Soak isinglass, ½ oz., in water, 4 oz., for 24 hours; evaporate in a water bath to 2 oz.; add rectified spirit, 2 oz., and strain through linen; mix this, whilst warm, with a solution formed by dissolving gum mastic (best), ½ oz., in rectified spirit, 2 oz.; add of powdered gum ammoniac 1 dr., and triturate together until perfectly incorporated, avoiding loss of the spirit by evaporation as much as possible.

3. (Ure's DIAMOND CEMENT.) Isinglass, 1 oz.; distilled water, 6 oz.; boil to 3 oz., and add rectified spirit, 1½ oz.; boil for a minute or two, strain, and add, while hot, first a milky emulsion of ammoniac, ½ oz., and then tincture of mastic, 5 drs.

4. Isinglass soaked in water and dissolved in spirit, 2 oz. (thick); dissolve in this 10 grs. of very pale gum ammoniac (in tears), by rubbing them together; then add 6 large tears of gum mastic, dissolved in the least possible quantity of rectified spirit.

5. Isinglass dissolved in proof spirit (as *above*), 3 oz.; bottoms of mastic varnish (thick, but clear), 1½ oz.; mix well.

Obs. When carefully made, this cement resists moisture and dries colourless. As usually met with, it is not only of very bad quality, but sold at exorbitant prices. "Some persons have sold a composition under the name of Armenian cement in England; but this composition is badly made; it is much too thin, and the quantity of mastic is much too small." (Eton.) Methylated spirit may be used instead of the pure spirit in the above preparations. Mastic and mastic varnish are also used by jewellers as cements.

Cement, Beale's. Chalk, 60 parts; lime and salt, of each, 20 parts; Barnsey sand, 10 parts; iron filings or dust, and blue or red clay, of each, 5 parts; grind together and calcine. Patented as a fire-proof cement.

Cement, Boil'er. *Prep.* Dried clay in powder, 6 lbs.; iron filings, 1 lb. Make into a paste with boiled linseed oil. *Used* to stop cracks and leaks in iron boilers, stoves, &c. See IRON CEMENT, STEAM-BOILER C.

Cement, Bot'any Bay. Yellow gum (Botany Bay gum) and brickdust, equal parts, melted together. *Used* to cement coarse earthenware, &c.

Cement, Bot'tle. *Prep.* 1. Resin, 1 lb.; tallow or suet, ¼ lb.; melt together, and stir in the colouring matter.

2. Resin, 5 lbs.; bees' wax, 1 lb.; colouring, q. s.; as last.

3. (Red.) To each pound of the above add whiting (dry), 3 oz., and light red (burnt ochre), 4 oz.; or red bole, q. s.; (all in fine powder).

4. (Black.)—*a.* To each pound of No. 1, or No. 2, add ivory black (bone black), q. s.

b. From black pitch, 6 lbs.; ivory black and whiting, of each, 1 lb.; melted together. *Used* in the same way as common sealing-wax for bottle corks, cask bungs, &c. See MAISSIAT'S CEMENT.

Cement, Brim'stone. Melted brimstone, either alone, or mixed with resin and brickdust. Cheap and useful.

Cement, Bru'yere's. Clay, 3 parts; slaked lime, 1 part; mix and expose them to a full red heat for 3 hours, then grind to powder. Recommended as an hydraulic cement.

Cement, Build'ing. *Syn.* ARTIFICIAL PUZZOLENE'. From a mixture of clay or loam, broken pottery, flints, or siliceous sand, or broken bottle glass, and wood ashes, exposed to a considerable heat in a furnace, until it becomes partially vitrified; it is then ground to fine powder, sifted, and mixed with one third its weight of quick-lime, also in fine powder, after which it must be packed (tight) in casks to preserve it from the air and moisture. For use it is mixed up with water and applied like Roman cement.

Cement, Cap. *Prep.* 1. Resin, 5 lbs.; bees' wax and dried Venetian red, of each, 1 lb.; melted together.

2. (C. G. Williams.) Equal weights of red lead and white lead. *Used* for chemical and electrical purposes. For cementing glass tubes, necks of balloons, &c., into metal mountings. No. 2 is preferable to white lead alone, and may be depended on for temperature up to 212°.

Cement, Cheese. From grated cheese, 2 parts; quick-lime (in fine powder), 1 part; white of egg, q. s.; beat to a paste. *Used* for earthenware, &c.

Cement, Chem'ical. *Syn.* SOFT CEMENT. *Prep.* From yellow wax, 4 parts; common turpentine, 2 parts; Venetian red (well dried), 1 part; melted together. *Used* as a temporary stopping or lute for the ends or joints of tubes, which are not exposed to much heat; as in alkalimetry, &c. See ELECTRICAL CEMENT.

Cement, Chi'nese. *Syn.* SHELL-LAC CEMENT, LIQUID GLUE. *Prep.* 1. Finest pale orange shell-lac (broken small), 4 oz.; rectified spirit (strongest), 3 oz.; digested together in a corked bottle in a warm place until dissolved. Very strong and useful; almost odourless. It should have about the consistence of treacle.

2. As before, but using rectified wood naphtha as the solvent. Inferior to the last, but excellent for many purposes.

3. (Without spirit.) *Prep.* Borax, 1 oz.; water, ¾ pint; shell-lac, 3 oz.; boil in a covered vessel until dissolved, then evaporate to a proper consistence. Cheap and useful, but dries slowly.

Uses, &c. Employed to mend glass, china, fancy work, jewelry, &c., for which it is only

inferior to Armenian cement. The first formula produces a cement so strong that pieces of wood may be joined together, cut slopingly across the grain, and will afterwards resist every attempt to break them at the same place. In many of the islands of the Indian Ocean, in Japan, China, and the East Indies, a similar cement is used to join pieces of wood for bows, lances, &c. The fluid is thinly smeared over each face of the joint, a piece of very thin gauze interposed, and the whole pressed tightly together and maintained so until the next day. Joints so made will even bear the continual flexure of a bow without separating. It is admirably adapted for fishing rods. The product of the second formula is commonly sold as LIQUID GLUE. That of the last is much used by the druggists and oilmen, instead of gum, for fixing paper labels to tin, and to glass when exposed to damp.

Cement, Cop'persmiths'. *Syn.* BLOOD CEMENT. From bullock's blood thickened with finely powdered quick-lime. *Used* to secure the edges and rivets of copper boilers, to mend leaks from joints, &c. It must be used as soon as mixed, as it rapidly gets hard. It is cheap and durable, and is suited for many other purposes.

Cement, Curd. *Prep.* 1. The curd of skimmed milk (obtained by the addition of vinegar or rennet) is beaten to a paste with quick-lime, in fine powder.

2. Add vinegar, ½ pint, to skimmed milk, ½ pint; mix the curd with the whites of 5 eggs; well beaten and powdered quick-lime, q. s. to form a paste. *Used* for mending glass and earthenware; they resist water and a moderate degree of heat.

Cement, Cut'lers'. *Prep.* 1. Black resin, 4 lbs.; bees' wax, 1 lb.; melt, and add finely powdered and well-dried brickdust, 1 lb.; mix well.

2. Equal weights of resin and brickdust, melted together.

Use. To fix knives and forks in their handles. It is put into the hollow of the handle, and the metal, previously made hot enough to melt the composition, pressed into its place whilst warm, and the whole kept upright and still until quite cold.

Cement, Di'amond. See ARMENIAN CEMENT.

Cement, Egg. White of egg thickened with finely powdered quick-lime. *Used* to mend earthenware, glass, china, marble, alabaster, par ornaments, &c. It does not resist long exposure to moisture, unless it has been exposed to heat.

Cement, Elas'tic. *Prep.* 1. Caoutchouc (in small pieces), 1 part; chloroform, 3 parts; dissolve.

2. (Lenher.) Caoutchouc, 5 parts; chloroform, 3 parts; dissolve, and add gum mastic (powdered), 1 part. Elastic and transparent.

3. Gutta percha, 3 parts; caoutchouc, 1 part (both cut small); bisulphide of carbon, 8 parts; mix in a close vessel and dissolve by the heat of a water bath. This is to be gently warmed before it is applied.

4. Gutta percha, 1 lb.; caoutchouc, 4 oz.; pitch, 2 oz.; shell-lac, 1 oz.; linseed oil, 2 oz.; melted together. This must be melted before being applied.

Obs. The cements 1 and 2 are elastic and transparent, and are applicable to many uses. The others, 3 and 4, are used for uniting leather, cloth, &c.

Cement, Elec'trical. *Syn.* CHEMICAL CEMENT. From black resin, 7 lbs.; red ochre, 1 lb.; plaster of Paris, ½ lb.; (both well-dried and still warm); melted together, and the heat and agitation continued until all frothing ceases, and the liquid runs smooth; the vessel is then withdrawn from the fire, and the mixture stirred until cooled sufficiently. *Used* to cement the plates in galvanic troughs, join chemical vessels, &c. See CAP CEMENT, SINGER'S CEMENT, &c.

Cement, Engineers'. *Prep.* 1. Ground white lead, mixed with as much red lead as will make it of the consistence of putty.

2. Equal weights of red lead and white lead, mixed with boiled linseed oil to a proper consistence. *Used* by engineers and others to make metallic joints. A washer of hemp, yarn, or canvas, smeared with the cement, is placed in the joint, which is then "brought home," or screwed up tight. It dries as hard as stone. It also answers well for joining broken stones, however large. Cisterns built of square stones, put together, while dry, with this cement, will never leak or come to repair.

Cement, Extempora'neous. 1. Shell-lac, melted and run into small sticks the size of a quill. *Used* to join glass, earthenware, &c. The edges are heated sufficiently hot to melt the cement, which is then thinly smeared over them, and the joint made while they are still hot. This is the cement so commonly vended in the streets of London, and which used to surprise us in our boyhood days.

2. Tears of gum mastic, used in the same way. Commonly employed by jewellers and others.

Cement, Fire'proof. *Prep.* From fine river sand, 20 parts; litharge, 2 parts; quick-lime, 1 part; linseed oil, q. s. to form a thin paste. Applied to walls, it soon acquires a stony hardness. It is also used to mend broken pieces of stone, stone steps, &c. See BEALE'S CEMENT, &c.

Cement, Flour. *Syn.* PASTE, FLOUR PASTE. This useful and well-known article is made by mixing about a tablespoonful of wheat flour with cold water, (say) ½ pint, adding the latter gradually, and thoroughly stirring in each portion before pouring in more; the vessel is then placed over the fire, and the whole assiduously stirred until it boils, great care being taken to prevent caking on the bottom, or

burning. Some persons add about ⅓rd of a teaspoonful of powdered alum to the water, which is said to strengthen the product; the shoemakers add a little quantity of powdered resin to the flour, with the same intention. The addition of a little brown sugar and a few grains of corrosive sublimate will prevent it turning mouldy, and is said to preserve it for years. When too hard or dry, it may be softened by beating it up with a little hot water.

Cement, French. Mucilage of gum arabic, thickened with starch powder or farina; a little lemon-juice is sometimes added. *Used* by naturalists in mounting specimens; by artificial-flower makers; and by confectioners, to stick paper, wafer papers, ornaments, &c., on their fancy cakes. Plain mucilage is often used in the same way.

Cement, Gad's. *Syn.* GAD'S HYDRAULIC CEMENT. From clay (well dried and powdered), 3 parts; oxide of iron, 1 part; mixed together, and made into a stiff paste with boiled oil. *Used* for work required to harden under water.

Cement, Glass. *Syn.* GLASS FLUX. *Prep.* Red lead, 3 parts; fine white sand, 2 parts; crystallised boracic acid, 3 parts; mixed and fused; it is levigated, and applied with thin mucilage of tragacanth. *Used* for mending broken china, &c. The repaired article must be gently heated, so as partially to fuse the cement.

Cement, Gibbs'. Mr. Gibbs patented in 1850 various processes for making admirable building and architectural cements, equal in hardness and duration, and superior in colour, to the best Roman and Portland cements at present in use. His materials are obtained from "the vast beds of (natural) argillaceous marls and marly limestones, or marl stones, which contain the due admixture of lime, silica, and alumina, from which hydraulic cements and artificial stones may be manufactured." These materials he finds in "the chalk formation, the Wealden formation, the Purbeck beds, the lias formation, the mountain limestone, and the lowest strata of the coal-measures." After duly choosing his materials according to the particular object in view, he prepares them "by burning in kilns, and grinding in mills, in the way cement is now manufactured." Marls and limestones are to be "first dried in kilns or ovens, at a heat fit for baking, until all moisture be driven off, and that then the calcination be prolonged as much as possible; the heat being kept as low as is only just sufficient to effect complete calcination—this being indispensable, to avoid the commencement of vitrification, which would destroy the adhesive properties of the cement."

Cement, Glue. *Prep.* 1. From glue, 1 lb., melted with the least possible quantity of water, and then mixed with black resin, 1 lb., and red ochre, 4 oz.

2. Glue, melted as above, and mixed with about ¼th of its weight each of boiled oil and red ochre.

3. (Ure.) Melted glue (of the consistence used by carpenters), 8 parts; linseed oil boiled to varnish with litharge, 4 parts; incorporate thoroughly together.

4. Glue (melted as last), 4 parts; Venice turpentine, 1 part.

Obs. The first three dry in about 48 hours, and are very useful to render the joints of wooden casks, cisterns, &c., watertight; also to fix stones in frames. The last serves to cement glass, wood, and even metal to each other. They all resist moisture well.

Cement, Grind'ers'. *Prep.* 1. From pitch, 5 parts; wood ashes and hard tallow, of each, 1 part; melted together.

2. Black resin, 4 lbs.; bees' wax, 1 lb.; melt, and add of whiting (previously heated red hot, and still warm), 1 lb.

3. Shell-lac, melted and applied to the pieces slightly heated. *Used* to fix pieces of glass, &c., whilst grinding. The last is used for lenses and fine work.

Cement, Ham'elin's. *Syn.* HAMELIN'S MASTIC. From siliceous sand, 60 parts; Bath or Portland stone (in fine powder), 40 parts; lime-marl, 20 parts; litharge, 8 parts; ground together. For use, it is mixed up with linseed oil and used like mortar. When this cement is applied to the purpose of covering buildings intended to resemble stone, the surface of the building is first washed with linseed oil.

Cement, Hens'ler's. Litharge, 3 parts; quick-lime, 2 parts; white bole, 1 part; (all in fine powder); linseed-oil varnish, q. s. to make a paste. *Used* for china, glass, &c. It is very tenacious, but long in drying.

Cement, Hœ'nle's. Shell-lac, 2 parts; Venice turpentine, 1 part; fused together, and formed into sticks. It is used like extemporaneous cement for glass and earthenware.

Cement, Hydrau'lic. Hydraulic mortars or cements are those which set or become hard under water. Common lime does not possess this property; but limestones containing from 8% to 25% of alumina, magnesia, and silica, yield a lime on burning, which does not slake when moistened with water, but forms a mortar with it, which hardens in a few days when covered with water, although it does not acquire much solidity in the air. Puzzolana, septaria, and argillaceous or siliceous earths, burnt, either with or without the addition of common limestone, and then ground to powder, form excellent hydraulic cements. The reniform limestone, commonly called "cement stone," which is found distributed in single nodules or lenticular cakes, in beds of clay, is the substance most commonly used in this country for the manufacture of the cement in question. See GAD'S, HAMELIN'S, and PARKER'S CEMENTS, &c.

Cement, Iron. This cement, which is much used for closing the joints of iron pipes and

similar purposes, is formed of the borings or turnings of cast iron, which should be clean and free from rust, mixed with a small quantity of sal-ammoniac and flowers of sulphur. For use, it is stirred up with just enough water to thoroughly moisten it, and it is rammed or caulked into the joints with a blunt caulking chisel and hammer, after which the joint is screwed up by its bolts as tightly as possible. If the turnings and borings are very coarse, they are broken by pounding in an iron mortar, and the dust sifted off before use. The following are good proportions:—

1. Sal-ammoniac (in powder), 2 oz.; flowers of sulphur, 1 oz.; iron borings, 5 lbs.; water, q. s. to mix.

2. Sal-ammoniac, 2 oz.; sulphur, 1 oz.; iron borings, 12 lbs.; water, q. s. to mix.

3. Sal-ammoniac, 2 oz.; iron borings, 7 or 8 lbs.; water, q. s. to mix.

4. Iron borings, 4 lbs.; good pipeclay, 2 lbs.; powdered potsherds, 1 lb.; make them into a paste with salt and water.

Remarks. The first of these forms is that generally employed for common purposes, but formerly much more sulphur and sal-ammoniac were used. We are told by one of the leading engineers in London, that the strongest cement is made without sulphur, and with only 1 or 2 parts of sal-ammoniac, to 100 of iron borings (see the third form); but that when the work is required to dry rapidly, as for the steam joints of machinery wanted in haste, the quantity of sal-ammoniac is increased a little, and a very small quantity of sulphur is added. This addition makes it set quicker, but reduces its strength. As the power of the cement depends on the oxidisation and consequent expansion of the mass, it is evident that the less foreign matter introduced the better. No more of this cement should be made at a time than can be used at once, because it soon spoils. I have seen it become quite hot by standing even a few hours, when it contained sulphur; and I have been informed by workmen, that when much sulphur is used, and it has been left together in quantity all night, combustion has taken place. The last form produces a cement that gets very hard when allowed to dry slowly, and is excellent for mending cracks in iron boilers, tanks, &c.

Cement, Japanese'. *Syn.* RICE GLUE. From rice flour, mixed with a little cold water, and boiling water gradually poured in until it acquires a proper consistence; when it is boiled for 1 or 2 minutes in a clean saucepan or earthen pipkin. It is beautifully white, and almost transparent, for which reason it is well adapted for fancy paper work, which requires a strong and colourless cement. It is superior to French cement. (See *antè*.)

Cement, Keene's Mar'ble. Baked gypsum or plaster of Paris, steeped in a saturated solution of alum, and then recalcined, and reduced to powder. For use, it is mixed up with water, as ordinary plaster of Paris.

Obs. This cement has been most extensively applied as a stucco. It is susceptible of a high polish, and when coloured, produces beautiful imitations of mosaic, and other inlaid marbles, scagliola, &c. It is not adapted to hydraulic purposes, or for exposure to the weather, but it is admirable for internal decorations, and from its extreme hardness is very durable. It may be coloured or tinted of any shade, by diffusing mineral colours (levigated, if in powder) through the water used to mix up the cement with. A pleasing tint is given to this cement by adding a little solution of green copperas to the alum liquor.

Cement, Lab'oratory. *Syn.* CHEMICAL MASTIC. From equal parts of pitch, resin, and plaster of Paris (thoroughly dried), mixed together. *Used* for the masonry of chlorine chambers, vitriol works, &c.; and as a lining for casks intended to hold chloride of lime.

Cement, Let'ter-fix'ing. *Prep.* Copal varnish, 15 parts; drying oil, 5 parts; turpentine, 3 parts; oil of turpentine, 2 parts; liquefied glue (made with the least possible quantity of water), 5 parts; melt togethr in a water bath, and add fresh slaked lime (perfectly dry, and in very fine powder), 10 parts. *Used* to attach metal letters to plate glass in shop windows, &c.

Cement, Mahog'any. *Prep.* 1. Melt bees' wax, 4 oz.; then add Indian red, 1 oz., and enough yellow ochre to produce the required tint.

2. Shell-lac, melted and coloured as above. Very hard. Both are used to fill up holes and cracks in mahogany furniture by the cabinet makers. Red putty is also used for the same purpose.

Cement, Mais'siat's. India rubber is melted, either with or without about 15% of either bees' wax or tallow; quick-lime (in fine powder) is gradually added; and the heat continued, until change of odour shows that combination has taken place, and until a proper consistence is obtained. *Used* as a waterproof and air-tight covering for corks, bungs, &c.

Cement, Mar'ine. See MARINE GLUE and ELASTIC CEMENT.

Cement, Opti''cians'. *Prep.* 1. Shell-lac softened with rectified spirit or wood naphtha. For fine work.

2. Bees' wax, 1 oz.; resin, 15 oz.; melt, and add, whiting (previously made red hot, and still warm), 4 oz.

3. Resin, 1 lb.; melt and add plaster of Paris (dry), 4 oz. The above are used to fix glasses, stones, &c., while polishing and cutting them. The last is a very strong cement for rough purposes.

Cement, Oxychlo''ride of Zinc. (Sorel.) *Prep.* In solution of chloride of zinc, marking from 50° to 60° of Baumé's hydrometer (*i.e.* sp. gr. 1·490 to 1·652), dissolve 3% of borax or sal-ammoniac; then add oxide of zinc, which has been heated to redness, until the mass is of a proper consistence.

Obs. This cement becomes as hard as marble. It may be cast in moulds, like plaster of Paris, or used in mosaic work, &c.

Cement, Parabol'ic. *Syn.* UNIVERSAL CEMENT. *Prep.* Curdle skim milk with rennet or vinegar, press out the whey, and dry the curd by a very gentle heat, but as quickly as possible. When it has become quite dry, grind it in a coffee or pepper mill, and next triturate it in a mortar until reduced to a very fine powder. Mix this powder with $\frac{1}{10}$th of its weight of new dry quick-lime, also in very fine powder, and to every ounce of the mixture add 5 or 6 grs. of powdered camphor; triturate the whole well together, and keep it in wide-mouth 1-oz. phials, well corked. *Used* to join glass, earthenware, &c. It is made into a paste with a little water, as wanted, and applied immediately.

Cement, Park'er's. This cement is made of the nodules of indurated and slightly ferruginous marl, called by mineralogists "septaria," and also of some other species of argillaceous limestone. These are burnt in conical kilns, with pit coal, in a similar way to other limestone, care being taken to avoid the use of too much heat, as if the pieces undergo the slightest degree of fusion, even on the surface, they will be unfit to form the cement. After being properly roasted, the calx is reduced to a very fine powder by grinding, and immediately packed in barrels, to keep it from the air and moisture.

Uses, &c. This cement is tempered with water, and applied at once, as it soon hardens, and will not bear being again softened down with water. For foundations and cornices exposed to the weather, it is usually mixed with an equal quantity of clean angular sand; for use as a common mortar, with about twice as much sand; for coating walls exposed to cold and wet, the common proportions are 3 of sand to 2 of cement, and for walls exposed to extreme dryness or heat, about 2½ or 3 of sand to 1 of cement; for facing cistern work, water frontages, &c., nothing but cement and water should be employed. Under the name of compo' or Roman cement, it is much employed for facing houses, water-cisterns, setting the foundations of large edifices, &c.

Cement, Pew's. Quick-lime, 1 part; baked clay, 2 parts (both in powder); mix and calcine; then add gypsum (fresh baked and in fine powder), 1 part, to powdered baked clay, 2 parts; mix well, add the former mixture, and incorporate them well together. *Used* to cover buildings. It is applied like mortar, and is very hard and durable. See GIBBS' CEMENT, &c.

Cement, Plumb'ers'. Black resin melted with about an equal weight of brick-dust. Sometimes a little pitch or tallow is added.

Cement, Port'land. From clay and chalk, or argillaceous river-mud and chalk or limestone, calcined together, and then ground to powder. See PARKER'S CEMENT.

Cement, Ro'man. Genuine Roman cement consists of puzzolene (a ferruginous clay from Pozzuoli, calcined by the fires of Vesuvius), lime, and sand. The only preparation which the puzzolene undergoes is that of pounding and sifting. It is generally mixed up with water, like most other cements, but occasionally with bullock's blood and oil, to give the composition more tenacity. That used in this country is now generally prepared from the septaria of either Harwich or Sheppy, or of the lias formation, or from the cement stone found in the upper division of the lias formation, or in the shale beds of the Kimmeridge clay. It is also prepared from several artificial mixtures of ferruginous clay and lime, calcined together. It must be kept in close vessels, and mixed with water when used. See PARKER'S and GIBBS' CEMENT.

Cement, Seal Engra''vers'. Resembles plumbers' cement. *Used* to fix the pieces of metal while cutting, and also to secure seals and tools in their handles. It grows harder and improves every time it is melted.

Cement, Sin'ger's. *Prep.* 1. Melt together resin, 5 lbs., and bees' wax, 1 lb., and stir in finely powdered red ochre (highly dried and still warm), 1 lb., and plaster of Paris, 4 oz.; continuing the heat a little above 212° Fahr., and stirring constantly till all frothing ceases.

2. Resin, 6 lbs.; dried red-ochre, 1 lb.; calcined plaster of Paris, ½ lb.; linseed oil, ¼ lb.

Used to cement the plates in voltaic troughs, to join chemical vessels, &c. No. 2 is specially applicable to troughs. See ELECTRICAL CEMENT.

Cement, Steam-boiler. *Prep.* Litharge, in fine powder, 2 parts; very fine sand and quick-lime (that has been allowed to slake spontaneously in a damp place), of each, 1 part; mix, and keep it from the air. *Used* to mend the cracks in boilers and ovens, and to secure steam joints. It is made into a paste with boiled oil before application.

Cement, Steam-pipe. *Prep.* Good linseed oil varnish is ground with equal weights of white lead, oxide of manganese, and pipeclay.

Cement, Transpar'ent. See ELASTIC CEMENT.

Cement, Turn'ers'. *Prep.* Bees' wax, 1 oz.; resin, ½ oz.; pitch, ½ oz.; melt, and stir in fine brick-dust, q. s.

Cement, Var'ley's. *Syn.* VARLEY'S MASTIC. Black resin, 16 parts; bees' wax, 1 part; melt, add whiting (sifted, dried by a dull-red heat, and allowed to cool), 16 parts; and stir until nearly cold.

Cement, Univers'al. See PARABOLIC CEMENT.

Cement, Water. *Prep.* 1. From good gray clay, 4 parts; black oxide of manganese, 1 part; limestone (reduced to powder by sprinkling it with water), 90 parts; mix, calcine, and powder.

2. Mix white iron ore (manganese iron ore), 15 parts, with lime, 85 parts; calcine and powder as above. Both this and the preceding must be mixed up with a little sand for

use. A piece thrown into water rapidly hardens.

3. Fine clean sand, 1 cwt.; quick-lime, in powder, 28 lbs.; bone ashes, 14 lbs. The above are beat up with water for use. See HYDRAULIC CEMENT, &c.

Cement, Wa'terproof. Several compounds of this class have been already noticed. The celebrated "waterproof cement of Dihl" consists of porcelain clay or pipeclay, dried by a gentle heat, and powdered, mixed up to the consistence of a paste with boiled linseed oil, and, sometimes, a little oil of turpentine. It is coloured by adding a little red or yellow ochre, or any similar pigment. It is used to cover the fronts of buildings, roofs of verandahs, &c.

Concluding remarks. For mending broken CHINA, EARTHENWARE, GLASS, and WOOD, the preparations generally used are the cements described above as ARMENIAN, BOTANY, BAY, CHEESE, CHINESE, CURD, EGG, EXTEMPORANEOUS, GLASS, GLUE, HENSLER'S, HŒNLE'S, MAHOGANY, and PARABOLIC. For SPAR, MARBLE, and similar materials, the ALABASTER CEMENT is specially adapted; the EGG and PARABOLIC CEMENTS will, however, answer the same purpose. For CLOTH, LEATHER, PAPER, CARD, and LIGHT FANCY WORK, the most suitable cements are the ELASTIC, CHINESE, FLOUR, FRENCH, and JAPANESE. The cements adapted for CHEMICAL and ELECTRICAL APPARATUS, and for SEALING BOTTLES, are those termed BOTTLE, BRIMSTONE, CAP, CHEMICAL, ELECTRICAL, LABORATORY, MAISSIAT'S, and VARLEY'S. The BUILDING and HYDRAULIC CEMENTS are described under the heads ARCHITECTURAL, BEALE'S, BRUYERE'S, FIREPROOF, GAD'S, GIBBS', HAMELIN'S, HYDRAULIC, KEENE'S, OXYCHLORIDE, PARKER'S, PEW'S, PORTLAND, ROMAN, WATER, and WATERPROOF. The cements used for METAL-WORK, &c., in different trades, are noticed under the heads COPPERSMITHS', CUTLERS', ENGINEERS', GRINDERS', IRON, LETTER-FIXING, OPTICIANS', PLUMBERS', SEAL-ENGRAVERS', STEAM-BOILER, STEAM-PIPE, and TURNERS'. See GLUE, LUTE, MORTAR, TOOTH-CEMENT, &c.

CEMENTA'TION. The process of imbedding a substance in, or covering it with, some powder or composition capable of acting on it when heated, and in this state exposing it to a red heat. Iron is converted into steel, and glass into Réaumur's porcelain, by cementation.

CEN'TAURIN. *Syn.* CENTAURIN'A. The bitter extractive matter of *Erythæa centaurium*, or common centaury. Combined with hydrochloric acid, it has been highly recommended as a febrifuge.

CER'ASIN. *Syn.* PRUN'INE. The insoluble portion of cherry-tree gum. It is identical with bassorin. Dr. John applies the term to all those gums which, like tragacanth, swell, but do not dissolve in water. See BASSORIN.

CE'RATE. *Syn.* CERA'TUM, L. A thick species of ointment containing wax. Cerates are intermediate in consistence between ointments and plasters; but are less frequently employed than either of those preparations. The medicinal ingredients which enter into the cerates are very numerous; indeed, almost every kind of medicine capable of exercising a topical effect may be prescribed in this form.

It is a general custom with the druggists to use a less quantity of wax for their cerates than that which is necessary to give them a proper consistence, and in many cases it is omitted altogether, and its place supplied by hard suet or stearine, and frequently by common resin. Lard is also very generally substituted for olive oil. Indeed, in no class of pharmaceutical preparations are the instructions of practitioners and the colleges more commonly disregarded. The operation of melting the ingredients should be performed in a water bath or steam bath, and the liquid mass should be assiduously stirred until cold.

All the medicated cerates may be prepared by adding the active ingredients, in the form of fine powder, soft extract, solution, &c., as the case may be, to either simple cerate or spermaceti cerate, in the proportions indicated under the head of "Doses" appended to every article of importance noticed in this work. The mixture, which must be complete, may be effected by working the articles together on a marble or glass slab or tile, or, still better, by trituration in a clean wedgwood mortar. In some cases the simple cerate is melted by a gentle heat, and the whole stirred or triturated until nearly solid; in others, digestion with heat is employed.

Cerate. *Syn.* SIM'PLE CERATE, SIMPLE DRES'SING; CERATUM (Ph. L.), C. SIM'PLEX (Ph. L. 1824). *Prep.* (Ph. L.) Yellow wax, 20 oz.; melt by a gentle heat; add olive oil, 1 pint; and stir until it begins to solidify.

Used as a simple emollient dressing. The corresponding preparations of the other colleges will be found noticed under OINTMENTS. The *ceratum simplex* of the Ph. E. is SPERMACETI CERATE.

Cerate, Ac'etate of Lead. *Syn.* CE'RATE OF SUGAR OF LEAD; CERA'TUM PLUM'BI ACETA'TIS (Ph. L.), L. *Prep.* (Ph. L.) White wax, 5 oz.; olive oil, 18 fl. oz.; melt together; add, acetate of lead (in fine powder), 5 drs., previously triturated with olive oil, 2 fl. oz., and stir till they unite (begin to solidify). *Used* as a cooling dressing to burns, excoriations, and inflamed sores.

Cerate, Ammoni'acal. *Syn.* CERA'TUM AMMONIACA'LE, L. *Prep.* (Rechoux.) Simple cerate, 1 oz.; carbonate of ammonia, 1 dr.; mix. As a counter-irritant in croup, &c.

Cerate, Arsen'ical. *Syn.* CERA'TUM ARSEN'ICI, C. A'CIDI ARSENIO'SI, L. *Prep.* 1. (Ph. U. S.) Arsenious acid (in very fine powder), 20 grs.; simple cerate, 1 oz.

2. (Sir A. Cooper.) Arsenious acid and

sublimed sulphur, of each, 1 dr.; spermaceti cerate, 1 oz. The above ingredients must be very carefully triturated together. The first is used as a dressing to cancerous sores; the second is applied on lint as a caustic in like cases.

Cerate, Belladonn'a. *Syn.* CERATE OF DEADLY NIGHTSHADE; CERA'TUM BELLADONN'Æ, L. *Prep.* 1. (W. Cooley.) Extract of belladonna, 3 drs.; simple cerate, 1 oz.; olive oil, 1 dr.; triturate together in a warm mortar, until nearly cold. *Used* in frictions to indolent tumours.

2. (Compound; C. B. COMPOS'ITUM, L.) *Prep.* (W. Cooley.) Belladonna cerate, 1 oz.; iodide of gold, 12 grs.; carefully triturated together. *Used* as a friction to scrofulous and syphilitic tumours, and to remove syphilitic and rheumatic pains. A most active and excellent preparation.

Cerate, Brown. See PLASTERS.

Cerate, Caca'o. *Syn.* CACA'O POMMADE. *Prep.* Butter of cacao, white wax, and oil of almonds, equal parts, melted together and strained. *Used* as a cosmetic for chapped hands and lips, &c.

Cerate, Cal'amine. *Syn.* TURNER'S CERATE, HEALING SALVE; CERATUM CALAMI'NÆ (Ph. L. & E.), C. LA'PIS CALAMINA'RIS (Ph. L. 1788), L. *Prep.* 1. (Ph. L.) Yellow wax, 7½ oz.; olive oil, 1 pint; melt together, remove the vessel from the fire, and when they first begin to thicken, add prepared calamine, 7½ oz., and stir constantly until they cool.

2. (P. E.) Prepared calamine, 1 part; simple cerate (Ph. E.), 5 parts; mix.

3. (Ph. D.) See OINTMENT.

4. (Commercial.) Hard suet, 5 lbs.; lard, 3 lbs.; melt, and sift in, gradually, calamine, 4 lbs.; agitate well for a few minutes, or until the whole is perfectly mixed, and after one minute's repose, pour it off into another vessel, the coarse sediment that has fallen to the bottom being carefully avoided; lastly, stir assiduously, until it is nearly cold. This forms the TURNER'S CERATE of the wholesale druggists. In many cases nothing but lard and calamine are used.

Uses, &c. When honestly prepared with genuine calamine, it is a most valuable desiccant and astringent application to excoriations, ulcers, burns, scalds, sore nipples, &c. It has long been held in popular esteem as a drying and healing dressing for sores.

Cerate, Cal'amine with Mercury. *Syn.* CERA'TUM CALAMI'NÆ CUM HYDRAR'GYRO, L. *Prep.* (Ph. Chirur.) Calamine cerate, 1 lb.; red oxide of mercury, 1 oz.; mix. *Used* as a stimulant application to foul and indolent ulcers, psorophthalmia, &c.

Cerate, Cal'omel. *Syn.* CERA'TUM CALOMELA'NOS, C. HYDRAR'GYRI CHLORI'DI, L. *Prep.* 1. Calomel, 1 dr.; spermaceti cerate, 2 drs. In herpes, and some other skin diseases.

2. (Compound; C. C. COMPOS'ITUM, L.) Calomel, 2 drs.; calamine cerate, 1 oz.; olive oil, 1 dr.

Cerate, Cam'phor. *Syn.* CERA'TUM CAMPHORA'TUM, C. CAMPHOR'Æ, L.; POMMADE DU FRÈRE COSME, Fr. *Prep.* Olive oil, 1 lb.; white wax, ½ lb.; camphor, 3 drs. As an application to chaps, chilblains, abrasions, excoriations, and slight wounds. See CAMPHOR BALLS.

Cerate, Canthar'ides. *Syn.* BLISTERING CERATE; CERA'TUM LYTT'Æ, C. CANTHAR'IDIS, L. *Prep.* 1. (Ph. L.) Cantharides (in very fine powder), 1 oz.; spermaceti cerate, 6 oz.; mix.

2. (Parrish.) Cantharides, 12 parts; lard, 10 parts; yellow wax and resin, of each, 7 parts; incorporated by fusion. Irritant; used to keep blisters open, and to stimulate issues, and indolent ulcers and tumours.

Cerate, Chalk. *Syn.* CERA'TUM CRE'TÆ, L. *Prep.* 1. Chalk (thoroughly dried, and in fine powder), 2 drs.; simple cerate, 6 drs.; almond oil, 3 drs. *Used* in piles, and foul ulcers.

2. (Acetated.) See KIRKLAND'S NEUTRAL CERATE.

3. (Compound; CERA'TUM CRE'TÆ COMPOS'ITUM, L.)—*a.* To simple chalk cerate, 1 oz.; add powdered catechu, ½ dr. In piles, and foul and indolent ulcers.

b. (U. S. Hospital.) Lead plaster and olive oil, of each, 8 oz.; white wax, 3 oz.; melt together; add solution of subacetate of lead, 6 oz.; thoroughly incorporate, and then further add, chalk (in fine powder), 5 oz. Cooling and astringent. *Useful* in inflamed sores, excoriations, piles, &c.

Cerate, Cher'ry-laur'el. *Syn.* CERA'TUM LAURO-CERASI, C. CALMANS, L. *Prep.* (Roux.) Simple cerate, 1 oz.; cherry-laurel water, ½ oz. As an application to burns.

Cerate, Cincho'na. *Syn.* BARK CERATE; CERA'TUM CINCHO'NÆ, L. *Prep.* 1. Extract of bark, 2 drs.; simple cerate, 1 oz.

2. (Van Mons.) Simple cerate, 8 oz.; camphor, 1½ dr.; melt together by a gentle heat, then add gradually, decoction of Peruvian bark (concentrated), 1 oz., and triturate until cold. *Used* as a dressing for ill-conditioned ulcers.

Cerate, Cin'nabar. *Syn.* CERA'TUM RU'BRUM, C. CINNABA'RIS, C. HYDRAR'GYRI SULPHURE'TI RU'BRI, L. *Prep.* 1. Camphor, 20 grs.; vermilion, 60 grs.; simple cerate, 1 oz. This is Alibert's "ANTIHERPETIC POMMADE."

2. (Ph. Chirur.) Yellow wax and lard, of each, ½ lb.; yellow resin, ½ oz.; red sulphide of mercury, 1 dr. *Used* as a common dressing.

Cerate, Cit'rine. See RESIN CERATE, NITRATE OF MERCURY C.

Cerate, Copai'ba. *Syn.* CERA'TUM COPAI'BÆ, L. *Prep.* 1. Spermaceti cerate, 3 oz.; melt by a gentle heat, then add, balsam of copaiba, 1 oz.

2. (Dr. Houlton.) White wax, 1 oz.; balsam

of copaiba, 2 oz.; mix, as last. Both the above have been recommended as topical applications to wounds and ulcers of the rectum, vagina, and urethra; especially in those of a fistulous character; and in piles, &c.

Cerate, Cop'per. *Syn.* CUPRIA'TED CERATE; CERA'TUM CU'PRI; C. C. AMMONIA'TI, L. *Prep.* (Swediaur.) Simple cerate, 8 parts; melt, and add solution of ammoniuret of copper, 1 part. As a stimulant dressing for indolent ulcers; and in psorophthalmia, &c.

Cerate, Cosmet'ic. *Syn.* COLD CREAM, CERATE OF GA'LEN; CERA'TUM COSMET'ICUM, C. GALENI, CREMOR FRIGIDA, L.; POMMADE EN CRÊME, Fr. *Prep.* 1. Oil of sweet almonds, 1 lb.; white wax and spermaceti, of each, 2 oz.; melt, pour the mixture into a marble or wedgwood mortar, which has been heated by standing for some time in boiling water; add, gradually, rose water, 10 fl. oz., assiduously stirring until an emulsion is formed; then further add, oil of bergamot, ½ oz.; oil of lavender, 1 dr.; and continue the stirring or trituration until the whole has become cold.

2. To the last, add otto of roses, 1 dr.; oil of rosemary, 15 drops.

3. Oil of almonds, 5 oz.; spermaceti, 5 drs.; white wax, 4 drs.; rose water, 3½ oz.; balm of Mecca (genuine), 8 drops.

4. As the last, with essence of vanilla, 15 drops; essence of ambergris, 10 drops.

5. (P. C.) White wax, 1 part; oil of almonds, 4 parts; rose water, 3 parts; as before.

6. (Van Mons.) White wax and butter of cacao, of each, 1 part; oil of almonds and rose water, of each, 4 parts.

Obs. The above are used as agreeable and cooling emollients for irritable surfaces, excoriations, sore nipples, &c. See COLD CREAM and OINTMENTS.

Cerate, Cro'ton. *Syn.* CERA'TUM CROTO'NIS, L. *Prep.* (Caventou.) Lard, 5 parts; wax, 1 part; melt, and when nearly cold, add croton oil, 2 parts. *Used* as a counter-irritant; but is apt to affect the bowels.

Cerate, Gou'lard's. See LEAD CERATE.

Cerate, Hem'lock. *Syn.* CERA'TUM CO'NII, L. *Prep.* (St. B. Hosp.) Spermaceti, 2 oz.; white wax, 3 oz.; melt, and add of hemlock ointment, 12 oz. *Used* for inveterate cancerous, scrofulous, and other sores.

Cerate, Hon'ey. *Syn.* CERA'TUM MEL'LIS, L. *Prep.* 1. Simple cerate, 3 parts; honey, 1 part; oil of lemon grass, 6 drops. *Used* as cold cream.

2. (Ph. Chirur.) Olive oil, ½ lb.; wax and lead plaster (or galbanum plaster), of each, 4 oz.; melt, and add honey, ½ lb. As a cooling emollient dressing.

Cerate, Is'sue. *Syn.* CERA'TUM AD FONTICULOS, L. As issue plaster, but adding a little almond oil.

Cerate, Kirk'land's. *Syn.* KIRKLAND'S NEUTRAL CERATE; CERA'TUM NEUTRA'LE, C. CRE'TÆ ACETA'TIS, L. *Prep.* 1. Lead plaster, 8 oz.; olive oil, 4 oz. melt, sift in chalk, 4 oz.; mix well, then add gradually, Goulard's extract, ½ oz.; distilled vinegar, 4 oz.; and stir until cold.

2. (Paris.) Lead plaster, 8 oz.; olive oil and chalk, of each, 4 oz.; sugar of lead, 3 drs., (dissolved in) distilled vinegar, 4 fl. oz. As a cooling dressing to irritable ulcers and excoriated parts.

Cerate, Lead (Compound). *Syn.* GOU'LARD'S CERATE; CERA'TUM PLUM'BI COMPOS'ITUM (Ph. L.), L. *Prep.* (Ph. L.) Olive oil, 16 fl. oz.; yellow wax, 8 oz.; melt, remove the vessel from the fire, and when they begin to thicken, add gradually, solution of subacetate of lead (slightly warmed), 6 fl. oz.; and stir constantly until the whole is nearly cold; then add camphor, 1 dr., dissolved in olive oil, 4 fl. oz. (by heat), and stir until the cerate is quite cold. *Used* in similar cases to KIRKLAND'S CERATE (which *see*). See also ACETATE OF LEAD CERATE.

Cerate, Mar'shall's. *Prep.* 1. Palm oil and calomel, of each, 2 oz.; acetate of lead, 1 oz.; ointment of nitrate of mercury, 4 oz.; triturated together in a wedgwood mortar.

2. (Paris.) Palm oil, 5 oz.; calomel, 1 oz.; acetate of lead, ½ oz.; citrine ointment, 2 oz.; as the last. Applied to the eyes, &c.

Cerate, Mercu"rial. *Syn.* CERA'TUM MERCURIA'LE, C. HYDRAR"GYRI, L. *Prep.* 1. (Guibourt.) Strong mercurial ointment and simple cerate, equal parts.

2. (Ph. L. 1746.) Strong mercurial ointment and yellow wax, of each, 6 oz.; lard, 3 oz. Both are used as dressings to venereal ulcers.

3. (Compound; CERA'TUM MERCURIA'LE COMPOS'ITUM, C. HYDRAR"GYRI, L.) *Prep.* (Ph. L.) Mercurial ointment (strong) and compound soap cerate, of each, 6 oz.; camphor (in powder), 1½ oz.; triturate together. Alterative and discutient; *used* to disperse indolent tumours and swellings, and as a resolvent in enlarged joints, &c.

Cerate, Meto"pium. *Syn.* CERA'TUM METO"PII, L. *Prep.* (Dr. Barham.) Hog-gum (from *Rhus Metopium*), and lard, of each, 4 oz.; white wax and root of Sweet Aristolochia (powdered), of each, 2 oz.; yellow resin, 1 oz.; in stiff joints and rheumatic pains.

Cerate, Mez'ereon. *Syn.* CERA'TUM MEZ'EREI, L. *Prep.* 1. Extract of mezereon, 1 part; (dissolved in) alcohol, 5 parts; add bees' wax, 5 parts; olive oil, 11 parts; melt together, and continue the heat until all the alcohol is evaporated.

2. Green oil of mezereon, 1 part; simple cerate, 20 parts; melt together. Both are used to keep up the discharge from blistered surfaces, and as a stimulant application to indolent sores.

Cerate, Neu'tral. See KIRKLAND'S CERATE.

Cerate, Ni'trate of Mer'cury. *Syn.* CITRINE CERATE; CERA'TUM HYDRAR"GYRI NITRA'TIS, L. *Prep.* (St. B. Hosp.) Citrine

ointment and simple cerate, equal parts. See OINTMENTS.

Cerate, O'pium. *Syn.* LAUD'ANUM CERATE, AN'ODYNE C.; CERA'TUM O''PII, C. OPIA'TUM, C. ANODY'NUM, L. *Prep.* 1. Tincture of opium and olive oil, of each, 2 drs.; simple cerate, 1 oz.; digest with heat until all the spirit and water is evaporated, constantly stirring the mixture all the time.

2. (Gilbert.) Wine of opium, 1 dr.; simple cerate, 1 oz.

3. (Lagneau.) Opium (in fine powder), ½ dr.; yolk of 1 egg; mix, then triturate it with simple cerate, 1 oz.

Uses. The above are applied to painful swellings, piles, and ulcers, and in chronic ophthalmia, &c.

Cerate, Phosphora'ted. *Syn.* CERA'TUM PHOSPHO'RI, C. PHOSPHORA'TUM, L. *Prep.* 1. Phosphorus, 6 grs.; simple cerate, 3 oz.; heat together in a phial placed in a water bath, with frequent agitation for 2 hours; and after repose for 10 minutes, pour off the clear portion, and stir it well until cold.

2. (Foy.) Phosphorated ether, 5 parts; simple cerate, 24 parts.—*Uses.* Both of the above have been recommended as frictions in obstinate cutaneous affections, and in rheumatism of the joints.

Cerate, Pitch. *Syn.* CERATUM PI'CIS BURGUNDI'CÆ, L. *Prep.* (Beral.) White wax, 3 parts; suet, 4 parts; Burgundy pitch, 6 parts; melted together. A mild stimulant and detergent dressing. See OINTMENTS.

Cerate, Quin'ine. *Syn.* CERA'TUM QUINIÆ, L. *Prep.* 1. Sulphate of quinine, 5 or 6 grs.; simple cerate, 1 dr. Applied to the denuded dermis (endermically).

2. Sulphate of quinine and olive oil, of each, 1 dr.; simple cerate, 6 drs. As a friction. Both are used in intermittents.

Cerate, Res'in. *Syn.* BASIL'ICON, B. CERATE, B. OINTMENT, YELLOW B., CIT'RINE CERATE; CERA'TUM CITRI'NUM (Ph. L. 1788), C. RESI'NÆ FLA'VÆ (Ph. L. 1745), C. RESI'NÆ (Ph. L. 1809 and since), L. *Prep.* 1. (Ph. L.) Yellow resin and bees' wax, of each, 15 oz.; melt, add olive oil, 1 pint; strain through a cloth, and stir the mixture until cold.

Obs. The above is the formula of the London College, but the basilicon of the shops is seldom, if ever, made in this manner. The following forms are those commonly used in trade, but the products are much inferior to that made according to the directions in the Pharmacopœia.

2. (Commercial.)—*a.* Yellow resin, 10 lbs.; bees' wax, 2 lbs.; linseed oil, 7 lbs.; melt together, and stir until cold.

b. As the last, but using nut oil instead of linseed oil.

c. Nut oil, 1 gal.; bees' wax, 5 lbs.; yellow resin, 14 lbs.

d. Lard (common) and linseed oil, of each, 3 lbs.; yellow resin, 9 lbs.; as before.

Uses, &c. This cerate is a mild stimulant, detergent, and digestive application; and as such is employed to dress foul and indolent ulcers, blistered surfaces, burns, &c. For the corresponding preparations of the other colleges, see OINTMENTS.

3. (Compound; DESH'LER'S CERATE; CERA'TUM RESI'NÆ COMPOS'ITUM, L.) *Prep.* (Ph. U. S.) Resin, suet, and bees' wax, of each, 1 lb.; turpentine, ½ lb.; flax-seed oil (linseed oil), ½ pint; as above. Rather more stimulating than resin cerate, but used for the same purposes.

Cerate, Rose. *Syn.* LIP SALVE; CERA'TUM ROSA'TUM, L. *Prep.* (P. C.) Oil of almonds, 16 parts; white wax, 8 parts; alkanet root, 1 part; digest, with a gentle heat, until sufficiently coloured, then strain, and for every ounce of the cerate, add otto of roses, 2 drops. See LIP SALVE.

Cerate, Sav'ine. *Syn.* CERA'TUM SABI'NÆ (Ph. E.; and Ph. L. 1836), L. *Prep.* 1. (Ph. E.) Bees' wax, 1 part; lard, 4 parts; fresh savin (leaves, bruised), 2 parts; boil together until the leaves become crisp, then strain, with pressure, through a linen cloth.

2. (Ph. L. 1836.) Lard, 2 lbs; savin leaves, 1 lb.; bees' wax, ½ lb.; as last.

3. (Ph. L. 1851.) In the B. P. this preparation is included among the OINTMENTS (which *see*); in trade, however, the old name (Ph. L. 1836) is still generally retained.

Obs. The preparation of this cerate requires caution, as the active principle of the savin, being volatile, is injured by long boiling and a high temperature. The leaves are usually boiled until they are crisp, but as this takes some time, the essential oil, and consequently the odour, is nearly all dissipated. A better plan is to express the juice from the leaves, and to add it to the wax and oil melted together, and just beginning to cool. As usually met with in the shops, this cerate has a lively green colour, and the odour of the fresh plant; but neither of these is derived from the leaves in the common process of making it. The first is caused by the addition of powdered verdigris, and the last by adding a little of the essential oil of savin to the compound when nearly cold. The preparations of the British Colleges have only a very pale green colour, and even that rapidly changes by exposure to the air. A uniform green colour may therefore be regarded as a proof of adulteration; as the unadulterated compound, however skilfully prepared, is of a dingy green colour, of little intensity; and after it has been made a short time, it fades on the surface, and the under portion becomes streaky and mottled. A greater quantity of colour is obtained from the leaves by long digestion in the fat and wax in earthen vessels, at a moderate heat, than by hasty boiling. In this way a lively green is sometimes produced, but it rapidly changes in the manner just mentioned.

The following forms are those commonly

adopted by the wholesale druggists for the manufacture of this cerate:—

4. Lard and suet, of each, 6 lbs.; yellow wax, 2 lbs.; melt them together in an earthen vessel; add 2 oz. of distilled verdigris (previously rubbed down smooth in a mortar with an equal weight of sweet oil); strain, whilst hot, into a large earthen pot, and when the whole has cooled a little, add of oil of savin, 1 oz., and stir until cold.

5. Savin leaves, 4 lbs.; yellow wax, 2 lbs.; lard, 8 lbs.; boil until the leaves become crisp; then strain, and add, of green ointment (lively coloured), 5 lbs.; when cooled a little, further add, of oil of savin, 3 drs., and stir briskly until cold. *Prod.* 13½ lbs.

Uses, &c. Savin cerate and ointment are chiefly employed to keep up the discharge from blisters (perpetual blisters), for which purpose it is peferable to preparations of cantharides. The practice of colouring this cerate with verdigris, which is general in trade, cannot be too severely censured, as its therapeutic action is thereby altered. The copper may be detected by burning down a little in a platinum or Hessian crucible, washing out the ashes with a little dilute nitric acid, placing the liquor in a glass tube, and applying the usual tests. See COPPER and OINTMENTS.

Cerate, Sim'ple. *Syn.* CERA'TUM SIM'PLEX, L. *Prep.* 1. (Ph. E.) Spermaceti, 1 part; white wax, 3 parts; olive oil, 6 parts; melt by a gentle heat, and stir until cold. This preparation is similar to SIMPLE OINTMENT (*Unguentum Simplex*) B. P. (which *see*).

Cerate, Soap. *Syn.* COMPOUND SOAP CERATE; CERA'TUM SAPO'NIS (Ph. L. 1836), C. SAPONIS COMPOS'ITUM (Ph. L. 1851), L. *Prep.* 1. (Ph. L.) Boil litharge, 15 oz., in distilled vinegar, 1 gal., until dissolved, stirring continually; then add of Castile soap, 10 oz.; again boil until all the moisture is evaporated; then add, gradually, bees' wax, 12½ oz., and olive oil, 1 pint, previously melted together, and stir until nearly cold. Similar to SOAP CERATE PLASTER (*Emplastrum Cerati Saponis*) B. P. (which *see*).

2. (Wholesale.) Distilled vinegar, 6 galls.; litharge, 5 lbs.; soap, 3¾ lbs.; yellow wax, 4½ lbs,; olive oil, 6 pints. Mix as above. Good nut or poppy oil may be used instead of olive oil.

Obs. Unless the instructions contained in the above formulæ are followed in every particular, the process is apt to miscarry. When this is the case, the cerate, on cooling, separates into two portions, and is commonly full of hard, gritty particles. To prevent this, care should be taken to use soap of the best quality. This mishap cannot be got over by long boiling and stirring, as is generally supposed. The only remedy is the addition of a little more soap, previously melted with some water, and again evaporating to a proper consistence. A small quantity of solution of potassa has a similar effect.

The colour and consistence of soap cerate chiefly depends on the length of time it is kept heated after the addition of the oil and wax. As evaporation proceeds, so the colour and consistence increase. Its usual colour is that of a lively, pale chocolate-brown, but occasionally it is much paler. This arises from its containing an undue quantity of moisture. When it has been kept heated for a period beyond that usually adopted, it attains greater hardness, and is then frequently called hard soap cerate (CERA'TUM SAPONIS DURUM); but by over-boiling it is apt to become gritty.

Uses, &c. Soap cerate is resolvent, cooling, and desiccative, and is chiefly employed as a cooling dressing for scrofulous swellings, &c. It may be spread on linen and applied like a plaster. It is sometimes used as a support for fractured limbs, and forms an excellent dressing for soft corns.

Cerate, Spermace'ti. *Syn.* WHITE CERATE, WHITE LIP SALVE, SIMPLE C.; CERATUM SIM'PLEX (Ph. E.), C. ALBUM (Ph. L. 1745), C. SPERMA'TIS CE'TI (Ph. L. 1788), C. CETA'CEI (Ph. L. 1809, and since), L. *Prep.* 1. (Ph. L.) Spermaceti, 2 oz.; white wax, 8 oz.; melt by a gentle heat; add, olive oil (warm), 1 pint, and stir with a spatula until they cool.

2. (Ph. E.) See SIMPLE CERATE.

3. (Ph. D.) The corresponding preparation of the Ph. D. is classed under *Ointments*, and contains lard.

4. (*Commercial.*) On the large scale lard or suet is substituted for oil, by which means less wax is required. The following is a good form where a cheap article is wanted, and is that commonly adopted in the wholesale trade:—

Clarified mutton suet, 5½ lbs.; white wax and spermaceti, of each, ¾ lb.; as above.

Obs. The materials should be melted by a very gentle heat (that of a water bath is best) in a clean stoneware vessel, and as soon as perfect liquefaction takes place, the heat should be withdrawn, and the fluid cerate strained into a clean vessel, and stirred with a clean wooden spatula until it solidifies. To facilitate the cooling, the vessel may be placed in cold water or in a current of cold air. In this way the product is rendered both whiter and finer than when the liquid mass is allowed to cool by itself. By adding a little flowers of benzoin with the oil, or a little nitric ether when the cerate is about half cold, this, as well as other like preparations, will keep for years without becoming rancid or suffering any material change of condition.

Uses, &c. Emollient and cooling. It is commonly employed as a soft, cooling dressing, as a lip salve, as an application to chaps, chilblains, &c.

Cerate, Sul'phur. *Syn.* CERA'TUM SULPHU'RIS, C. SULPHURA'TUM, L. *Prep.* (P. C.) Washed sulphur. 2 parts; cerate of Galen, 7 parts; almond oil, 1 part; mix. In itch, &c.

Cerate, Sul'phide of Mer'cury. *Prep.* (Swediaur.) Yellow resin, ½ oz.; yellow wax and lard, of each, ½ lb.; vermilion, 20 grs. As a

dressing to unhealthy ulcers. See CINNABAR CERATE.

Cerate, Tobac'co. *Prep.* Bees' wax, 3 oz.; yellow resin, 1 oz.; olive oil, 6 oz.; tobacco, juice, 4 oz.; mix and evaporate to dryness, and when nearly cold, add bergamot, 2 drs. *Used* to destroy pediculi, &c.

Cerate, Touch. *Syn.* CERA'TUM PRO TEC'TU, L.; CERAT POUR LE TOUCHER, Fr. *Prep.* (Soubeiran.) Spermaceti and yellow wax, of each, 1 part; olive oil, 16 parts; melt, add caustic soda, 1 part, and stir until cold. *Used* in hospitals for practising the touching in accouchements.

Cerate, Turner's. See CALAMINE CERATE.

Cerate, Ver'digris. *Syn.* CERA'TUM ÆRU'GINIS, C. CU'PRI DIACETA'TIS, L. *Prep.* 1. Resin cerate, 19 parts; verdigris (in fine powder), 1 part.

2. (For. Ph.) Wax and resin, of each, 6 parts; Venice turpentine, 5 parts; linseed oil, 2 parts; verdigris, 1 part. *Used* as a mild escharotic and stimulant to fungous ulcers, warts, corns, &c.

Cerate, White. See SPERMACETI CERATE.

Cerate, Zinc. *Syn.* CERA'TUM ZINC'I, C. Z. OXY'DI, L. *Prep.* 1. Oxide of zinc, 20 grs. spermaceti cerate, 1 oz. *Used* in sore nipples, excoriations, &c.; and in chronic ophthalmia.

2. (Compound; CERA'TUM ZINCI COMPOSITUM, L.)—*a.* To the last, add calomel, 10 grs.; *Used* as the last, and in scrofulous ophthalmia.

b. (Mid. Hosp.) Zinc ointment and compound lead ointment, equal parts. Cooling, astringent; in excoriations, and as a dressing for ulcers.

c. (Hufeland.) Oxide of zinc and lycopodium, of each, 15 grs.; simple cerate, ½ oz. In sore nipples, ulcerations of the breast, tetters, &c. It acts best when diluted with half its weight of spermaceti cerate.

CEREB'RIC ACID. A peculiar acid compound, first noticed by M. Frémy, obtained along with oleo-phosphoric acid when the brain and nerves are treated with hot alcohol. It is solid, white, crystalline; freely soluble in boiling alcohol, and forms a solid gelatinous mass with hot water; fusible with decomposition, exhaling a peculiar odour, and leaving much charcoal behind. It has been found also in the yolk of eggs, in seminal fluid, and in pus. With the alkalies it forms insoluble salts termed cerebrates.

CEREB'ROLEIN. When oleo-phosphoric acid is boiled in water, it is resolved into a fluid neutral oil and phosphoric acid, which dissolves. The former is cerebrolein.

CE'RIN. $HC_{27}H_{53}O_2$. (Brodie.) *Syn.* CEROTIC ACID. When pure bees' wax (bleached) is digested in boiling alcohol for some time, a solution of myricin and cerin is formed. The former is deposited as the liquid cools, and the latter may be obtained by evaporating the decanted portion. *Cerin* is a white, crystallisable substance, soluble in 16 parts of boiling alcohol; it fuses at 144° Fahr.; and is readily saponified with caust alkaline lyes. It greatly resembles whi wax, of which, indeed, it forms from 70% t 80%.

CE'RIUM. Ce. A metal discovered i 1803 by Hisinger and Berzelius, in the mine ral named *cerite*.

CE'ROMEL. *Prep.* (Van Mons.) Bees' wax 1 oz.; honey, 4 oz.; melt together and sti until cold. An excellent application to irri table ulcers, abraided surfaces, sore nipples, &c.

CERO'TIC ACID. See CERIN.

CE'TIN. $C_{32}H_{64}O_2$. Chevreul applied this name to pure spermaceti. *Prep.* Dissolve spercaceti in boiling alcohol, and collect the crystals that are deposited as the solution cools. Bright pearly crystals, melting at 120°, and subliming at 670° Fahr. See SPERMACETI.

CETRAR'IC ACID. $H_2C_{18}H_{14}O_8$. *Syn.* CETRAR'IN. The bitter principle of Iceland moss (*Cetraria Islandica*). It exists, in the free state, in the cortical portion of the thallus.

Prep. 1. Iceland moss (bruised), 1 part; rectified spirit, 6 parts; boil in a covered vessel for half an hour; express the liquor whilst hot, filter, and distil off the spirit; redissolve the residuum in boiling alcohol, decant the clear, and let the solution cool slowly; lastly, collect the crystals and preserve them out of contact with air.

2. (Herberger.) Iceland moss (in coarse powder), 1 lb.; alcohol (·883), 4 lbs.; boil as before, cool until vapours cease to rise, express the tincture, add hydrochloric acid, 3 drs., (dissolved in) water, 2 oz.; let it rest for a night in a closed matrass; then decant, throw the deposit on a filter, press it in bibulous paper, and whilst still moist, wash it with both alcohol and ether; lastly, purify it by digestion in boiling alcohol, as before.

Prop., &c. Pure cetraric acid occurs under the form of minute, shining, acicular crystals; it is intensely bitter, non-volatile, scarcely soluble in water, ether, and cold alcohol; soluble in alkaline solutions forming soluble salts, which give a red colour with the persalts of iron, and a yellow one with acetate of lead. The compounds are called *cetrarates*.—*Dose.* 2 to 4 grs. every three hours, as a febrifuge; 1 to 3 grs. thrice daily, as a tonic.

CHABERT'S OIL. *Syn.* CHABERT'S EMPYREUMAT'IC OIL; O'LEUM EMPYREUMAT'ICUM CHABERTI, O. CONTRA TÆNIAM CHABERTI, L. *Prep.* (Ph. Bor. 1847.) From empyreumatic oil of hartshorn, 1 part; oil of turpentine, 3 parts; mix and distil over three fourths only in a glass retort, and keep it in well-stopped bottles. In tape-worm.—*Dose.* 2 teaspoonfuls in water, night and morning, until 4 to 6 or even 7 oz. have been taken; a cathartic being also administered from time to time.

CHAIRS. The black leather work of chairs, settees, &c., may be restored by first well

washing off the dirt with a little warm soap and water, and afterwards with clean water. The brown and faded portions may now be restrained by means of a little black ink, or preferably, black reviver, and when this has got thoroughly dry, they may be touched over with white of egg, stained and mixed with a little sugar-candy. When the surface is nearly dry, it should be polished off with a clean brush.

CHALK. *Syn.* SOFT CARBONATE OF LIME, or CARBONATE OF CALCIUM, EARTHY C. OF L.; CRE'TA, L. Chalk is largely used in the arts and manufactures, and in medicine. The natural varieties are remarkable for the fossils which they contain. The COLOURED CHALKS which are used as pigments and for crayons generally contain both clay and magnesia, as well as oxide of iron, and are minerals quite distinct from WHITE CHALK, or CHALK, properly so called. The latter is an AMORPHOUS CARBONATE OF LIME. Exposed for some time to a red heat, it is converted into QUICK-LIME; ground in mills and elutriated, it forms WHITING; the same process performed more carefully and on a smaller scale produces the PREPARED CHALK used in medicine. When prepared artificially (by precipitation), it is the PRECIPITATED CHALK of modern pharmacy. (See *below*.)

Chalk, Black. A variety of drawing slate.

Chalk, Brown. A familiar name for umber.

Chalk, Cam'phorated. *Syn.* CRETACEOUS TOOTH POWDER, CAM'PHORATED T. P.; CRE'TA CAM'PHORATA, C. CUM CAMPHO'RA, L. *Prep.* 1. Camphor, 1 oz.; add a few drops of spirit of wine, reduce it to a very fine powder, and mix it (perfectly) with precipitated chalk, 7 oz.; lastly, pass it through a clean, fine sieve, and keep it in a corked bottle. These proportions make the strongest "CAMPHORATED TOOTH POWDER" of the shops.

2. Camphor, 1 oz.; precipitated chalk, 15 oz.; as before. These are the best and safest proportions, and those now generally adopted by the West-end perfumers.

3. As either of the above, but using prepared chalk in lieu of precipitated chalk. Less white and velvety, but cleans the teeth better than the softer article.

Uses, &c. Camphorated chalk is much esteemed as a dentifrice; especially by smokers, and those troubled with foul teeth, or offensive breath. It may be scented with a few drops (3 or 4 to each oz.) of otto of roses, oil of cloves, or neroli, or of the essences of ambergris, musk, or vanilla; but care must be taken not to overdo it. When the teeth are much furred or discoloured, it may be mixed with about one seventh of its weight of finely powdered pumice stone (sifted through lawn), which will render it more effective. A little carmine, rouge, light red (burnt ochre), red coral, or rose pink, is also sometimes added to give it a tinge approaching that of the gums. The quantity of camphor (1 to 3 or 4) commonly ordered in certain books is absurdly large, and would render the compound not only unpleasant in use, but actually detrimental to the teeth. See DENTIFRICES.

Chalk, French. Soap stone or steatite, a soft magnesian mineral, possessing the property of writing on glass. It is used by tailors for marking cloth. Its powder (obtained by scraping) is very soft, velvety, and absorbent of grease. It forms the boot powder of the boot- and shoe-makers.

Chalk Mixture. *Syn.* MISTURA CRETÆ, L. Prepared chalk, 1 part; gum arabic (in powder), 1 part; syrup, 2 parts; cinnamon water, 30 parts; mix by trituration.—*Dose.* 1 to 2 oz., with astringent tinctures and opium. Care should be taken to use the *prepared chalk*, as directed; the precipitated chalk has a crystalline character, and is said to occasion irritation of the bowels. (Squire.)

Chalk, Precipitated. *Syn.* PRECIPITATED CAR'BONATE OF LIME; CRE'TA PRÆCIPITA'TA, CAL'CIS CARB'ONAS PRÆCIPITA'TUM, L. *Prep.* 1. By adding to a solution of chloride of calcium, any quantity, another of carbonate of soda (both cold), and well washing the precipitate with pure water, and drying it out of the dust.

2. (Ph. D.) Solution of chloride of calcium (Ph. D.), 5 parts; carbonate of soda, 3 parts; (dissolved in) water, 4 parts.

Uses, &c. It is chiefly employed for making aromatic confection, cretaceous powder, and chalk mixture. That of the shops is seldom pure, the refuse of the soda-water makers (sulphate of lime) being commonly sold for it. When pure, it is wholly soluble, with effervescence, in dilute hydrochloric acid. (See *below*.)

Chalk, Prepa"red. *Syn.* CRE'TA (Ph. E. & Ph. L. 1836), CRE'TA PRÆPARA'TA (Ph. L. 1851), CRE'TA AL'BA (Ph. D.), L. *Prep.* 1. (Ph. D. 1836.) Rub chalk, 1 lb., with sufficient water, add gradually, until reduced to a smooth cream; then stir this into a large quantity of water, and, after a short interval, to allow the coarser particles to subside, pour off the supernatant water (still turbid) into another vessel, and allow the suspended powder to settle; lastly, collect the chalk so prepared and dry it. In the same way shells are prepared, after being first freed from impurities and washed with boiling water.

2. (Commercial; WHI'TING.) On the large scale, the chalk is ground in mills, and the elutriation and deposit made in large reservoirs. It is now seldom prepared by the druggist.

Pur. Almost entirely soluble in dilute hydrochloric acid, provided it contains no sulphate of lime or silica, giving off small bubbles of carbonic acid gas.

Test. The salt formed by dissolving the chalk in hydrochloric acid, if rendered neutral by evaporation to dryness and redissolved in water, gives only a very scanty precipitate on

the addition of a saccharated solution of lime, indicating absence of phosphate. (B. P.)

Uses, &c. In *medicine*, as an absorbent, antacid, and desiccant; in acidity, heartburn, dyspepsia, and other like stomach affections, and in diarrhœa, depending on acidity or irritation; in the latter, generally combined with aromatics, astringents, or opium. It forms a valuable dusting powder in excoriations, ulcers, &c., especially in those of children.—*Dose.* 10 grs. to a spoonful, in a little water or milk, or made into a mixture with mucilage or syrup.

Chalk, Red. A natural clay containing about 18% of protoxide and carbonate of iron.

CHALYB'EATES. *Syn.* CHALYBEA'TA, FERRUGIN'EA, L. The medicinal qualities of the preparations of iron are noticed under the name of that metal. Those most frequently employed in medicine are—IRON FILINGS; QUEVENNE'S IRON; the BLACK OXIDE, MAGNETIC OXIDE, and SESQUIOXIDE OF IRON; the AMMONIO-CHLORIDE and SESQUICHLORIDE; the CARBONATE and SACCHARINE CARBONATE; the CITRATE and AMMONIO-CITRATE; the IODIDE, LACTATE, and SULPHATE; the TARTRATE, AMMONIO-TARTRATE, and POTASSIO-TARTRATE OF IRON; and the CHALYBEATE MINERAL WATERS. For the doses, &c., see the respective articles.

CHAM'OMILE. *Syn.* ANTHE'MIS, L. The flowers of the *Anthemis nobilis* (*Anthemidis Flores*, B. P.). They are bitter, stomachic, and tonic; in dyspepsia, loss of appetite, intermittents, &c. They are an effectual remedy for nightmare; and, according to Dr. Schall, the only certain remedy for that complaint. —*Dose.* 10 grs. to ½ dr., or more, in powder or made into a tea. Fomentations are also made with it. See EXTRACTS, OILS, PILLS, &c.

CHAMPAGNE'. See WINES.

CHAPS. These are too well known to require description. Chapped hands are common amongst persons with a languid circulation, who are continually "dabbling" in water during cold weather. Chapped lips generally occur in persons with pallid, bluish, moist lips, who are much exposed to the wind in dry, cold weather; especially in those who are continually moving from heated apartments to the external air. The application of a little COLD CREAM, POMATUM, SPERMACETI OINTMENT, LARD, or any similar article, will generally prevent chaps on the lips, and chaps and chilblains on the hands. Persons employed in oil and tallow works, or about oil, and who have consequently their hands continually in contact with greasy matter, never suffer from these things. A little oil or unguent of any kind, well rubbed on the hands on going to rest (removing the superfluous portion with a cloth), will not only preserve them from cold, but tend to render them both soft and white. See CHILBLAINS.

CHAR (Potted). The flesh of the *Salmo Alpinus* (Linn.), or trout of the Alps, common in the lakes of Lapland, preserved by the common process of potting.

CHAR'BON-ROUX [Fr.]. See WOOD CHARCOAL (*below*).

CHAR'COAL. Charcoal is made by charring organic substances, such as wood, bone, blood, &c., and is, in other words, the fixed residuum of vegetable or animal matter exposed to a high temperature out of contact with atmospheric air.

There are several different varieties of charcoal, the chief of which, however, are wood and animal charcoal.

Charcoal, Animal. *Syn.* ANIMAL BLACK, BONE BLACK, IVORY BLACK, CARBO ANIMALIS. The charcoal obtained by igniting bone in close vessels, but often applied likewise to any charcoal obtained from animal matter.

Commercial. Bones (deprived of their grease by boiling) are broken to pieces, and put into small cast-iron pots, varying from ⅜ to ½ an inch in thickness. Two of these being filled, are dexterously placed with their mouths together and then luted with loam. A number of these vessels are then placed side by side and piled on each other, in an oven resembling a potter's kiln, to the number of 100 or 150, or even more. The fire is next kindled, and the heat kept up strongly for 10 or 12 hours, according to circumstances, until the process is completed. The whole is then allowed to cool before opening the pots.

A more economical method is by distillation, as under:—

Bones (previously boiled for their grease) are introduced into retorts similar to those used in gas works, and heat being applied, the volatile products are conveyed away by iron pipes to cisterns where the condensable portion is collected. As soon as the process of distillation is finished, the solid residuum in the retorts, while still red hot, is removed through their lower ends into wrought-iron canisters, which are instantly closed by air-tight covers, and luted over. These are then raised to the ground by a crane, and set aside to cool.

The bones having been carbonised, are ground in a mill, and the resulting coarse powder, sorted by sieves into two kinds, one, granular, somewhat resembling gunpowder, for decolorising liquids, and the other, quite fine, to be used as a pigment. The first is sold under the name of animal charcoal; the second, as bone or ivory black. The latter and other fine varieties of animal charcoal are fully described under the head of BLACK PIGMENTS.

Uses, &c. This crude animal charcoal possesses the valuable property of taking lime and other saline matter from syrups and other aqueous solutions, especially organic ones, at the same time that it decolours them. Its power as a decoloriser may be tested by adding it to a solution of brown sugar or of molasses,

or to water containing $\frac{1}{1000}$ part of indigo dissolved in sulphuric acid. The test should be made in a small glass tube. By well washing and carefully reburning it, this charcoal may be used any number of times. As a decoloriser and deodoriser, animal charcoal is vastly superior to vegetable charcoal.

PREPARED ANIMAL CHARCOAL. Hydrochloric acid, 1 lb.; water, 1 pint; mix, add bone black, 7 lbs.; make a paste; in 2 or 3 days stir in boiling water, 1 quart; and the next day wash it with fresh water until the washings cease to affect litmus paper or a solution of carbonate of sodium; then collect it in a cloth, and drain, press, and dry it; lastly, heat it to redness, as before. *Used* to decolour syrups, &c.; and occasionally by the distillers and rectifiers.

The most powerful charcoal is prepared by calcining blood, and well washing the residue, and which is the method of the last 'London Pharmacopœia.'

Concluding remarks. Animal charcoal, however prepared, if intended to be used as a deodoriser or decoloriser, should be kept thoroughly excluded from the air, as by exposure it loses all its valuable properties, and becomes absolutely inert. Freshly burnt charcoal is therefore to be employed whenever it can be obtained.

Charcoal, Wood, *Syn.* VEG'ETABLE CHARCOAL; CAR'BO LIG'NI, L. The residue obtained after heating wood without access of air to about 572° Fahr. It is extremely porous, and retains the structure of the wood from which it is derived. It consists essentially of carbon and of the fixed or inorganic matter which exists in wood; but if carbonisation be imperfectly effected, it may contain a sensible amount of hydrogen.

Charcoal-burning is effected in the open air in piles or stacks provided with a yielding cover, in pits, in closed chambers of brick or stone, and in iron retorts heated externally like common gas retorts. The latter method is only practised by the manufacturers of pyroligneous acid and gunpowder.

CHARCOAL FOR FUEL, &c. The method of pile burning is that which is most extensively practised. Pieces of wood of equal length are piled concentrically round a sort of chimney formed by driving 3 stakes in the ground; those nearest the centre are almost vertical, and the surrounding pieces have a slight but gradually increasing inclination; a second row, and in the case of very large piles even a third, may be stacked in a similar manner one above the other. The pile is covered with turf and soil, and kindled by filling the space within the 3 central stakes with easily inflammable wood, which is ignited. The character of the smoke which issues from vents made in the pile indicates exactly the degrees of carbonisation in different parts. When the charcoal is drawn from the pile it is extinguished by cold water, or if that is not at hand, by charcoal dust or dry soil. In some parts of Sweden the wood is charred in large rectangular stacks, and in China the method of charring in pits is practised.

CHARCOAL FOR GUN'POWDER; CYL'IND CHARCOAL. The charcoal employed in t manufacture of gunpowder is burnt in cl iron cylinders, and has hence received t name of cylinder charcoal. For this and oth nice purposes, it is essential that the last p tion of the tar and vinegar should be suffe to escape, and the reabsorption of the cr vapours prevented, by cutting off the co munication between the cylinders and t condensing apparatus; as without this p caution, on the fire being withdrawn, a ret grade movement of the product takes pl and the charcoal is much reduced in quali Alder and willow are the woods chiefly u for making charcoal at Waltham Abbey. Dutch white willow, and after that the H tingdon willow, are said to yield the b charcoal for gunpowder. The charcoal fr the cylinders of the pyroligneous acid (w vinegar) works is also called cylinder ch coal, and is that chiefly used for chemi purposes; but it is inferior to that prepa for gunpowder.

CHARCOAL FOR SCIENTIFIC PURPOSES. box-wood charcoal, employed in voltaic el tricity, is prepared by putting prismatic pie of box-wood, about 1 inch long by $\frac{1}{2}$ in thick, into a crucible, which is then filled w clean, dry sand, covered up, and exposed t red heat for about an hour.

Uses, &c. These are numerous and vari Charcoal is extensively employed as a fu and in metallurgy for tempering met making steel, &c.; reduced to powder, it used to surround vessels and bodies requi to retain their heat for some time; a coat of charcoal, formed on piles and stakes wood by charring them, promotes their p servation. Fresh burnt charcoal, in coa powder, restores tainted meat and put water, decolours vegetable solutions, deodori fetid substances, and withdraws lime fr syrups filtered through it.

In *medicine*, charcoal is principally used a deodoriser and disinfectant, either in form of powder or made into a poultice. has been given internally in dyspepsia, di rhœa, dysentery, heartburn, agues, consti tion, sickness of pregnancy, and various oth diseases, with advantage. As a prophyla of cholera and fevers it is invaluable a superior to all other substances. It forms t best tooth powder known, as it both whit the teeth and deodorises the breath.—*Do* 10 grs. to a teaspoonful, or more ad libit An ointment made with lard and charcoal been successfully employed in some skin d eases. In all cases, to be useful, the charc must be both fresh burnt and fresh-powder and carefully preserved, out of contact wi the air, until about to be administer

Fresh carbonised bread forms an excellent charcoal, both for a prophylactic and a tooth powder.

Charcoal varies in its qualities according to the substance from which it is prepared; that of the soft woods (willow or alder) is best for crayons and gunpowder; that of the hard woods for fuel, and for blowpipe supports. That made by a low-red heat, not exceeding cherry red, and which has a dull surface, is the most valuable. If the heat is carried much beyond this point, the charcoal acquires a brilliant surface, and deteriorates in quality. Chestnut charcoal is preferred by smiths for forging, as it not only burns slowly, but deadens as soon as the blast ceases. Arecanut charcoal is preferred as a dentifrice; but the willow charcoal or box-wood charcoal is usually substituted for it by shopkeepers.

Ant., &c. Poisoning or suffocation, resulting from respiring the fumes of burning charcoal, has been already alluded to, and the treatment briefly pointed out. See CARBONIC ANHYDRIDE.

CHAR'GES (for Cattle). See VETERINARY MEDICINE.

CHAR'RING (Surface). The operation by which the surface of wood is carbonised, to prevent its decay from exposure to air and moisture. Stakes and piles are generally thus treated before they are driven into the ground. Casks are charred on the inside by coopers when they are intended to hold water. In both these cases the fire is commonly applied directly to the wood. A new method has, however, been lately employed with apparent success. This consists in washing the wood with the strongest oil of vitriol. In this way, not only the outer surface, but the surface of all the cracks and holes, gets carbonised, which is not the case when heat is employed. It succeeds admirably with musty casks and vats.

CHEESE, *Syn.* CA'SEUM, CA'SEUS; L. The curd of milk compressed into a solid mass. That of commerce is usually salted and dried, and in some varieties it is also coloured and flavoured.

The process of cheese-making is one which is eminently interesting and scientific, and which, in every gradation, depends on principles which chemistry has developed and illustrated. When a vegetable or mineral acid is added to milk, and heat applied, a coagulum is formed, which, when separated from the liquid portion, constitutes cheese. Neutral salts, earthy and metallic salts, sugar, and gum Arabic, as well as some other substances, also produce the same effect; but that which answers the purpose best, and which is almost exclusively used by dairy farmers, is rennet, or the mucous membrane of the last stomach of the calf. Alkalies dissolve this curd at a boiling heat, and acids again precipitate it. The solubility of cheese in milk is occasioned [illegible] free alkalies. In fresh milk these substances may be readily detected by the property it possesses of restoring the colour of reddened litmus paper. The addition of an acid neutralises the alkali, and so precipitates the curd in an insoluble state. The philosophy of cheese-making is thus expounded by Liebig:—

"The acid indispensable to the coagulation of milk is not added to the milk in the preparation of cheese, but it is formed in the milk at the expense of the milk-sugar present. A small quantity of water is left in contact with a small quantity of a calf's stomach for a few hours, or for a night; the water absorbs so minute a portion of the mucous membrane as to be scarcely ponderable; this is mixed with milk; its state of transformation is communicated (and this is a most important circumstance), not to the cheese, but to the milk sugar, the elements of which transpose themselves into lactic acid, which neutralises the alkali, and thus causes the separation of the cheese. By means of litmus paper the process may be followed and observed through all its stages; the alkaline reaction of the milk ceases as soon as the coagulation begins. If the cheese is not immediately separated from the whey, the formation of lactic acid continues, the fluid turns acid, and the cheese itself passes into a state of decomposition.

"When cheese-curd is kept in a cool place, a series of transformations takes place, in consequence of which it assumes entirely new properties; it gradually becomes semi-transparent, and more or less soft, throughout the whole mass; it exhibits a feebly acid reaction, and develops the characteristic caseous odour. Fresh cheese is very sparingly soluble in water, but after having been left to itself for two or three years, it becomes (especially if all the fat be previously removed) almost completely soluble in cold water, forming with it a solution, which, like milk, is coagulated by the addition of the acetic or mineral acids. The cheese, which whilst fresh is insoluble, returns during the maturation, or ripening, as it is called, to a state similar to that in which it originally existed in the milk. In those English, Dutch, and Swiss cheeses, which are nearly inodorous, and in the superior kinds of French cheese, the caseine of the milk is present in its unaltered state.

"The odour and flavour of the cheese is owing to the decomposition of the butter; the non-volatile acids, the margaric and oleic acids, and the volatile butyric acid, capric and caproic acids, are liberated in consequence of the decomposition of glycerin. Butyric acid imparts to cheese its characteristic caseous odour, and the differences in its pungency or aromatic flavour depend upon the proportion of free butyric, capric, and caproic acids present." In the cheese of certain dairies and districts, valerianic acid has been detected [illegible]

Messrs. Jljenko and Laskowski found this acid in the cheese of Limbourg, and M. Bolard in that of Roquefort.

"The transition of the insoluble into soluble casein depends upon the decomposition of the phosphate of lime by the margaric acid of the butter; margarate of lime is formed, whilst the phosphoric acid combines with the casein, forming a compound soluble in water.

"The bad smell of inferior kinds of cheese, especially those called meagre or poor cheeses, is caused by certain fetid products containing sulphur, and which are formed by the decomposition or putrefaction of the casein. The alteration which the butter undergoes (that is, in becoming rancid), or which occurs in the milk-sugar still present, being transmitted to the casein, changes both the composition of the latter substance and its nutritive qualities.

"The principal conditions for the preparation of the superior kinds of cheese (other obvious circumstances being of course duly regarded) are a careful removal of the whey, which holds the milk-sugar in solution, and a low temperature during the maturation or ripening of the cheese."

Cheese differs vastly in quality and flavour, according to the method employed in its manufacture, and the richness of the milk of which it is made. Much depends upon the quantity of cream it contains, and consequently, when a superior quality of cheese is desired, cream is frequently added to the curd. This plan is adopted in the manufacture of Stilton cheese and others of a like description. The addition of a pound or two of butter to the curd for a middling size cheese also vastly improves the quality of the product. To ensure the richness of the milk, not only should the cows be properly fed, but certain breeds chosen. Those of Alderney, Cheddar, Cheshire, Gloucestershire, Guernsey, and North Wiltshire, deserve a preference in this respect.

The materials employed in making cheese are milk and rennet. Rennet is the stomach of the calf, and is used either fresh or salted and dried; generally in the latter state. The milk may be of any kind, according to the quality of the cheese required. Cows' milk is that generally employed; but occasionally ewes' milk is used; and sometimes, though more rarely, that from goats.

In preparing his cheese, the dairy farmer puts the greater portion of the milk into a large tub, to which he adds the remainder, sufficiently heated to raise the temperature to that of new milk. The whole is then whisked together, the rennet or rennet liquor added, and the tub covered over. It is now allowed to stand until completely "turned," when the curd is gently struck down several times with the skimming-dish, after which it is allowed to subside. The vat covered with cheese-cloth is next placed on a "horse" or "ladder" over the tub, and filled with curd by means of the skimmer, care being taken to allow as little as possible of the oily particles or butter to run back with the whey. The curd is pressed down with the hands, and more added as it sinks. This process is repeated until the curd rises to about 2 inches above the edge. The newly formed cheese, thus partially separated from the whey, is now placed in a clean tub, and a proper quantity of salt added, as well as of annotta, when that colouring is used, after which a board is placed over and under it, and pressure applied for about 2 or 3 hours. The cheese is next turned out and surrounded by a fresh cheese-cloth, and then again submitted to pressure in the cheese press for 8 or 10 hours, after which it is commonly removed from the press, salted all over, and again pressed for 15 to 20 hours. The quality of the cheese especially depends on this part of the process, as if any of the whey is left in the cheese it rapidly becomes bad-flavoured. Before placing it in the press the last time, the common practice is to pare the edges smooth and sightly. It now only remains to wash the outside of the cheese in warm whey or water, to wipe it dry, and to colour it with annotta or reddle, as is usually done.

The storing of the newly made cheese is the next point that engages the attention of the maker and wholesale dealer. The same principles which influence the maturation or ripening of fermented liquors also operate here. In England, a cool cellar, neither damp nor dry, and which is uninfluenced by change of weather or season, is commonly regarded as the best for the purpose. If possible, the temperature should on no account be permitted to exceed 50° or 52° Fahr. at any portion of the year. An average of about 45° is preferable when it can be procured. A place exposed to sudden changes of temperature is as unfit for storing cheese as it is for storing beer. "The quality of Rochefort cheese, which is prepared from sheep's milk, and is very excellent, depends exclusively upon the places where the cheeses are kept after pressing and during maturation. Those are cellars, communicating with mountain grottoes and caverns, which are kept constantly cool, at about 41° to 42° Fahr., by currents of air from clefts in the mountains. The value of these cellars as storehouses varies with their property of maintaining an equable and low temperature. Giron mentions that a certain cellar, the construction of which had cost only 480*l.* (12,000 francs), was sold for 8,600*l.* (215,000 francs), being found to maintain a suitable temperature, a convincing proof of the importance attached to temperature in the preparation of these superior cheeses." (Liebig.)

It will thus be seen that very slight differences in the materials, in the preparation, or in storing of the cheese, materially influence the quality and flavour of this article. The richness of the milk—the addition to or sub-

traction of cream from the milk—the separation of the curd from the whey with or without compression — the salting of the curd — the collection of the curd, either whole or broken, before pressing—the addition of colouring matter, as annotta or saffron, or of flavouring —the place and method of storing—and the length of time allowed for maturation, all tend to alter the taste and odour of the cheese, in some or other particular, and that in a way readily perceptible to the palate of the connoisseur. No other alimentary substance appears to be so seriously affected by slight variations in the quality of the materials from which it is made, or by such apparently trifling differences in the methods of preparing it.

Var. The varieties of cheese met with in commerce are very numerous, and differ greatly from each other in richness, colour, and flavour. These are commonly distinguished by names indicative of the places in which they have been manufactured, or of the quality of the materials from which they have been prepared. Thus, we have Dutch, Gloucester, Stilton, skimmed-milk, raw-milk, cream, and other cheeses; names which explain themselves. The following are the principal varieties met with in Europe:—

CHEESE, BRICK-BAT. From its form; made in Wiltshire of new milk and cream.

CHEESE, CHEDDAR. A fine, spongy kind of cheese, the eyes or vesicles of which contain a rich oil; made up into round, thick cheeses, of considerable size (150 to 200 lbs.).

CHEESE, CHESHIRE. From new milk, without skimming, the morning's milk being mixed with that of the preceding evening, previously warmed, so that the whole may be brought to the heat of new milk. To this the rennet is added, in less quantity than is commonly used for other kinds of cheese. On this point, much of the flavour and mildness of the cheese is said to depend. A piece of dried rennet, of the size of half-a-crown, put into a pint of water over night, and allowed to stand until the next morning, is sufficient for 18 or 20 gallons of milk. In large, round, thick cheeses (100 to 200 lbs. each). They are generally solid, homogeneous, and dry, and friable rather than viscid.

CHEESE, COTTENHAM. A rich kind of cheese, in flavour and consistence not unlike Stilton, from which, however, it differs in shape, being flatter and broader than the latter.

CHEESE, CREAM. From the "strippings" (the last of the milk drawn from the cow at each milking), from a mixture of milk and cream, or from raw cream only, according to the quality desired. It is usually made in small oblong, square, or rounded cakes, a gentle pressure only (that of a 2 or 4 lb. weight) being applied to press out the whey. After twelve hours, it is placed upon a board or wooden trencher, and turned every day, until dry. It ripens in about three weeks. A little salt is generally added, and frequently a little powdered lump sugar.

CHEESE, DERBYSHIRE. A small, white, rich variety, very similar to Dunlop cheese.

CHEESE, DUNLOP. Rich, white, and buttery; in round forms, weighing from 30 lbs. to 60 lbs.

CHEESE, DUTCH. (Holland.) Of a globular form. 5 to 14 lbs. each. Those from Edam are very highly salted; those from Gouda less so.

CHEESE, GLOUCESTER. Single Glo'ster; from milk, deprived of part of its cream; Double Glo'ster, from milk retaining the whole of the cream. Mild tasted, semi-buttery consistence, without being friable; in large, round, flattish forms.

CHEESE, GREEN or SAGE. From milk mixed with the juice or an infusion or decoction of sage leaves, to which marygold flowers and parsley are frequently added.

CHEESE, GRUYÈRE. A fine description of cheese made in Switzerland, and largely consumed on the Continent. It is firm and dry, and exhibits numerous cells of considerable magnitude. Its flavour is peculiar, and is not generally liked by English people.

CHEESE, LINCOLN. From new milk and cream; in pieces about 2 inches thick; soft, and will not keep over 2 or 3 months.

CHEESE, NEUFCHÂTEL. A much esteemed variety of Swiss cheese; made of cream, and weighs about 5 or 6 oz.

CHEESE, NORFOLK. Dyed yellow with annotta or saffron; good, but not superior; in cheeses of 30 lbs. to 50 lbs.

CHEESE, PARMESAN. (Parma, &c.) From the curd of skimmed milk, hardened by a gentle heat. The rennet is added at about 120°, and an hour afterwards, the curdling milk is set on a slow fire until heated to about 150° Fahr.; during which the curd separates in small lumps. A few pinches of saffron are then thrown in. About a fortnight after making, the outer crust is cut off, and the new surface varnished with linseed oil, and one side coloured red.

CHEESE, ROQUEFORT. From ewes' milk; the best prepared in France. It greatly resembles Stilton, but is scarcely of equal richness or quality, and possesses a peculiar pungency and flavour.

CHEESE, SLIPCOAT or SOFT. A very rich white cheese, somewhat resembling butter; for present use only.

CHEESE, STILTON. The richest and finest cheese made in England. From raw milk to which cream taken from other milk is added; in cheeses generally twice as high as they are broad. Like wine, this cheese is vastly improved by age, and is therefore seldom eaten before it is 2 years old. A spurious appearance of age is sometimes given to it by placing it in a warm, damp cellar, or by surrounding it with masses of fermenting straw, or dung.

CHEESE, SUFFOLK. From skimmed milk;

in round, flat forms, from 24 lbs. to 30 lbs. each. Very hard and horny.

CHEESE, SWISS. The principal cheeses made in Switzerland are the Gruyère, the Neufchâtel, and the Schabzieger or green cheese. The latter is flavoured with melilot.

CHEESE, WESTPHALIAN. In small balls or rolls of about 1 lb. each. It derives its peculiar flavour from the curd being allowed to become partially putrid before being pressed. In small balls or rolls of about 1 lb. each.

CHEESE, WILTSHIRE. Resembles poor Cheshire or Glo'ster. The outside is generally painted with a mixture of ruddle or red-ochre or whey.

CHEESE, YORK. From cream: it will not keep.

Qual., &c. Cheese has been objected to as an article of diet, but without sufficient reason, since it is, when of good quality, eminently nutritious, wholesome, and digestible. Like all other food, cheese digests more readily when well masticated, and the neglect of this precaution is one reason why it frequently disagrees with delicate stomachs. It is rendered more agreeable to many palates by toasting it, but becomes less digestible by that operation. The basis of cheese is casein or coagulated curd, a protein substance; it therefore cannot fail to prove nutritious, provided it is properly digested. Cheese-curd, carefully freed from water and milk by expression, and the addition of salt, is a mixture of casein and butter. It contains all the phosphate of lime and part of the phosphate of soda of the milk. (Liebig.) When taken as a condiment, especially when rich and old, it powerfully promotes the secretion of the saliva and gastric juice, and thereby aids the stomach in performing its proper functions. Rotten cheese is very unwholesome.

Concluding remarks. It is surprising that cheese is not more frequently made an article of domestic manufacture, especially by housewives resident in the country. The operations of cheese-making are all exceedingly simple, and not laborious, and will, in most cases, amply repay the outlay for the milk. Besides, cheese is not unfrequently coloured with stains and pigments, which are injurious, and even poisonous, the risk of taking which is not encountered when it is made at home. Several persons have nearly lost their lives from eating cheese coloured with annotta, for instance. This substance, though harmless in itself, is frequently adulterated with red lead, so that the cheesemonger may very innocently introduce a dreadful poison, when he only intends to improve the colour of his goods.

When a whole cheese is cut, and the consumption small, it is generally found to become unpleasantly dry, and to lose flavour before it is consumed. This is best prevented by cutting a sufficient quantity for a few days' consumption from the cheese, and keeping the remainder in a cool place, rather damp than dry, spreading a thin film of butter over the cold surface, and covering it with a cloth or pan, to keep off the dirt. This removes the objection existing in small families against purchasing a whole cheese at a time. The common practice of buying small quantities of cheese should be avoided, as not only a higher price is paid for any given quality, but there is little likelihood of obtaining exactly the same flavour twice running. Should cheese become too dry to be agreeable, it may be used for stewing, or for making grated cheese or Welsh rare-bits.

Cheese, Ap'ple. The pomace or ground apples from the cider press.

Cheese, Dam'son. *Prep.* From damsons boiled with a little water, the pulp passed through a sieve, and then boiled with about one fourth the weight of sugar, until the mixture solidifies on cooling; it is next poured into small tin moulds previously dusted out with sugar. Cherry cheese, gooseberry cheese, plum cheese, &c., are prepared in the same way, using the respective kinds of fruit. They are all very agreeable candies or confections.

Cheese, Facti'tious Roque'fort. *Prep.* (Roulle.) The gluten of wheat is kneaded with a little salt, and a small portion of a solution of starch, and made up into cheeses. It is said that this mixture soon acquires the taste, smell, and unctuosity of cheese, and when kept a certain time is not to be distinguished from the celebrated Roquefort cheese, of which it possesses all the peculiar pungency. By slightly varying the process, other kinds of cheese may be imitated.

Cheese, Legu'minn. The Chinese prepare an actual cheese from peas, called "tao-foo," which they sell in the streets of Canton. The paste from steeped ground peas is boiled, which causes the starch to dissolve with the casein; after straining the liquid, it is coagulated by a solution of gypsum; this coagulum is worked up like sour milk, salted, and pressed into moulds.

Cheese, Toast'ed. This much relished article is seldom well prepared. The following has been recommended as an excellent receipt:—Cut the cheese into slices of moderate thickness, and put them into a tinned copper saucepan, with a little butter and cream; simmer very gently until they are quite dissolved, then remove the saucepan from the fire, allow the whole to cool a little, add some yolk of egg, well beaten, add spice, make the compound into a "shape," and brown it before the fire. See FOUDUE.

CHEL'SEA PEN'SIONER. *Prep.* From gum guaiacum, ½ oz.; rhubarb, ½ oz.; cream of tartar, 2 oz.; flowers of sulphur, 4 oz.; nutmegs, 2 in number; (all in powder); honey, 1½ lb., or q. s.; made into an electuary by beating them together in a mortar.—*Dose.* 1 to 2 table-spoonfuls, night and morning, in gout and chronic rheumatism. The name is

said to have been given to it from the circumstance of a Chelsea pensioner having cured Lord Amherst with it.

CHEL'TENHAM SALTS. See SALTS.

CHEM'IQUE or CHEM'IC BLUE. See INDIGO.

CHEROOT'. A species of cigar imported from Manilla, in the Philippine Islands, distinguished by extreme simplicity of construction, as well as delicacy of flavour. The cigars now so commonly sold as cheroots in England are, for the most part, made of inferior tobacco, and are often much adulterated articles.

CHER'RIES are the fruit of different species of the genus *Cerasus*. They are regarded as wholesome, cooling, nutritive, laxative, and antiscorbutic. Brandy flavoured with this fruit or its juice is known as cherry-brandy. Morello cherries preserved in brandy are called brandy cherries. See BRANDY, FRUIT, &c.

CHER'RY LAUR'EL. *Syn.* LAU'REL. The *Cerasus Lauro-Cerasus*, a shrub common in every garden in England, and often confounded with the true Laurel or Sweet Bay, which does not possess any of its deleterious properties. Leaves, occasionally used instead of bay leaves in cookery. The distilled oil and distilled water are both poisonous. See OIL, WATER.

CHI'CA. The red colouring matter deposited by a decoction of the leaves of *Bignonia Chica* in cooling. *Used* by the American Indians to stain their skin. It is soluble in alcohol, ether, oil, fat, and alkaline lyes, and slightly so in boiling water.

Chi'ca. See MAIZE-BEER.

CHIC'ORY. *Syn.* WILD SUC'CORY; CICHOR'IUM INTY'BUS (Linn.), L. A plant belonging to the natural order *Compositæ*. It is indigenous to this and many other countries of Europe, and is extensively cultivated for the sake of its roots, which are sliced, roasted, and ground, to form the chicory of the shops. Nearly 100 millions of pounds are annually consumed in Europe. Much of the chicory used in Britain is of home growth; but still more is imported in a raw state from Holland and other parts of the Continent. A blue dye has been prepared from the leaves of this plant.

The FRESH ROOT OF CHICORY (*ra'dix chico'rii re'cens*) is reputed to be alterative, attenuant, diuretic, febrifuge, hepatic, resolvent, and tonic; and in large doses, aperient. It is now seldom used in medicine, although it appears to possess similar qualities and equal activity to those of dandelion. "An infusion of the root, mixed with syrup, becomes thick; forming the GOMME SACCHO-CHICORINE of Lacarterie." (Fee.)

The ROASTED ROOT is prepared by cutting the full-grown root into slices, and exposing it to heat in iron cylinders, along with about $1\frac{1}{2}$% or 2% of lard, in a similar way to that adopted for coffee. When ground to powder in a mill, it constitutes the CHICORY of the grocers (CHICORY COFFEE, SUCCORY C.; RADIX CHICO'RII TORREFAC'TA, R. C. T. CONTRI'TA); so generally employed both as a substitute for coffee and as an adulterant of that article. The addition of 1 part of good, fresh roasted chicory to 10 or 12 parts of coffee forms a mixture which yields a beverage of a fuller flavour, and of a deeper colour than that furnished by an equal quantity of pure or unmixed coffee. In this way a less quantity of coffee may be used, but it should be remembered that the article substituted for it does not possess in any degree the peculiar exciting, soothing, and hunger-staying properties of that valuable product. The use, however, of a larger proportion of chicory than that just named imparts to the beverage an insipid flavour, intermediate between that of treacle and liquorice; whilst the continual use of roasted chicory, or highly chicorised coffee, seldom fails to weaken the powers of digestion and derange the bowels. "There can be no doubt that roasted chicory must, when taken largely, have a tendency to excite diarrhœa." (Pereira.)

Pur., &c. The ground chicory of the shops, like ground coffee, is almost universally adulterated. Pigments are added to it to colour it, and various vegetable substances to lessen its value. The following articles have been reported to have been detected in roasted chicory, or to have been known to be used to adulterate it:—Venetian red, reddle, and red clay; roasted acorns, beans, carrots, damaged dog-biscuits, damaged bread, damaged wheat, horse-chestnuts, mangel wurzel, parsnips, peas, rye, and sugar; coffee flights (coffee husks), coffina (roasted lupins), Hambro' powder (roasted peas coloured with reddle), and the marc of coffee; exhausted bark (from the tan yards), logwood dust, mahogany dust, &c. It has also been asserted that the scorched livers of bullocks, horses, and dogs, have been applied to the same purpose; but of this there is not sufficient evidence. The only way to avoid being thus cheated or poisoned is to buy the chicory whole, and to grind it at home.

Roasted chicory is highly hygrometric or absorbent of moisture, and should, therefore, be always kept in close vessels (bottles or canisters), the same as coffee. If the lumps become tough or soft, or the powder cakes together, it is unfit for use; but in some cases it may be recovered, by exposing it on a plate in an oven until it again becomes perfectly dry or brittle.

Tests.—1. Powdered chicory thrown on water turns it reddish-brown and rapidly sinks, leaving light impurities either floating or diffused through the liquid.—2. The cold decoction tested with tincture, or solution of iodine, gives a brown colour; if it turns purple, blue, or black, it indicates the presence of roasted peas, beans, rye, or some other like substance, containing starch.—3. Persulphate or perchloride of iron, added in the

same way, should not materially affect the liquid; if it turns it bluish or blackish, it indicates the presence of roasted acorns, oak-bark tan, or some other substance containing tannin.—4. Water acidulated with vinegar, digested on the powder, should not be blackened, or even materially darkened, by tincture of galls or a solution of red prussiate of potash; the contrary shows the presence of ferruginous colouring matter.—5. The dry powder, when incinerated, should not leave more than 4½ to 5% of ash, which should be of a grayish or fawn colour; the contrary indicates the presence of reddle, red clay, ochre, or the like.—6. To the above may be added attention to the odour, colour, and appearance, both to the naked eye and under the microscope; by the latter, adulteration may be easily detected. See COFFEE.

CHIL'BLAIN. *Syn.* PER'NIO, L. An inflammatory swelling, of a purple or lead colour, produced by the action of cold. Chilblains (PERNIO'NES) exclusively attack the extremities of the body, and are generally confined to the fingers, toes, and heels. The common symptoms are itching and irritation, more or less intense, often accompanied with shooting pains, and tenderness, and tumefaction of the parts. Children, especially those of a scrofulous habit, and elderly persons, are generally the most liable to chilblains. The common cause of chilblains is holding the hands or feet to the fire after exposure to cold. The sudden change of temperature partially destroys the vitality of the minute surfacial vessels, and thus prevents the proper flow of blood through the part. The best preventives of chilblains are woollen socks or stockings, good waterproof shoes, woollen gloves, exercise, and friction. These act by promoting the circulation of the blood in the extremities, and protecting them from vicissitudes of temperature. When chilblains have once formed, the best treatment is friction with stimulants, as spirits of wine and camphor, oil of turpentine, opodeldoc, dilute spirits, camphorated oil, hartshorn and oil, &c. Linnæus recommends bathing the part with dilute muriatic acid, just strong enough to faintly prick the skin. When the inflamed parts have ulcerated, they are commonly called KIBES. In this state they should be dressed with a little resin cerate, or elemi ointment. If fungous granulations appear, they must be removed by touching them with nitrate of silver or blue vitriol. See CHAPS, &c.

REMEDIES FOR CHILBLAINS.—The following have been strongly recommended by different parties, and may all prove useful in their turns, as circumstances and convenience may suggest:—

1. Sulphate of copper, 1 oz.; rosemary water, 1 pint; dissolve.

2. Sal-ammoniac, 1 oz.; vinegar, ½ pint.

3. Sal-ammoniac, 1 oz.; rum, ½ pint; camphor, 1 dr. The affected part is wetted with the above night and morning, and when dry, is touched with a little simple ointment, cold cream, or pomatum.

4. Soap liniment, 2 oz.; tincture of cantharides, 1 oz.; oil of cajeput, 2 drs.

5. Oil of turpentine, 2 oz.; camphor, 3 drs.; oil of cajeput, 1 dr. The application of the last two is accompanied by gentle friction.

6. (DR. GRAVES' PREVENTIVE.) Sulphate of copper, 20 grs.; water, 1 oz. As the first three.

7. (LEJEUNE'S BALSAM.) See CHILBLAIN BALSAM.

8. (LINNÆUS' REMEDY). Hydrochloric acid, 1 oz.; water, 11 oz. As No. 6.

9. (MORTON'S LINIMENT.) Calomel and camphor, of each, 1 dr.; spermaceti ointment, 4 drs.; oil of turpentine and cocoa-nut oil, of each, 2 drs. As No. 5.

10. (RUSSIAN REMEDY.) The rind of perfectly ripe cucumbers, dried with the soft parts attached. For use, they are placed with the inner side, previously soaked in warm water, over the soft parts. (Med. Zeitung.)

11. (SWEDIAUR'S PASTE.) Bitter almonds, 8 oz.; honey, 6 oz.; powdered camphor and flour of mustard, of each, ½ oz.; burnt alum and olibanum, of each, ¼ oz.; yolks of 3 eggs; beat to a paste. To be applied night and morning.

12. (VANCE'S CREAM.) Ointment of nitrate of mercury, 1 oz.; camphor, 1 dr.; oil of turpentine, 2 drs.; oil of olives, 4 drs.; mix well together. To be applied, by gentle friction, 2 or 3 times daily.

Obs. All the preceding preparations are intended for chilblains before they break. The liniments of ammonia, camphor, opium, soap, and turpentine, as well as the compound camphor liniment of the British Pharmacopœia, are also excellent preparations for the same purposes.

13. (WAHLER'S OINTMENT.) Black oxide of iron, bole, and oil of turpentine, of each, 1 dr.; resin cerate, 1 oz. For broken chilblains. We have found a mixture of equal parts of calamine cerate and resin cerate answer quite as well. See CERATE, OINTMENT.

CHIL'DREN (Care of). See INFANCY.

Children (Diseases of). See the respective heads, and DISEASES.

CHIL'LIES. See CAPSICUM, PEPPERS.

CHIM'NEYS were not introduced into England until the reign of Queen Elizabeth, and for a considerable period the principles of their construction were ill-understood. When the air inside and outside a chimney is at the same temperature, an equilibrium exists; there is no draught in the chimney, because the downward tendency of that within is counteracted by the upward pressure of that without. Let a fire be kindled in the grate; hot air is evolved, the chimney is heated, the air it contains suffers expansion, and a portion is expelled. The chimney now contains a smaller weight of air than it did before; the external

and internal columns no longer equibalance each other, the warmer and lighter air is forced upwards from below, and its place is occupied by cold, and consequently heavier air. If the fire continues to burn, and the chimney retains its temperature, this second portion of air is disposed of like the first, and the ascending current continues, so long as the sides of the chimney are hotter than the surrounding air. Should the reverse happen to be the case, as sometimes occurs from sudden atmospheric changes, the column of air within the chimney rapidly contracts in volume, the deficiency is filled up from without, the column of air becomes heavier than one of a corresponding height on the outside of it, or in the apartment, and, obeying the common laws of gravitation, it falls out of the throat of the chimney or fire-place, just as a heavy body sinks in water, and has its place occupied by air from above. In this way, a descending current, of more or less intensity and duration, is established, and, if there is a fire in the grate, the chimney "smokes," or, if the grate is empty, perhaps, the smoke from neighbouring chimneys finds its way into our apartments. By the judicious arrangement of the fire-place, and the throat and flue of a chimney, an upward current may be constantly ensured so long as there is a fire in the grate, or the air of the apartment is warmer than the external atmosphere.

Count Rumford was the first who scientifically investigated the construction of chimneys. He showed that more heat is obtained from the fire by reflection when the coverings are placed in an oblique position. He also directed that the fire itself should be kept as near to the hearth as possible, and that the throat of the chimney should be constructed much narrower than was then the practice, in order to prevent the escape of so much heated air as happened with wide throats. By contracting the open part of the fire-place immediately over the fire, as by lessening the width of the hobs, or by bringing the throat of the chimney closer to the fire, and by contracting the throat of the chimney itself, within certain limits, any desired amount of draught may be obtained. When the space above the fuel is too small, the throat too near the burning fuel, or the throat itself too contracted, the draught of a common chimney is often too strong, and much fuel and heat is wasted. When the reverse is the case, the draught is commonly too languid, the fire draws badly, a portion of the smoke escapes into the room, and all the usual annoyances of a smoky chimney are suffered. By a proper attention to these conditions, a common fire-place may be adapted for the combustion of bituminous or easy burning coal, or of anthracite, and varieties of coal that require a considerable draught. It may even be converted into a wind furnace; whilst the inconvenience of smoky chimneys may be always avoided, and when existing, easily cured. This is presuming, however, that no more than the ordinary amount of air exists in the room (or apartment), not only for the fuel, but also for the chimney. Many of the supply here alluded to may be further stated, the greater the length of a chimney will be the draught. Hence, the upper rooms of a house whilst the fires in the rooms below burn pleasantly and vigorously. Such cases are commonly relieved by a chimney-pot or cowl, of which numerous varieties are now before the public. The more crooked or tortuous the course of a chimney, the less likely is it to be affected by eddies and gusts of wind from neighbouring buildings or hills. See FIRES, GRATE, SMOKE, STOVE.

CHI'NA. In the purchase of china, glass, and earthenware, care should be taken to select those patterns which in case of breakage can be the most readily matched. Peculiar or rare patterns should be avoided, for if any such be broken, it will generally be found very difficult and expensive, and frequently impossible, to replace them.

China, glass, and earthenware, when very dirty, are best cleaned with finely powdered fuller's earth and warm water, followed by rinsing in clean water. A little clean soft soap may be added to the water instead of fuller's earth. See PACKING, PORCELAIN.

CHIN'OIDINE. See QUINOIDINE.

CHINOLINE BLUE. See CYANINE.

CHI'TIN. This name has been given to the hard, insoluble matter forming the shells and elytra of insects. It is obtained by boiling the elytra of the cockchafer with water, alcohol, ether, acetic acid, and alkalies.

CHIT'TICK'S REMEDY. Dr. Chittick's remedy for stone consisted of a fixed alkali, administered in veal broth. (Paris.)

CHLORAL. C_2HCl_3O. A peculiar liquid first obtained by Liebig, by the action of chlorine on alcohol.

Prep. (Liebig.) Anhydrous alcohol is placed in a tubulated retort, and dry chlorine gas passed through it, at first in the cold, but afterwards with the application of a gentle heat, until the chlorine passes unchanged through the liquor on raising it to the boiling temperature; on cooling, the whole forms a crystalline mass of chloral hydrate; this is melted by a gentle heat, and agitated with three times its volume of oil of vitriol; on increasing the heat a little, an oily stratum of impure chloral rises to the surface. It is purified by boiling it for some time (to drive off free hydrochloric acid and alcohol), next distilling it with an equal volume of oil of vitriol; and lastly, rectifying it from some powdered quick-lime, the process being stopped as soon as the surface of the lime becomes dry.

Prop., &c. Chloral is an oily liquid, pos-

same ng an ethereal smell; it is soluble in alcoliquid ether, and water; with a small quantity dicat the latter it rapidly changes into a semi- d crystalline mass (chloral hydrate), which tanni luble in a larger quantity of water; boils gested 1°; sp. gr. 1·502. It is decomposed by or eve ustic earths and alkalies. By age it is congalls or into a white, solid, translucent substance the conti chloral), which is reconverted by neous col by sulphuric acid into ordinary chloral. when incin a operating as above, the chlorine is 4½ to 5½ o veniently introduced by a tube in- or fawn into the tubulature of the retort, and a sen e tube, bent upwards, should be connected with the beak to convey away the hydrochloric acid gas extricated, and to allow the volatilised alcohol and chloral to condense, and flow back into the retort.

CHLORAL HYDRATE. C_2HCl_3O . Aq. *Syn.* HYDRATE OF CHLORAL. *Prep.* "Pass dry chlorine gas, for several days, through absolute alcohol, sp. gr. 0·795, until it becomes a thick viscid liquid of sp. gr. 1·57. At the beginning of the operation the alcohol is well cooled to prevent inflammation and explosion, but towards the end of the operation the alcohol is heated nearly to the boiling-point. The resulting liquid, which after a day or two solidifies to a mass of crude chloral hydrate, is agitated with four times its bulk of concentrated sulphuric acid, and the anhydrous chloral which floats on the surface is separated and purified by fractional distillation. The purified anhydrous chloral is placed in a still, mixed with 11 per cent. of water, and distilled over chalk to remove any hydrochloric acid that may be present; the resulting solid distillate is then fused and poured out into shallow vessels to cast into cakes." (Squire.) The purest chloral hydrate is said to be that which has been crystallised two or three times out of pure bisulphide of carbon.—*Prop.* White opaque solid, having a pungent odour resembling that of a ripe melon. Soluble in water, glycerin, and alcohol. Gradually volatilises in the air, and may be distilled without decomposition. From 100 grs. dissolved in ½ fl. oz. of water, well shaken with 1 fl. oz. of solution of potash (B. P.), and allowed to stand for several hours, at least 46 grain-measures of chloroform should separate.

Uses. An excellent sedative, antispasmodic, hypnotic, anodyne. It has done good service in hypochondriacal and other nervous affections, also in asthma, whooping-cough, and scarlet fever. It has also the reputation of being an efficient preventive of sea-sickness, especially on short voyages, such as crossing the Channel, which can be accomplished during the sleep occasioned by the agent.—*Dose.* From 10 to 60 grs.

CHLORALUM. An impure aqueous solution of chloride of aluminum, sp. gr. 1·15. 1 fl. oz. of the liquid contains 75 grains of anhydrous chloride. Introduced by Professor Gamgee as an antiseptic and disinfectant, for which purposes it is recommended to dilute the article as sold with four times its bulk of water.

CHLO″RATE. *Syn.* HYPEROXYMU″RIATE†, CHLO″RAS, L. A compound in which the hydrogen of chloric acid, $HClO_3$, is replaced by a metal or other basic radical, *e.g.* $KClO_3$, chlorate of potassium. Chlorates may be prepared by dissolving the hydrate or oxide in chloric acid, and crystallising. The alkaline chlorates, however, are made by passing chlorine into solutions of the hydrate or carbonate of potassium or sodium, boiling the resulting liquid, and separating the chlorate from the chloride, which is also formed, by crystallisation. They are very similar to the nitrates, both in their general properties and composition. They are all decomposed at a red heat, metallic chlorides being formed and oxygen gas given off. Like the nitrates, they deflagrate with inflammable substances, but with greater facility and violence. A mixture of this kind will detonate with a slight blow or friction. All the chlorates are soluble in water.

Char., Tests, &c. The chlorates are known by their deflagrating when placed on red-hot charcoal. By evolving a yellowish-green gas when treated with concentrated sulphuric acid, in the cold, which gas also communicates to the liquid a red or yellow tinge. By evolving oxygen gas when heated alone in a test-tube. This test is not characteristic, unless carried a stage further, by dissolving the residual chloride out of the tube, and adding to the filtered solution a few drops of nitrate of silver; then the formation of a white precipitate, insoluble in nitric acid, will show that the salt treated was a chlorate, and not a nitrate. Pure chlorates give no precipitate with nitrate of silver.

CHLORHY′DRIC ACID. See HYDROCHLORIC ACID.

CHLO″RIC ACID. $HClO_3$. *Syn.* HYPEROXYMURIAT′IC ACID; ACIDUM CHLO″RICUM, L. An acid discovered by Chenevix, but first obtained in a separate form by Gay-Lussac.

CHLO″RIDE (id). *Syn.* CHLO″RURET†; CHLORI′DUM, L. A chemical compound of chlorine with a metal or other basic radical, *e.g.* NaCl, chloride of sodium; C_2H_5Cl, chloride of ethyl.

Prep. The majority of the metallic chlorides may be made by simply dissolving the metal or its carbonate, oxide, or hydrate, in hydrochloric acid (previously diluted with about twice its weight of water), and evaporating and crystallising the solution, in the usual manner. Zinc, cadmium, iron, nickel, cobalt, and tin, dissolve readily in hydrochloric acid; copper only in strong boiling acid; silver, mercury, and gold, not at all. The insoluble chlorides, as those of silver and mercury, may be readily prepared by precipitating any of their corresponding soluble salts with hydrochloric acid, or a soluble chloride, such as

common salt. Anhydrous chlorides are generally prepared by the direct action of chlorine on the bases.

Char., Tests, &c. Most of the metallic chlorides are soluble in water. Many fuse when heated, and volatilise unchanged, but others are completely or partially decomposed at a red heat. All, with the exception of those of the alkali and earth metals, are decomposed at a red heat in a current of hydrogen. They are recognised by the following reactions:—1. Heated with a little peroxide of manganese and sulphuric acid, chlorine is evolved, and easily detected by its colour, smell, and bleaching properties:—2. The soluble chlorides may be readily detected by their solutions, slightly acidulated with nitric acid, giving with a solution of nitrate of silver a white, curdy precipitate (chloride of silver), insoluble in nitric acid, freely soluble in liquor of ammonia, and blackened by the light:—3. The insoluble chlorides may be tested by digesting them in a little liquor of potassa, when a solution of chloride of potassium will be formed, which may be treated as just directed (2); or the chloride may be dissolved in nitric acid, and tested with nitrate of silver as before.

CHLORIM'ETRY. See CHLOROMETRY.

CHLORINA'TED LIME. See LIME.

CHLORINA'TED SO'DA. See SODA.

CHLO'RINE. *Syn.* CHLORIN'IUM, L.; CHLORE, Fr.; CHLOR, Ger. An elementary substance discovered by Scheele in 1774, and at first supposed to be a compound body. In 1809, MM. Gay-Lussac and Thénard suggested the probability of it being a simple substance; but it was reserved for Sir H. Davy, shortly afterwards, to demonstrate the truth of the suggestion of these foreign chemists.

Nat. hist. It exists in nature chiefly in the form of chloride of sodium, which constitutes rock salt when deposited in inland beds, sea salt when dissolved in masses of water. The sea also contains chlorides of potassium, calcium, and magnesium. It is a constituent of several well-known minerals. It has been met with in the air of volcanic districts, combined with hydrogen, as hydrochloric acid.

Prep. Strong hydrochloric acid is poured on half of its weight of finely powdered peroxide of manganese, previously placed in a glass flask or retort; chlorine gas is immediately evolved, even in the cold, but much more rapidly on the application of a gentle heat, and is collected in clean, dry bottles by displacement. The tube conducting the gas is so arranged as to reach to the bottom of the bottle, and the chlorine, being heavier than the air, displaces the latter without mixing with it. The bottle is known to be full by the gas, easily perceived by its green colour, overflowing the top of the vessel. The bottle is then closed up with an accurately fitting stopper, previously greased, and an empty one put in its place, which is subsequently treated in like manner. To free the gas entirely from hydrochloric acid, it is passed through a wash bottle containing a small quantity of water; and to render it quite dry, it is passed over fused chloride of calcium. When the presence of moisture is no object, chlorine may be collected over warm water, or, what is better, a saturated solution of common salt, in the pneumatic trough. The mercurial trough cannot be employed, as the chlorine rapidly acts upon the metal, and becomes absorbed.

Commercial.—From oil of vitriol and water, of each, 7 parts, cautiously mixed, and allowed to cool; chloride of sodium (common salt), 4 parts, mixed intimately with peroxide of manganese, 3 parts. The dilute acid is placed in a retort or other generating vessel, and the powder added. The gas comes off slowly at first, but the application of a gentle heat causes it to rush forth in large quantities. Of late years, owing to the general demand for bleaching agents, numerous new methods for obtaining chlorine have been patented, with a view of adopting a continuous process.

Prop., Uses, &c. Chlorine is a gas possessing a yellowish-green colour, and a pungent, suffocating odour. It is one of the heaviest substances that are gaseous at ordinary temperatures, being nearly 2½ heavier than atmospheric air—sp. gr. 1·47. It is soluble to a considerable extent in water, that liquid at 60° Fahr. absorbing about twice its volume. It is non-inflammable, but its union with some of the elements is attended with the phenomena of combustion; thus, phosphorus, copper leaf, powdered antimony and arsenic, and several other substances thrown into chlorine immediately inflame. Under a pressure of 4 atmospheres, it is condensed into a yellow, limpid liquid. Moist chlorine gas cooled to 32° Fahr. condenses into yellow crystals, containing 35½ parts of chlorine and 90 parts of water. The most remarkable property of chlorine is, its power of destroying almost all vegetable and animal colours, and the putrid odour of decomposing organic matter; hence its value as a bleaching agent, and as a disinfectant and fumigation. When first proposed as a bleaching agent by Berthollet, it was used much the same way as sulphur is now in bleaching woollen goods; afterwards a solution of the gas in water was employed, but the final improvement was Tennant's patent of combining the gas with lime to form "chloride of lime." With the bases chlorine forms an important series of compounds called chlorides.

Tests. Free chlorine is readily distinguished from other gases by its colour, suffocating odour, and bleaching properties. The aqueous solution dissolves gold leaf, and with nitrate of silver gives a white, curdy precipitate.

CHLO'RITE. A salt in which the hydrogen of chlorous acid, $HClO_2$, is replaced by a metal or other basic radical. See CHLOROUS ACID.

CHLOROCHRO'MIC ACID. $CrOCl$. *Syn.* CHLOROCHROMIC ANHYDRIDE. *Prep.* Bichromate of potassium, 3 parts; common salt, 3½ parts; are intimately mixed together, put into a glass retort, and oil of vitriol, 9 parts, added; heat is next applied and maintained as long as dense, red vapours are given off. The product in the receiver is a heavy, deep-red liquor, greatly resembling bromine in appearance. Water resolves it into hydrochloric and chromic anhydride.

CHLO''RODYNE. See PATENT MEDICINES.

CHLO''ROFORM. $CHCl_3$. *Syn.* TERCHLO''RIDE OF FOR'MYLE, FOR'MYL-CHLO''RID; CHLOROFOR'MYL, CHLOROFOR'MUM, L. A remarkable fluid discovered by Soubeiran in 1832, and carefully examined in 1834 by Dumas. In 1842 its action upon animals was investigated by Dr. M. Glover, and in 1847 it was introduced to the medical profession as an anæsthetic agent by Dr. Simpson, of Edinburgh.

It was first obtained by the action of caustic alkali upon chloral, but it is more easily prepared by distilling alcohol or wood spirit with chloride of lime.

Prep. 1. Chloride of lime (in powder), 4 lbs.; water, 12 lbs.; mix, in a capacious retort or still, add of rectified spirit, 12 fl. oz., and cautiously distil, as long as a dense liquid, which sinks in the water it passes over with, is produced; separate this from the water, agitate it with a little sulphuric acid, and, lastly, rectify it from carbonate of barium.

2. Chloride of lime, 4 lbs.; water, 10 pints; rectified spirit, ½ pint; proceed as last, using a spacious retort that the mixture will only 1-3rd fill, and the heat of a sand bath. When ebullition commences remove the fire as quickly as possible, lest the retort be broken by the suddenly increased heat, and let the solution distil into a receiver as long as there is nothing which subsides, the heat being restored if it be at all needed. Add to the distilled liquid four times as much water, and shake the whole well together; next cautiously separate the heavier part as soon as it has subsided, and to this add of chloride of calcium, broken into fragments, 1 dr.; and shake occasionally during an hour; finally let the fluid again distil from a glass retort into a glass receiver.

3. Hydrate of lime, 1 part, is suspended in cold water, 24 parts, and chlorine passed through the mixture until nearly the whole of the lime is dissolved; hydrate of lime, q. s. just to restore the alkaline reaction of the liquid, is then added; and, afterwards, rectified spirit of wine or wood spirit, 1 part, is mixed in; the whole, after repose for 24 hours in a covered vessel, is cautiously distilled as before.

Prop., &c. Liquid; transparent; colourless; odour, fragrant, ethereal, and apple-like; taste, ethereal, sweetish, but slightly acrid; soluble in 2000 parts of water; mixes in all proportions with alcohol and ether; dissolves (readily) bromine, camphor, caoutchouc, gutta percha, iodine, oils, resins, wax, and several other like substances; boils at 141·8° Fahr.; kindles with difficulty; burns with a greenish flame; and communicates a dull, smoky-yellow colour to the flame of alcohol. Sp. gr. 1·48 (1·497, Miller); density of vapour, 4·2. The vapour has the remarkable property of rendering a person breathing it temporarily insensible to pain.

Pur. Chloroform is frequently adulterated with alcohol and ether; and, owing to careless manipulation, is also sometimes contaminated with other substances, as chloral, hydrochloric acid, and free chlorine. When pure, it is free from colour, and of a pleasant odour. Sp. gr. not less than 1·48. It is not perfectly soluble in water; and does not turn the colour of litmus red. Rubbed on the skin, it quickly evaporates, scarcely leaving any odour. Dropped into water, it falls to the bottom and remains bright and limpid; but if it contain alcohol the surface of the drop becomes opaline. If the same experiment be made with diluted sulphuric acid, sp. gr. 1·44, the drop of pure chloroform will fall to the bottom; but that which contains spirit, if not shaken, will float or remain suspended in the acid solution. When contaminated with heavy hydrocarbon oils, a drop evaporated from the palm of the hand leaves behind a strong smell. Hydrochloric acid and free chlorine are detected by the ordinary tests.

Uses, Action, &c. Chloroform is anodyne, antispasmodic, sedative, stimulant, and anæsthetic. In small doses (5 to 12 or 15 drops, in water, mixed with a little syrup or mucilage), it is employed in spasmodic disorders, and as a stimulant and diaphoretic. It is now chiefly used as an anæsthetic to produce insensibility to pain during surgical operations. The dose for inhalation is 1 fl. dr., which is repeated, in a few minutes, if no effect is produced, until 3 fl. dr. have been thus exhibited; the effects being carefully watched, and the source of the chloroform vapour removed as soon as a sufficient degree of anæsthesia is produced, or any unpleasant symptoms develop themselves.

Chloroform in large doses depresses the heart's action, and causes profound coma, and death. It is therefore dangerous in all cases complicated with diseases of the heart or brain, or any visceral affections of a congestive character.

The treatment of asphyxia from chloroform is—the horizontal position, cold affusion to the head and spine, artificial respiration, and, if possible, either the application of electricity, or the inhalation of protoxide of nitrogen or oxygen gas, largely diluted with atmospheric air.

Concluding remarks. The preparation of chloroform is not unattended with danger, and frequently miscarries in careless or inexperienced hands. This arises chiefly from the violent reaction which immediately follows

the application of the heat. On the common plan there is great danger of explosion, or of the liquid in the still being forced over into the receiver, owing to the extraordinary rapidity with which the vapours are eliminated, and the ingredients, in consequence, swell up. The method we have successfully adopted on the large scale, is to employ a very broad and shallow capsule-shaped still, having a flat rim round it, with a head or capital furnished with a corresponding rim at its lower part. In use, a flat, endless band of vulcanised India rubber is placed between the two rims, which are then held air-tight together by means of small iron clamps. The application of heat is also delayed for some time after the admixture of the spirit with the other ingredients, and the process is interrupted as soon as the first violence of the reaction has subsided, by which time the whole product of chloroform will have passed over into the receiver. If the distillation is continued beyond this point, the remaining product is water. On the small scale, a very capacious, flat-bottomed retort or cucurbit should be employed. A similar refrigeratory may be used to that noticed under ether.

CHLOROHYPONI'TRIC GAS (NOCl) and **CHLORONI'TROUS GAS** ($N_2O_2Cl_4$) are two peculiar compounds, formed when nitric acid and hydrochloric acid are mixed.

CHLOROM'ETER. *Syn.* CHLORIM'ETER. An instrument or apparatus employed in chlorometry. The chlorometers in common use are graduated measures and tubes precisely similar to those used in ACIDIMETRY, ALKALIMETRY, &c.

CHLOROM'ETRY. *Syn.* CHLORIM'ETRY. The estimation of the available chlorine in the bleaching powder of commerce, which is valued and sold in this country by its percentage of that element. The plans generally adopted are applicable to the so-called chlorides of soda and potassa, as well as to the ordinary bleaching powder, chloride of lime. Most of them depend on the oxidising effect of water when undergoing decomposition through the action of chlorine.

Dalton's Process. The test-solution is prepared as follows:—Pure protosulphate of iron (previously dried by strong pressure between the folds of cloth or bibulous paper), 78 grs., are dissolved in distilled water, 2 oz., and a few drops of hydrochloric or sulphuric acid added. This quantity of protosulphate requires for complete peroxidation just the quantity of oxygen liberated by 10 grs. of chlorine; in other words, the solution exhibits the indirect effect produced by exactly 10 grs. of the bleaching element.

Exactly 50 grs. of the sample of chloride of lime to be examined are next weighed, and well mixed in a glass or wedgwood mortar with tepid water, 2 oz.; and the mixture poured into a graduated tube or chlorometer. The tube is next filled up to 0, or zero, with the washings of the mortar, and the whole well mixed, by placing the thumb over the orifice and shaking it. The solution of chloride of lime, thus formed, is next gradually and cautiously added to the solution of sulphate of iron, previously noticed, until the latter is completely peroxidised, which may be known when it ceases to be affected by a solution of red prussiate of potash. When a drop of the latter test, placed upon a white plate, ceases to give a blue colour on being touched with the point of a glass stirrer or rod dipped in the liquor under examination, enough of the solution of the chloride has been added. The number of measures thus consumed must now be carefully read off from the graduated scale of the chlorometer, from which the richness of the sample may be estimated as follows:—As 100 of the chlorometer divisions contain exactly 50 grs. of the chloride under examination, each measure will contain only ½ gr., and, consequently, the number of measures consumed will represent half that number of grains of the chloride examined; and the weight of the chloride thus used will have contained 10 grs. of chlorine—the constant quantity of that substance required to peroxide the test-solution of sulphate of iron. Thus:—If 80 measures of the liquor in the chlorometer have been consumed, this quantity will represent 40 grs. of chloride of lime, and 10 grs. of chlorine. By dividing 1000 by this number, the per-centage of chlorine will be obtained. In the present instance this would be—

$$\frac{1000}{40} = 25\%.$$

Crum's Process. Equal weights of water and hydrochloric acid are mixed together, and cast-iron borings digested in the diluted acid until saturation is complete; a large excess of iron being purposely employed, and the liquid kept at the heat of boiling water for some time. One measure of the solution, marking 40° on Twaddell's scale (sp. gr. 1·200), is then mixed with an equal quantity of acetic acid (sp. gr. 1·048). This forms the test-liquid. When mixed with 6 or 8 parts of water, it is quite colourless, but chloride of lime occasions the production of peracetate of iron, which gives it a red colour.

The above proof-solution is next poured into 12 two-oz. vials, of exactly equal diameters, to the amount of $\frac{1}{9}$th of their capacity; these are filled up with bleaching liquid of various strengths; the first at $\frac{1}{12}$th of a degree of Twaddell, the second $\frac{2}{12}$ths, and so on up to $\frac{11}{12}$ths of 1°. They are then well corked up, and, after agitation, arranged side by side on a tray, furnished with holes to receive them. (See *engr.*) To ascertain the strength of an unknown sample of bleaching liquor, the proof-solution of iron is put into a phial, exactly similar to the 12 previously used, and

in precisely the same proportion ($\frac{1}{3}$th). The phial is then filled up with the bleaching liquor, well shaken, and placed beside that one of the 12 already prepared which it most resmbles in colour. The number on that phial expresses the strength of the sample under examination, in twelfths of a degree of Twaddell's hydrometer.

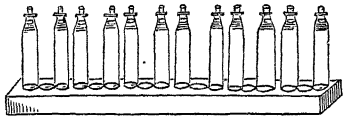


TABLE *exhibiting the quantity of Bleaching Liquid, at 6° on Twaddell's scale (sp. gr. 1·030), required to be added to a weaker liquor, to raise it to the given strengths. Adapted from Mr. Crum's table by Mr. Cooley.*

Strength of sample in $\frac{1}{12}$°.	Required Strength.	Proportions required.	
		Given Sample.	Liquor at 6°.
		Parts.	Part.
Water.	$\frac{8}{12}$°	8	1
1	,,	9¼	1
2	,,	11	1
3	,,	13½	1
4	,,	17	1
5	,,	23	1
6	,,	35	1
7	,,	71	1
Water.	$\frac{6}{12}$°	11	1
1	,,	13½	1
2	,,	17	1
3	,,	23	1
4	,,	35	1
5	,,	71	1
Water.	$\frac{4}{12}$°	17	1
1	,,	23	1
2	,,	35	1
3	,,	71	1
Water.	$\frac{3}{12}$°	23	1
1	,,	35	1
2	,,	71	1

Obs. The preceding method is admirably suited for weak solutions, such as are employed for bleaching textile fabrics, and is well adapted (from its simplicity) to the purposes of practical men. Indeed, it is quite astonishing to see with what ease and accuracy it is applied by unlettered operatives. This gives it great practical value. It has been for some time in extensive use in the bleaching houses of Scotland.

According to Mr. Crum, the range of strength within which cotton is "safe," is very limited. A solution at 1° of Twaddell's scale (sp. gr. 1·005), is not more than safe, while one at $\frac{1}{2}$° is scarcely sufficiently strong for the first operation on stout cloth, unless it is packed more loosely than usual.

Gay-Lussac's Indigo Process. One part of the best indigo is dissolved in 9 parts of strong sulphuric acid, by the aid of a gentle heat; this solution is then mixed with distilled water, in such proportion, that 1 volume of chlorine gas shall exactly decolour 10 volumes of this solution. Each measure so decoloured is called a degree, and each degree is divided into fifths. 5 grs. of the best chloride of lime, dissolved in 500 gr. measures of water, possess the above power, and indicate 10° or proof; or in other words, will decolour 10 times its volume of the indigo solution.

Obs. This method of chlorometry is objectionable, and liable to error, from the indigo solution altering by keeping. When, however, the proper precautions are used, it may be safely trusted for weak bleaching liquors.

Arsenious Acid Process. This depends on the conversion, by oxidation, of arsenious acid into arsenic acid, in the presence of chlorine and water.

To prepare the test-liquor, pure arsenious acid, 100 grs. are dissolved in about 4 fl. oz. of pure hydrochloric acid (free from sulphurous acid), and the solution diluted with water until, on being poured into a graduated 10,000 grains-measure-glass, it occupies the volume of 7000 grains measure marked on the scale. Each 1000 grains measure of this liquid now contains 14·29 grs. of arsenious acid; corresponding to 10 grs. of chlorine, or $\frac{1}{10}$th gr. of chlorine for every division or degree of the scale of the chlorometer.

100 grs. of the chloride of lime to be examined are next dissolved in water as before, and poured into a tube graduated up to 2000 grains measure. The whole is now well shaken, in order to obtain a uniformly turbid solution, and half of it (1000 grains measure) transferred to a graduated chlorometer, which is, therefore, thus filled up to 0°, or the zero of the scale, and contains exactly 50 grs. of the chloride of lime under examination; whilst each degree or division of the scale contains only $\frac{1}{2}$ gr.

1000 grains measure of the arsenious acid test-liquor are now poured into a glass beaker, and a few drops of solution of sulphate of indigo added in order to impart a faint but distinct blue colour to it; the glass is then shaken so as to give a circular movement to the liquid, and whilst it is whirling round, the chloride of lime solution from the chlorometer is gradually and cautiously added, until the blue tinge given to the arsenious acid test-liquor is destroyed; care being taken to stir the mixture well during the whole process, and to stop as soon as the decolorisation is completed.

Let us suppose now, that in order to destroy the blue colour of the 1000 grains measure of the arsenious acid test-liquor, 90 divisions or degrees of the chloride of lime solution have been employed. These 90 divisions, therefore,

contained the 10 grs. of chlorine required to destroy the colour of the test-solution; and since each division represents ½ gr. of chloride of lime, 45 grs. of chloride of lime (10 grs. of chlorine) were present in the 90 divisions so employed, from which the per-centage strength may be astertained. For—

45 : 10 : : 100 : 22·22

The chloride of lime examined, therefore, contained 22¼ per cent. (nearly) of chlorine.

Obs. This method is extremely simple and trustworthy when properly employed; but to ensure accuracy, certain precautions must be adopted. Instead of pouring the test-liquor into the solution of the sample (as in alkalimetry), the solution of the sample must be poured into the test-liquor.

Another process is that of Dr. Ure, as follows:—Liquor of ammonia, of a known strength, tinged with litmus, is added to a solution of a given weight of the chloride under examination, until the whole of the chlorine is neutralised, which is known by the colour being destroyed. From the quantity of ammonia consumed the strength of the sample is estimated.

CHLO″ROPHYLL. The green colouring matter contained in the leaves, stalks, unripe fruit, and juices of most plants.

CHLORO′SIS. *Syn.* GREEN SICKNESS. A disease which principally affects young unmarried females.

Symp. Langour, listlessness, fatigue after the least exercise, palpitation of the heart, flatulency, indigestion, acidity of stomach and bowels, constipation (generally), appetite for unnatural food, general debility, &c. As the disease advances, the skin, at first pale, assumes a peculiar greenish tint, the respiration becomes affected, the feet and legs swell, and various organic affections of the viscera ensue. During the early stages of this disease the catamenia are usually pale and scanty, and return at irregular intervals, and as it progresses they disappear altogether.

Treat. This should be tonic and restorative. That recommended under ANÆMIA may be adopted with advantage. See also APPETITE, ATROPHY.

CHLO″ROUS ACID. $HClO_2$. *Syn.* ACIDUM CHLORO′SUM, L. *Prep.* From chlorate of potassium, 4 parts; arsenious anhydride, 3 parts; nitric acid, 12 parts; (diluted with) water, 4 parts; heated together in a glass flask, furnished with a bent tube, and placed in a water bath. It must be collected in the same way as chlorine, or passed into water, when it forms a solution of chlorous acid.

Prop., &c. Chlorous acid is a greenish-yellow gas, non-condensable by a freezing mixture of salt and ice, but liquefiable by extreme cold. The aqueous solution undergoes gradual decomposition, yielding chloric acid and chlorine. Chlorous acid possesses powerful oxidising and bleaching properties; with the bases it forms salts called CHLORITES. These are all soluble in water, and bleach like the acid. They may be recognised by the evolution of chlorous acid gas when acted on by an acid. The use of the arsenious acid is to deoxidise the nitric acid employed in the process. Tartaric acid, or other deodorising agent, may be substituted for it.

CHOC′OLATE. *Syn.* CHOCOLA′TA, L.; CHOCOLLATL, Mexican; CHOCOLAT, Fr. A beverage or paste made from the roasted seeds of the *Theobroma Cacao*, or COCOA. Strictly speaking, the term "chocolate" is applicable to all genuine preparations of cocoa, but it is now generally used to distinguish those which contain sugar, and, commonly, flavouring substances. Of late years great attention has been paid to the manufacture of chocolate in England; our principal makers now import the finest descriptions of cocoa, and produce varieties of the manufactured article which are scarcely inferior to those of their French rivals. The different kinds of cocoa, and the processes of roasting, sweating, &c., are described under COCOA, to which article we refer the reader also for particulars respecting the chemistry of chocolate.

Prep. The cocoa nibs[1] are ground in a mill consisting of stone or metal rollers, which are usually heated either by charcoal fires or by steam, so as to soften or melt the natural fat.[2] The warm, smooth paste which passes from the mill is then placed in a mixing mill, and incorporated with refined sugar, and usually vanilla or other flavouring substance. The trituration is continued until the whole paste is converted into an entirely homogeneous mass, which is finally shaped, by means of suitable moulds, into various forms, as blocks, loaves, tablets, lozenges, &c.

Obs. Chocolate, prepared as above, without the addition of aromatics, is known in the trade as PLAIN CHOCOLATE. The Spaniards flavour it with vanilla, cloves, and cinnamon, and frequently scent it with musk and ambergris. With these additions it is termed SPANISH CHOCOLATE. In general, they add too large a quantity of the last four articles. The Parisians, on the contrary, use little flavouring, and that principally vanilla. They employ the best kinds of cocoa, and add a considerable quantity of refined sugar. So prepared, it is called FRENCH CHOCOLATE.

Proportions. 1. FRENCH CHOCOLATE:—The proportions used for the best description are said to be—2 beans of vanilla, and 1 lb. of the best refined sugar, to every 3 lbs. of the choicest cacao nuts.

2. SPANISH CHOCOLATE:—The following forms are said to be commonly adopted:—

℞. Caracas cocoa, 11 lbs.; sugar (white), 3 lbs.; vanilla, 1 oz.; cinnamon (cassia), ¼ oz.; cloves, ½ dr.

[1] The bruised, roasted seeds, freed from husk and membrane.

[2] Cacao- or cocoa-butter.

b. Caracas cocoa, 10 lbs.; sweet almonds, 1 lb.; sugar, 3 lbs.; vanilla, 1¼ oz.

c. Caracas cocoa, 8 lbs.; island cocoa, 2 lbs.; white sugar, 10 lbs.; aromatics, as above.

d. Island cocoa, 7 lbs.; farina, q. s. to absorb the oil. Inferior.

3. VANILLA CHOCOLATE. *Syn.* CHOCOLAT À LA VANILLE, Fr. A variety of French or Spanish chocolate highly flavoured with vanilla. The following proportions have been recommended:—

a. Caracas cocoa, 7 lbs.; Mexican vanilla, 1 oz.; cinnamon, ½ oz.; cloves, 3 in no.

b. Best chocolate paste, 21 lbs.; vanilla, 4 oz.; cinnamon, 2 oz.; cloves, ½ dr.; musk, 10 grs.

Obs. The vanilla used in making chocolate is reduced to powder by rubbing it with a little sugar, before adding it to the paste.

Pur., &c. The chocolate commonly sold in England is prepared from the cake left after the expression of the oil, and this is frequently mixed with the roasted seeds of ground peas, and maize or potato flour, to which a sufficient quantity of inferior brown sugar, or treacle and mutton suet, is added to make it adhere together. Inferior sweet almonds are also employed in the same way.

Since the above paragraph was written there has been a vast improvement in English chocolates, though the cheaper sorts of certain makers are still much adulterated. Genuine chocolate should dissolve in the mouth without grittiness, and should leave a peculiar sensation of freshness; after boiling it with water the emulsion should not form a jelly when cold, for if it does starch or flour is present. The presence of animal fat may generally be detected by a cheesy or rancid flavour. See COCOA.

Qual., &c. Chocolate is nutritive and wholesome, if taken in moderation, but is sometimes apt to disagree with weak stomachs, especially those that are easily affected by oily substances or vegetable food. When this is the case, by adopting the simple plan recommended under BUTTER, chocolate may generally be taken with impunity, even by the dyspeptic. The quantity of aromatics mixed with the richer varieties of chocolate improve the flavour, but render them more stimulant and prone to produce nervous symptoms and head complaints.

Chocolate is taken in the solid form, or made into a beverage; or, combined with sugar, is made into various articles of confectionery.

CHOCOLATE FOR THE TABLE is prepared by slicing or scraping very finely the required quantity into a jug, and adding to it a small quantity of boiling water. This is worked into a thin, smooth paste, and the jug immediately filled up with boiling milk-and-water. A froth is produced by the same means that eggs are beaten up. The operation of "milling," performed by rapidly twirling a notched cylinder of wood in the emulsion, raises the froth very quickly. Sugar may be put in with the scraped chocolate, or added afterwards at pleasure.

Chocolate should never be made for the table before it is wanted, because beating it again injures the flavour, destroys the froth, and separates the body of the chocolate, the oil of the nut being observed, after a few minutes' boiling, or even standing long by the fire, to rise to the top. This is one of the principal reasons why chocolate offends the stomach.

Preparations of chocolate, intended either as nutritious articles of food for convalescents, or as vehicles for medicine, are common among the pharmacopœial and magistral formulæ of the Continent. The following are a few examples:—

Chocolate, Aromat'ic. *Prep.* (Weiglebt.) Cocoa beans and sugar, of each 16 oz.; cinnamon, ½ oz.; cloves 2 drs.; cardamoms and vanilla, of each, 1 dr.

Chocolate, Car'rageen. See WHITE CHOCOLATE (Nos. 1 and 2).

Chocolate, Chalyb'eate. *Syn.* FERRUGIN'EOUS CHOCOLATE; CHOCOLA'TA CHALYBEA'TA, C. MAR'TIS, L. *Prep.* 1. (Trousseau.) Spanish chocolate, 16 oz.; carbonate of iron, ½ oz.; mix, and divide into 1-oz. cakes. One at a time; in anæmia, amenorrhœa, chlorosis, &c.

2. (Pierquin.) Iodide of iron, 2 drs.; chocolate, 16 oz. For ½-oz. cakes; as above, and in scrofulous and glandular affections.

Chocolate, Guarana'. *Syn.* PAULLIN'IA CHOCOLATE; CHOCOLA'TA PAULIN'IÆ, C. GUARAN'Æ, L. *Prep.* From guarana and white sugar, of each, 1 oz., triturated together, and afterwards thoroughly mixed with good plain chocolate, 18 oz. Recommended as a restorative in debility, chlorosis, and other diseases of debility, especially those of a nervous character.

Chocolate, Ice'land Moss. *Syn.* CHOCOLA'TA CETRAR'IÆ ISLAND'ICÆ, C. LICHEN'IS, L. *Prep.* 1. (P.C.) Simple chocolate (P.C.), 32 parts; sugar, 29 parts; dried jelly of Iceland moss, 11 parts; mix.

2. (Cadet.) Chocolate, 4 lbs.; sugar, 2 lbs.; Iceland moss (freed from its bitter, and powdered), 1½ lb.; tragacanth and cinnamon, of each, 4 oz.; water, q. s.; to be beaten in a warm mortar, or ground with a muller on a warm slab to a paste. Recommended in pulmonary affections, general debility, weakness of stomach, &c. See COCOA (Iceland Moss).

Chocolate, Purgative. *Syn* CHOCOLA'TA PUR'GANS, C. CATHAR'TICA, L. *Prep.* 1. Jalap, 1 oz.; chocolate, 9 oz.; mix, and divide into 1-dr. cakes.—*Dose.* 1 to 2 cakes, as a purge.

2. Jalap, 2 oz.; calomel and sugar, of each, 1 oz.; triturate together, then add chocolate, 20 oz.; for 1-dr. cakes.

3. Scammony, 2 drs.; chocolate, 3 oz.; for 1 dozen cakes. The last two are given in

worms.—*Dose* (for an adult). 1 cake, taken fasting.

Chocolate, Sal'ep. *Syn.* SAL'OOP CHOCOLATE; CHOCOLA'TA CUM SAL'EP, L. *Prep.* 1. (P.C.) Chocolate, 16 oz.; powdered salep, ½ oz.

2. (Cadet.) Cacao paste and sugar, of each, 1 lb.; powdered salep, 1 oz. Arrowroot chocolate and tapioca chocolate are made in the same manner. (See *below*.)

Chocolate, Sim'ple. *Syn.* HYGIEN'IC C., HOMŒOPATH'IC C.; CHOCOLA'TA, C. SIM'PLEX, C. SALU'TIS, L.; CHOCOLAT DE SANTÉ, Fr. *Prep.* (P.C.) Caracas and Maragnan cocoa, of each, 96 lbs.; sugar, 160 lbs.; cinnamon, 1 oz. (to 2 oz.); triturated together in the usual manner, and formed into cakes or powder.

Chocolate, Vanil'la. *Syn.* CHOCOLA'TA CUM VANIL'LA, L. *Prep.* 1. (P.C.) Chocolate (plain,—P.C.), 16 oz.; vanilla, ½ dr.

2. (Cotterau.) Cocoa paste, 6 lbs.; sugar, 10 lbs.; vanilla, 11 drs.

See forms previously given.

Chocolate, Ver'mifuge. *Syn.* CHOCOLA'TA VERMIFU'GA, L. See PURGATIVE CHOCOLATE (Nos. 2 and 5, *above*).

Chocolate, White. *Syn.* WHITE COCOA, CAR'RAGEEN C.; CHOCOLA'TA CUM CHON'DRO, PAS'TA CACA'O CUM CHON'DRO, P. C. C. LICHEN'IS CARRAGHEN'O, L. *Prep.* 1. As Iceland moss chocolate, but employing carrageen moss.

2. (Ph. Dan.) Roasted and decorticated cocoa seeds (reduced to a subtile mass in a warm iron mortar) and powdered white sugar, of each, 2 lbs.; powdered carrageen (debitterised), 3 oz.

3. (Cottereau.) Sugar, 6 lbs.; rice flour, 1¾ lb.; potato starch and butter of cocoa, of each, ½ lb.; gum arabic ¼ lb. (dissolved); tincture of vanilla, ½ fl. oz.; boiling water, q.s.; triturate to a stiff paste. The above are highly nutritious, and are recommended as articles of diet for convalescents and debilitated persons.

CHOKE-DAMP. *Syn.* AFT'ER-DAMP. The term applied by miners to carbonic anhydride (carbonic acid) and other irrespirable gases and vapours evolved in mines. See CARBONIC ACID, FIRE DAMP, VENTILATION, &c.

CHOLAL'IC ACID. $C_{24}H_{40}O_5$. *Syn.* CHOL'IC ACID.[1] A non-nitrogenous acid existing in bile. It is best prepared by boiling the resinous mass precipitated by ether from an alcoholic solution of ox bile with a dilute solution of potassa, for 24 to 36 hours, till the amorphous potassa-salt that has separated begins to crystallise. The dark-coloured soft mass is then removed from the alkaline liquid, dissolved in water, and hydrochloric acid added. A little ether will cause the deposition of the CHOLALIC ACID from this solution in crystals. With sulphuric acid and solution of sugar, it strikes a purple-violet colour; this constitutes Pettenkofer's test for bile.

CHOLE'IC ACID. *Syn.* TAURO-CHOLAL'IC ACID. A peculiar conjugated compound of cholalic acid with a substance called taurine, which contains both nitrogen and sulphur. In combination with soda, choleic acid constitutes a principal ingredient in *bile*.

CHOL'ERA. This word, which, from its derivation, can be only applied correctly to a bilious affection of the stomach and bowels, has been of late years very loosely extended to a malignant disease, the most marked characteristic of which is a total suspension of the functions of the biliary organs.

Cholera, En"glish. *Syn.* COM'MON CHOLERA, BIL'IOUS C.; CHOL'ERA MOR'BUS, L. A disease characterised by bilious vomiting and purging, accompanied by more or less pain and debility. Diarrhœa is the most common precursor of the disease, and ought to be attended to without delay, particularly if the weather be warm. Cholera most frequently occurs towards the end of the summer and early in the autumn, when the increased heat of the sun stimulates the liver to an inordinate secretion of bile, by which the whole system becomes overloaded with it. Among secondary and accidental causes, are sudden changes of temperature, checked perspiration, and the use of indigestible food, and food and beverages in a state of incipient decomposition. It is usually accompanied by fever, thirst and severe colic, and sometimes, by cold sweats, extreme debility, feeble pulse, &c., under which the patient sinks in 24 hours.

Treat. In most cases this complaint is not dangerous, and yields to proper treatment in a few days. As soon after the commencement of the attack as possible, some mild aperient should be administered. Opiates may be employed, both topically and by the mouth. Jeremie's solution is stated to be very efficacious in the diarrhœa which so generally precedes cholera. A teaspoonful or two of laudanum, rubbed over the region of the stomach and bowels, is a simple application which will generally allay the pain. 10 to 20 drops of laudanum, mixed with a table-spoonful of good brandy, or a few grains of cayenne pepper, may also be taken every hour, if the pain is severe. Should the stomach reject the medicine, or the vomiting be apparently increased by drinking warm diluents, a few spoonfuls of ice-cold water, or of a mixture of lemon-juice and water, may be taken instead, until the sickness abates. Dr. Copeland recommends spirit of turpentine in violent attacks, both internally and as an external application in the form of warm epithems. When the violence of the symptoms has abated, tonics and bitters (as calumba, gentian, orange-peel, &c.) may be advantageously had recourse to. Calumba, in the form of a weak infusion, conjoined, if necessary, with aromatics, is, perhaps, the most valuable agent we possess for the after-treatment of the disease. See DIARRHŒA.

Cholera, Malig'nant. *Syn.* ASIAT'IC CHO-

[1] This name is generally applied to another compound. See CHOLIC ACID.

LERA, EPIDEM'IC C., BLUE C., PESTILEN'TIAL C., SPASMOD'IC C.; CHOL'ERA ASIAT'ICA, C. ASPHYX'IA, C. MALIG'NA, L. This fearful disease first became known in this country in the autumn of 1831. The attack usually begins with sickness and purging; this discharge, however, is not bilious, as in ordinary cholera, but a thin, colourless fluid, like rice-water; at the same time there is great prostration of strength, and cold, clammy sweats. In a short time dreadful cramps assail the extremities and afterwards the abdomen; the body becomes bent, the limbs twisted, the countenance cadaverous, the pulse almost imperceptible, and the eyes sunken; the patient sinks into a state of apathy, and unless a favorable change speedily takes place, soon expires from exhaustion. When there is a reaction the pulse gradually returns, the natural warmth of the body is restored, and the spasms and difficulty of breathing give way. Frequently, however, the reaction is accompanied by fever closely resembling typhus, and which often terminates fatally in from four to eight days. The symptoms of epidemic cholera are not always of this terrible character.

Treat. The following are a few of the many remedies that have been recommended for this terrible malady:—

1. (American remedy.) Equal parts of maple sugar and powdered fresh-burnt charcoal, made into a stiff paste with lard, and divided into pieces the size of a filbert.—*Dose.* One, occasionally, swallowed whole.

2. (Austrian specific.) The proportions of the ingredients in the following formulæ are founded on Mr. Herapath's analysis of this celebrated preparation, and are given in the nearest available whole numbers:—

a. Sulphuric acid (sp. gr. 1·845), 20 grs.; nitric acid (sp. gr. 1·500), 12 grs.; sugar and gum, of each, 15 grs.; distilled or pure soft water, q. s. to make the whole weigh exactly 1 oz.

b. Sulphuric acid, 3 drs.; nitric acid, 2 drs.; simple syrup, 6 drs.; water, q. s. to make the whole weigh exactly 10 oz. A single drop of essential oil of lemon may be added.

Doses, &c. One table-spoonful is ordered to be taken in water, on the first appearance of premonitory symptoms, followed by the free use of very cold water. In half an hour a second dose is to be taken. This (as asserted) is generally sufficient to arrest the progress of the disease. A table-spoonful is then to be added to a pint of cold water, and drank *ad libitum*. In more obstinate cases it is said that 4 or 5 doses are generally required to effect a cure. When collapse sets in, double doses are ordered to be given, and to be repeated after every attack of vomiting until the sickness and cramp abate. After the vomiting abates, the doses are still to be repeated until 5 or 6 doses are retained by the stomach. Should quiet sleep or drowsiness come on, it is not to be interfered with. The free use of cold water or soured water is to be allowed until perspiration sets in and the warmth of the body returns. According to the report, the use of warm liquors, wines, spirits, &c., must be carefully avoided, as so much poison.

Obs. A bottle of the above remedy was handed to the late Mr. Wm. Herepath, by the superintendent of the Birmingham police, who had received it from the head of the Austrian police, as being in general use in Austria, under the sanction of the medical department of the government, and being found to act almost as a specific in cholera. In 1831-2, it was first tried on some criminals, with perfect success, and soon afterwards with similar results on thousands of the general public. In 1849 the Austrian government ordered its use in the public establishments of the empire, since which not a single case of failure had occurred in which it had been *fairly* tried.

3. (Mr. Buxton's Remedy.) From dilute sulphuric acid (spirit of vitriol), 25 drops; water, 1 fl. oz. For a draught; as the last.

4. (College of Physicians and Board of Health; for Premonitory Diarrhœa.) Chalk mixture, 1 oz.; aromatic confection, 10 to 15 grs.; tincture of opium, 5 to 15 drops; to be repeated every 3 or 4 hours, or oftener, if required, until the looseness is arrested.

5. (Dr. Graves's Astringent Pills.) Acetate of lead, 20 grs.; opium, 1 gr.; conserve of roses, q. s.; for 12 pills.—*Dose.* One every ½ hour or hour, at first; then one every two hours.

6. (Homœopathic Preventive.) Camphor, 1 dr.; rectified spirit, 6 drs.; dissolve, and preserve it in a well-corked bottle.—*Dose.* 2 drops on a lump of sugar, sucked as a lozenge two or three times a day.

7. (Homœopathic Remedy.) As the last, repeating the dose every 10 or 15 minutes, followed by draughts of ice-cold water, until the symptoms abate.

8. (Mr. Hope's Remedy.) Red nitrous acid, 2 drs.; peppermint water or camphor julep, 1 oz.; tincture of opium, 40 drops; mix.—*Dose.* One to two teaspoonfuls in a cupful of thin gruel every 3 or 4 hours.

9. (Liverpool Preventive Powders.) Bicarbonate of soda, 20 grs.; ginger, 10 grs.; for a dose. One to be taken in a glass of water after breakfast and supper daily.

10. (Police Remedy; Mr. B. Child's r.) Rectified sulphuric ether and tincture of opium, of each, 30 drops; for a dose for an adult; especially during the earlier stages.

11. (Mr. Ross's Astringent Pills.) Each pill contains 1 gr. of nitrate of silver, made up with crumb of bread, q. s.—*Dose.* One pill, to be repeated after the interval of half an hour or an hour, should the symptoms continue unabated.

12. (Russian Remedy.) Sumbul, in the form of tincture, concentrated essence, in decoction, in cold infusion, and in powder in the form of pill.—*Doses.* Tincture, from 20 to 60 drops;

essence, from 5 to 10 or 20 drops; in a little camphor julep or plain water. The physicians of Moscow and St. Petersburg ascribe to the virtues of this drug the saving of thousands of lives during the last epidemic. See SUMBUL.

13. (Dr. Stevens's Saline Powders.) Bicarbonate of soda, ½ dr.; common salt, 20 grs.; chlorate of potassa, 7 grs.; for a dose.

14. (Sir M. Tierney's Remedy.) Cajeput oil, in doses of 20 to 30 drops, every two or three hours. The oil excites the nervous system and equalises the circulation. The late Sir M. Tierney and others prescribed it frequently, it is said with considerable success.

15. (Common Remedies of the Shops.) These generally consist of chalk mixture, with a little laudanum, and some aromatic or carminative, as cassia, cinnamon, cardamoms, nutmeg, or peppermint. In a few, some astringent, as tincture of catechu, or extract of logwood, is added.

CHOLES'TERIN. $C_{26}CH_{44}O.H_2O$. This substance is found in the bile, brain, nerves, blood, &c., and forms the principal ingredient of biliary calculi (*gall-stones*).

Note.—The remedies containing astringents are the most efficacious.

CHOL'IC ACID. *Syn.* GLYCO-CHOLAL'IC ACID. A peculiar acid, existing as cholate of sodium, and associated with choleic acid in the bile. It is a conjugate compound of cholalic acid with a nitrogenised substance called glycocin.

CHON'DRIN. Gelatin obtained from cartilage. It differs from ordinary gelatin, in being precipitable by acetic acid, alum, and acetate of lead.

CHRO'MATE. *Syn.* CHRO'MAS, L. A salt in which the hydrogen of (hypothetical) chromic acid, $HCrO_2$, is replaced by a metal or other basic radical.

Chromates:—

Prep. The insoluble chromates, as those of barium, zinc, lead, mercury, silver, &c., may be made by mixing a soluble salt of those bases with neutral chromate of potassium. The first three are yellow; the fourth, brick-red; and the fifth, reddish-brown, or ruby red when crystallised. The soluble chromates may all be made by direct solution of the base in the acid, or by double decomposition. The chromates of commerce are prepared from either chrome ore or chromate of potassium.

Prop., Uses, &c. The chromates are characterised by their yellow or red colour, the latter predominating when the acid is in excess; and except those with the alkaline bases, they are, for the most part, insoluble in water. Both the chromate and the bichromate of potassium are extensively used in dyeing and calico-printing. The former is employed in conjunction with sulphuric acid in the laboratory as an oxidising agent, and in the manufactory for bleaching sperm oil. The bichromate of ammonium and potassium are used in photography.

They are readily recognised by the following tests:—

On boiling a chromate in hydrochloric acid mixed with alcohol, chromic acid is first set free, and then decomposed, forming a green solution of chloride of chromium. Sulphuretted hydrogen and sulphurous acid effect similar changes. With acetate of lead, the chromates give a yellow precipitate; with nitrate of silver, a reddish-brown; with nitrate of mercury, a red one.

CHROME ALUM. See ALUMS.

CHROME GREEN. See GREEN PIGMENTS.

CHROME RED. See RED PIGMENTS.

CHROME YELLOW. See CHROMATE OF LEAD.

CHROMIC ACID. See CHROMIC ANHYDRIDE.

CHRO'MIUM. Cr. A metal discovered in native chromate of lead by Vauquelin in 1797. It is found in the state of oxide, combined with oxide of iron, in some abundance, in the Shetland Islands, and elsewhere; as chromate of lead, it constitutes a very beautiful material.

Prepared in an impure condition as a white, very infusible, hard metal, by igniting the oxide with charcoal, at a white heat, in a lime crucible.

Chromous Chloride. $CrCl_2$. *Syn.* PROTOCHLORIDE. *Prep.* Ignite the chromic chloride in a current of dry hydrogen. A white, foliated mass, soluble in water (evolving much heat), and yielding a blue solution, which absorbs atmospheric oxygen with astonishing rapidity, acquiring a deep-green colour, and passing into the state of oxychloride of chromium. It is the most powerful reducing or deoxidising agent known.

Chromic Chloride. Cr_2Cl_6. *Syn.* SESQUICHLORIDE. *Prep.* Pass dry chlorine over a mixture of sesquioxide of chromium and charcoal, heated to redness, in a porcelain tube. The chloride collects as a sublimate, of a peach or violet colour, in the cool part of the tube.

Dissolve chromic oxide in hydrochloric acid and evaporate to dryness; the residue is chromic chloride. It forms a dark green mass, containing water, which is evolved by igniting at a temperature of 400°, turning a purplish red.

Chromium Oxides:—

Chromous Oxide. CrO. *Syn.* PROTOXIDE OF CHROMIUM. This oxide has not yet been obtained in a satisfactory manner, but the hydrate is prepared by the addition of potassium hydrate solution to a solution of chromous chloride or sulphate. A brownish-red powder, speedily passing to a deep foxy-red, with disengagement of hydrogen, and forming pale, blue-coloured salts with the acids, which absorb oxygen with avidity, whilst the metal passes into a higher state of oxidation.

Chromic Oxide. Cr_2O_3. *Syn.* SESQUIOXIDE. Prepared by igniting potassium bichromate at a red heat and well washing the residue, and as hydrate by cautiously adding equal parts of hydrochloric acid and alcohol or sugar to a boiling solution of chromate of potassa in water,

in small portions at a time, until the red tint disappears, and the liquid assumes a green colour; pure ammonia, in excess, is next added, and the precipitate which subsides is collected, and washed with water.

Prop., &c. The anhydrous oxide is a rich crystalline, green powder, insoluble in both water and acids; fused with borax and glass, it imparts a beautiful green colour.

The hydrate is soluble in the acids and in alkaline lyes; with the first, it forms salts which have a green or purple colour. These compounds may be made by direct solution of the hydrate in the dilute acids. Chromic sulphate combines with the sulphates of potassium and ammonium, giving rise to salts (CHROME ALUMS) which crystallise in magnificent octahedrons of a deep claret colour. The finest crystals are obtained by spontaneous evaporation.

These salts of chromium are the most important, the chromous salts being seldom met with, and are best recognised by the following reactions:—Caustic alkalies precipitate the hydrate, easily soluble in excess of the precipitant.—Ammonia, the same, but the precipitate is nearly insoluble.—The carbonates of potassium, sodium, and ammonium, throw down a green precipitate of carbonate and hydrate, slightly soluble in a large excess.—Sulphuretted hydrogen causes no change.—Sulphydrate of ammonium precipitates the hydrate of a bluish-green colour.

Chromic Anhydride. CrO_3. *Syn.* CHROMIC ACID, ANHYDROUS CHROMIC ACID, CHROMIC TEROXIDE. *Prep.* By conducting gaseous fluoride of chromium into a silver or platinum vessel, the sides of which are just moistened with water, and the aperture covered with a piece of moist paper, the anhydride will be deposited under the form of red, acicular crystals, which will nearly fill the vessel. When the process is skilfully conducted, the product is of exquisite beauty and chemically pure. The fluoride referred to above is obtained from fluor spar, 3 parts; chromate of lead, 4 parts; fuming (or the strongest) sulphuric acid, 5 parts; mixed cautiously, in a silver or leaden retort. A red-coloured gas is evolved, which acts rapidly on glass, forming fluosilicic acid gas, and upon water, forming hydrofluoric acid and chromic anhydride. The moisture of the atmosphere is sufficient to effect the decomposition last referred to; the former substance escaping as gas, and the latter being deposited in small crystals.

It is also prepared nearly pure by adding a cold saturated solution of potassium bichromate to once and a half its bulk of pure strong sulphuric acid. As the liquor cools, the anhydrous chromic acid is deposited under the form of brilliant crimson-red prisms; the mother-liquor is then poured off, and the crystals, placed between two tiles of glass or porcelain, are submitted to strong pressure for some time, under a bell-glass or jar, when the anhydride will be found sufficiently dry. It may be deprived of a little adhering moisture, by placing it over sulphuric acid for a short time *in vacuo*.

Commercially, it is prepared by one of the two following processes:—

To a saturated solution of chromate of potassium, 100 parts, add oil of vitriol (sp. gr. 1·845), 49 parts; and let the whole cool. This is the common process. The product contains sulphate of potassium, but this does not much interfere with its value as a bleaching agent.

From chromate of barium, decomposed by concentrated nitric acid. The anhydrous chromic acid is separated from the nitrate of barium by decantation, or, which is still better, by filtration through glass or asbestos. It is then evaporated to dryness, when the nitric acid is volatilised, and pure chromic anhydride left behind. The volatilised nitric acid may be condensed, and again used for the same purpose. The only precautions necessary to ensure the purity of the anhydrous chromic acid prepared by this plan are—to use a sufficient quantity of nitric acid, and to take care that the nitric acid is sufficiently concentrated and pure.

Prop., &c. Forms ruby-red anhydrous prisms, very soluble in water, with formation of true chromic acid, and extensively manufactured for the purpose of oxidising and bleaching substances.

CIDER. *Syn.* CYDER; POMACEUM, L. Cider is the fermented juice of the apple, and is a very ancient beverage. Pliny calls cider and perry the "wine of apples and pears."

The attention of the cider farmer should be first directed to the culture of the apple tree. The situation most appropriate for an orchard is one on rising ground, rather dry than moist, and unexposed to sea air or high winds. The soil should be strong, but not too heavy, and should be rich in the alkaline and earthy bases, especially the phosphates. The selection of the proper varieties of the apple for grafting, is also a point on which particular care should be taken. It is found that the juices of different kinds of apples vary in the quantity of saccharine matter which they contain, as well as in other particulars that influence the quality and flavour of the cider prepared from them. As a general rule, those varieties should be chosen that yield a juice rich in sugar, and contain no undue amount of acid, and which, after the period of active fermentation is past, furnishes a liquor which clarifies itself, and keeps well. This quality of the juice may generally be determined from its specific gravity. The heaviest and clearest is the best, other points being equal. The specific gravity of the juice of the different varieties of apple varies from 1·060 to 1·100.

Cider apples are classed under three heads—bitter, sweet, and sour. The first are the best; their juice has the greatest specific gra-

vity, is the richest in sugar, ferments the most freely, clarifies spontaneously the quickest, and keeps the best after fermentation. They contain a minute quantity of extractive matter which is not present in other apples. The juice of sweet apples ferments tumultuously, clears with difficulty, and the resulting cider does not keep so well as that produced from the first variety. The juice of sour apples contains less sugar and more acid than the other two, and consequently, not only produces the weakest, but the worst cider; it, however, "fines" well, although it "stores" badly. Sour and "rough-tasted" apples are usually preferred by farmers for making cider. This preference, which is very decided in the West of England, may be readily accounted for. The sour and rough-tasted apples contain less sugar, and more malic acid, than some of the other varieties, and the presence of this acid impedes the conversion of the alcohol of the cider into vinegar; a change which their rude mode of operating renders otherwise inevitable. But cider made with such apples never equals in quality that prepared at a low temperature, from fruit abounding in sugar, provided equal skill is exercised in the manufacture as in the process of converting malt-worts into beer.

The process of making cider varies in different places, but in every case essentially consists of the collection of the fruit, the expression and fermentation of the juice, and the storing and management of the fermented liquor.

The collection of the fruit should not be commenced before it has become sufficiently mature, and should be performed with greater care than is commonly bestowed upon it. The apples, after being gathered, are usually left for 14 or 15 days in a barn or loft, to mellow, during which time a considerable portion of the mucilage is decomposed, and alcohol and carbonic acid developed. If this "ripening" is allowed to go too far, loss arises, notwithstanding the vulgar prejudice in its favour. The spoiled apples are then separated from the sound ones, as they not only impart a bad flavour to the cider, but impede its spontaneous clarification.

The expression of the juice is the next step in the process of cider-making. The apples are crushed or ground in mills consisting of two fluted cylinders of hard wood or cast iron, working against each other. The common practice is next to sprinkle the pulp with $\frac{1}{8}$th to $\frac{1}{4}$th of its weight of spring or river water, and then to allow it to remain in tubs or wooden cisterns for 12 or 14 hours, during which time incipient fermentation commences, and the breaking up of the cells of the membrane takes place, by which the subsequent separation of the juice is facilitated. This plan, though general among cider manufacturers, is prejudicial to the quality of the future liquor; as not only is a portion of the newly formed alcohol lost, but the skins and pips often impart to it a disagreeable flavour. By employing more efficient crushing machinery, this system of vatting is rendered quite unnecessary. A machine furnished with a revolving circular rasp, similar to that used in making potato starch, is admirably adapted to this purpose.

The pulp of the crushed or ground apples is now placed on a kind of wicker frame, or in hair-cloth or coarse canvas bags, and after being allowed to drain into suitable tubs or receivers, is subjected to powerful pressure, gradually applied, in the cider press. The liquor which runs off first is the best, and is usually kept separately; whilst that which follows, especially the portion obtained by much pressure, tastes of the "pips" and skins.

The expressed juice or must, obtained as above, is next put into clean casks with large bung-holes, and freely exposed to the air in the shade, where they are placed on "stillions," with flat tubs under them to catch the waste. They are now constantly attended to, and kept quite full, in order that the yeast, as it forms, may froth over and be carried off from the surface of the liquor. After 2 or 3 days for weak cider, and 8 or 10 days for strong cider, or as soon as the sediment has subsided, the liquor is "racked off" into clean casks, which have been (according to the common practice) previously sulphured with a cooper's match. The casks containing the "racked cider" are then stored in a cellar, shaded barn, or other cool place, where a low and regular temperature can be ensured, and are left to mature or ripen. By the following spring the cider is commonly fit for use, and may be "re-racked" for sale.

The marc, or pressed pulp, is generally again sprinkled with $\frac{1}{3}$ or $\frac{1}{2}$ its weight of water, and re-pressed. The resulting liquor, when fermented, forms a weak kind of cider (cider moil, water moil), which is reserved for domestic use in the same way as table-beer. The refuse-pulp (apple marc, pomace, pommage, apple cheese) is used as food for pigs and store cattle, and is very acceptable to them.

The storing and management of cider are matters of vast importance to the cider farmer, the factor, the wholesale dealer, and the bottler. The principles by which these should be directed are precisely similar to those which are explained under the heads BREWING, FERMENTATION, and MALT LIQUORS; and which, indeed, refer, with slight modifications, to all fermented liquors.

Preparatory to bottling cider, it should be examined, to see whether it is clear and sparkling. If not so, it should be clarified, in a similar way to beer, and left for a fortnight. The night before it is intended to put it into bottles, the bung should be taken out of the cask, and left so until the next day, and the filled bottles should not be corked down until the day after; as, if this is done at once, many of the bottles will burst by keeping. The

best corks should alone be used. Champagne bottles are the variety generally chosen for cider. It is usual to wire down the corks, and to cover them with tinfoil, after the manner of champagne. A few bottles at a time may be kept in a warm place to ripen. When the cider is wanted for immediate use, or for consumption during the cooler portion of the year, a small piece of lump sugar may be put into each bottle before corking it; or, what is the same thing in effect, the bottles may be corked within 2 or 3 hours after being filled. In summer, and for long keeping, this practice is, however, inadmissible. The bottled stock should be stored in a cool cellar, when the quality will be greatly improved by age. Cider for bottling should be of good quality, sound and piquant, and at least a twelvemonth old. When out of condition it is unfit for bottling.

Qual., &c. Cider, when of good quality, and in good condition, is doubtless a very wholesome liquor. Cider consumers, living in the cider districts, appear to enjoy almost an immunity from cholera, and often from other diseases which are common in other parts of the kingdom. At the same time, however, it is right to mention, that the dry colic or belly-ache (*colica pictonum*) is far from uncommon in these districts, but is wholly confined to those who drink early, hard, or inferior cider, made from harsh, unripe fruit. We believe that, in most cases, it may be referred to the acid of the common cider having acted on the lead, pewter, or copper of the articles or utensils with which it has come in contact, and of which it has dissolved a very minute portion. The best cider contains from 8% to 10% of absolute alcohol; ordinary cider, from 4% to 6%.

Concluding remarks. Much of the excellence of cider depends upon the temperature at which the fermentation is conducted; a point utterly overlooked by the manufacturers of this liquor. Instead of the apple-juice, as soon as it is expressed from the fruit, being placed in a cool situation, where the temperature should not exceed 50° or 52° Fahr., it is frequently left exposed to the full heat of autumn. In this way much of the alcohol formed by the decomposition of the sugar is converted into vinegar, by the absorption of atmospheric oxygen, and thus the liquor acquires that peculiar and unwholesome acidity, known in the cider districts by the name of "roughness." When, on the contrary, the fermentation is conducted at a low temperature, nearly the whole of the sugar is converted into alcohol, and this remains in the liquor, instead of undergoing the process of acetification. The acetous fermentation, by which alcohol is converted into vinegar, proceeds most rapidly at a temperature of about 90° Fahr., and at lower temperatures, the action becomes gradually slower, until at 46° to 50° Fahr. no such change takes place. (Liebig.) It is therefore evident, that if the saccharine juice of apples, or any other fruit, is made to undergo the vinous fermentation in a cool situation, less of the spirit resulting from the transformation of the sugar, will be converted into acetic acid, and, consequently, more will be retained in an unaltered state in the liquor, to improve its quality, and by its conservative and chemical action, to preserve it from future change. This is the principal cause, other circumstances being alike, of the difference in the quality of the cider made by persons living in the same district. The one has probably a cooler barn and cellar than the other, to store his liquor in, and is more careful to keep the pulp and juice cool during the early part of the process. In Devonshire, the pressing and fermentation are conducted in situations where the temperature varies little from that of the external air, and fluctuates with all its changes; the result is, that Devonshire cider, of the best class, will rarely keep more than 4 or 5 years, and seldom improves after the second or third year; whilst the cider of Herefordshire and Worcestershire, where these operations are more carefully attended to, will keep for 20 or 30 years.

When the pressing the apples for the juice is deferred until late in the season, it sometimes happens that the fermentation is sluggish. Though the juice has been set on the old system, in November or December, the working hardly commences until March. At this time the cider is sweet; it now rapidly becomes pungent and vinous, and is soon ready to be racked for use. If the fermentation still continues, it is again racked into a clean cask that has been sulphured; or, two or three cans of the cider are put into a cask, and a brimstone match burned in it. The cask is then agitated, after which it is nearly filled with the cider. By this process the fermentation is checked, and the cider in a short time becomes fine. Great care must be taken that the sulphuring be not overdone, as it is apt to impart a slightly unpleasant flavour to the liquor. If, on the first operation, the fermentation is not checked, the process of 'racking' is repeated, until the liquor becomes clear, and is continued from time to time, till the cider is in a quiet state, and fit for drinking.

A common practice in Devonshire is to add a stuff called 'stum,' sold by the wine-coopers, or an article called 'antiferment,' sold by the druggists, for the purpose of checking the fermentation, but a much better plan is that described above.

To improve the flavour of weak cider, or to render ordinary cider more vinous, various plans are followed by the cellarmen and bottlers. An excellent one is to add to each hogshead 1½ gal. of good brandy or rum, with 2 oz. of powdered catechu (dissolved in water), 10 lbs. of good moist sugar or honey, ½ oz. each of bitter almonds and cloves, and 4 oz. of mustard seed (all in powder). These must be

well 'rummaged' into the liquor, and the whole occasionally stirred up for a fortnight, after which it must be allowed to repose for 3 or 4 months, when it will usually be found perfectly 'bright,' and no bad substitute for foreign wine. Should this not be the case, the liquor must be 'fined' with a pint of isinglass finings, or a dozen eggs, and allowed to rest for a fortnight. If the cider is preferred pale, the catechu must be omitted, and instead of isinglass, a quart of skimmed milk is to be used as 'finings.' When desired of a pinkish tint, 1 oz. of cochineal (in powder) may be added, instead of the catechu.

About 13 cwt. of November apples commonly yield one hogshead of cider. In Devonshire, about 6 sacks or 24 bushels are the common quantity for the hogshead of 63 galls.

The best cider made at the present day is that of Normandy, Herefordshire, and New Jersey (U. S.), and next that of Devonshire and Somersetshire. See ANTIFERMENT, FERMENTATION, &c.

Cider, Champagne. This name is given in the United States of America to a fine, pale variety of cider, much used for bottling, which has a great resemblance to inferior champagne. The best variety comes from New Jersey. The name is also applied in this country in a similar manner. The following is a good form for a 'made' cider of this class:—

Prep. Good pale vinous cider, 1 hhd.; proof spirit (pale), 3 galls.; honey or sugar, 14 lbs.; mix well, and let them remain together in a temperate situation for 1 month; then add orange-flower water, 3 pints; and in a few days fine it down with skimmed milk, ½ gal. A similar article, bottled in champagne bottles, silvered, and labelled, is often sold to the ignorant for champagne.

Cider, Made. An article under this name is made in Devonshire, chiefly for the supply of the London market, it having been found that the ordinary cider will not stand a voyage to the metropolis without some preparation. The finest quality of 'made' cider is simply ordinary cider racked into clean and well-sulphured casks; but the mass of that which is sent to London is mixed with water, treacle, and alum. The cider sold in London under the name of Devonshire cider, would be rejected even by the farmers' servants in that county.

Cider, Rai'sin. This is made in a similar way to raisin wine, but without employing sugar, and with only 2 lbs. of raisins to the gal., or even more, of water. It is usually fit for bottling in 10 days, and in a week longer is ready for use.

Ci'derkin. *Syn.* CIDER MOIL. See *above*.

CIDER SPIRIT. See BRANDY.

CIGAR'. *Syn.* SEGAR'; CIGARRE, Fr.; CIGARRO, Span. A small roll of tobacco-leaf used for smoking. The leaf is stalked or stripped of its midrib, and damped before it passes into the hands of the cigar-roller. The envelope or skin is cut from a smooth, unbroken leaf, and is quickly rolled round sufficient tobacco to form the inside. To secure the loose end of the envelope a small quantity of paste, coloured brown with chicory, is generally used. Only those who have had great practice can make cigars of a good shape. A full account of the manufacture of cigars does not come within the scope of this work. Although cigars of British make cannot compete in point of flavour with those manufactured in tobacco-growing countries, they have obtained a high degree of favour from the excellent manner in which they are made, and from their comparative cheapness. For information respecting the adulteration of cigars, and the influence of their use upon health, see TOBACCO.

CIGARS'. (In *pharmacy.*) *Syn.* MED'ICATED CIGARS, M. CIGARETTES'. The administration of medicinal agents in the form of cigars, is of recent introduction, and as yet, in only very limited use. The medicinal substance, if of a suitable description, as the leaves of plants, is made up into small rolls, like cheroots, and then smoked in the usual manner. In some cases, common cigars, or paper cigars (cigarettes), are medicated by moistening them in a preparation of the article to be administered. When the narcotic property of the tobacco would prove injurious, it is first exhausted by soaking and washing it in water.

Cigars, Aromat'ic. *Syn.* AROMATIC CIGARETTES; CIGARETT'Æ AROMAT'ICÆ, L.; CIGARETTES AROMATIQUES, Fr. Aromatic spices, lavender flowers, &c., made into cigarettes. Smoked for their odour; and in tooth-ache, face-ache, &c. See SCENTED CIGARS (*below*).

Cigars, Arsen'ical. *Syn.* CIGARR'Æ ARSENICA'LES, L. *Prep.* Dissolve arseniate of soda, 1 part, in water, 30 parts; dip white, unsized paper into the solution, and form it into small rolls, 3 or 4 inches long. *Used* in pulmonary consumption; 4 or 5 whiffs as many times a day.

Cigars, Balsam'ic. *Syn.* BALSAMIC CIGARETTES; CIGARR'Æ BALSAM'ICÆ, CIGARETT'Æ B., L. Thick, unsized paper is soaked in a solution of saltpetre, and dried; after which it is brushed over first with tincture of cascarilla, and when again nearly dry, with compound tincture of benzoin; in about half an hour, it is cut into pieces (1¼ × 4 inches), and rolled into cigarettes. *Used* in hoarseness, loss of voice, asthma, &c.

Cigars, Belladonn'a. *Syn.* BELLADONNA CIGARETTES; CIGARETT'Æ BELLADONN'Æ, L. *Prep.* 1. Belladonna leaves made into cigarettes of 1 dr. each.

2. (Compound—C. B. COMPOS'ITUM.) From belladonna leaves, 4 parts; moistened with tincture of opium (Ph. L.), 1 part; dried, and made into 1 dr. cigarettes, as before.

Used as an anodyne and antispasmodic, in

troublesome coughs, hooping-cough, toothache, sore throat, tic douloureux, &c.

Cigars, Cam'phor. *Syn.* CAMPHOR CIGARETTES; CIGARETT'Æ CAMPHO'RÆ, L.; CIGARETTES DE CAMPHRE, Fr. *Prep.* 1. Bibulous paper, moistened with 2 or 3 drops of essence of camphor, and rolled into cigarettes. For use, they are loosely placed in a tubular cigar-holder.

2. (Raspail.) These are made by loosely filling a quill or large straw with small fragments of camphor, closing the open end with a little cotton wool or bibulous paper, and piercing the closed end with a pin, to allow the passage of air.

Obs. Both the above are used unlighted, by drawing the air through them into the mouth, which then becomes very slightly charged with the vapour of camphor. In cold weather, the vaporisation is promoted by holding the cigarette for a few minutes in the warm hand. The homœopathists regard them as prophylactic of cholera, and the common people hold them to possess the same virtue in reference to contagious diseases generally, but especially typhus and scarlet fever. They should not be employed oftener than 3 or 4 times a day.

Cigars, Hen'bane. *Syn.* CIGARE'Æ HYOSCY'AMI, L. From henbane leaves, as directed under BELLADONNA CIGARS.

Cigars, Mercu''rial. *Syn.* CIGARE'Æ MERCURIA'LES, L. *Prep.* (Paul Bernard.) Ordinary cigars are deprived of their narcotic properties by soaking them in water, and are then wetted with a weak solution of corrosive sublimate, to which a little opium is generally added. The proportion may be, of corrosive sublimate, 1 gr.; rectified spirit, 20 drops; dissolve; add laudanum, 15 drops; with this solution, 6 cigars are to be equally moistened to within about 1½ inch of the mouth end, and then set aside to dry.

Used by persons afflicted with syphilitic affections of the throat and palate, as a convenient method of mercurial fumigation. For those accustomed to the use of tobacco, mild cigars, undeprived of their nicotine, may be employed for the purpose.

Cigars, Scent'ed. *Syn.* PERFU''MED CIGARS; CIGARE'Æ AROMAT'ICÆ, L. *Prep.* 1. By moistening ordinary cigars with a strong tincture of cascarilla, to which a little gum benzoin and storax may be added. Some persons add a small quantity of camphor, or of oil of cloves or cassia.

2. By soaking the tobacco, of which the cigars are to be made, or the cigars themselves, for a short time, in a very strong infusion of cascarilla, and then allowing them to dry by a very gentle heat.

3. By simply inserting very small shreds of cascarilla bark between the leaves of the cigar, or in small slits made for the purpose.

Obs. The above yield a very agreeable odour when smoked; but are said to intoxicate quicker than unprepared cigars of equal strength and quality. They lose much of their fragrance by age.

Cigars, Stramo''nium. *Syn.* DATU'RA CIGARS; CIGARRÆ STRAMO''NII, L. From the leaves of *Datura stramonium*, or preferably those of the eastern species, *Datura tatula*. See ASTHMA, DATURA.

CINCHONA.
CINCHONICINE.
CINCHONIDINE.
CINCHONINE.
} See QUINIA.

CINCHOVATINE. *Syn.* CINCHOVINE. See Appendix.

CINNAMEIN. $C_{16}H_{14}O_2$. *Syn.* OIL OF BALSAM OF PERU. A volatile oil existing in balsam of Peru.

CINNAMIC ACID. $HC_9H_7O_2$. A colourless, transparent, crystalline substance, obtained from oil of cinnamon, liquid storax, balsam of Peru, and balsam of tolu. It is freely dissolved by alcohol, but nearly insoluble in water. At 248° Fahr. it fuses, and at 560° Fahr. it sublimes unchanged. Distilled with dichromate of potassium and sulphuric acid, it is converted into benzoic acid. Its salts are called cinnamates.

CINNAMON. *Syn.* CINNAMON BARK; CINNAMOMI CORTEX (B. P.), L. The inner bark of shoots from the truncated stock of the *Cinnamomum Zeylanicum*, imported from Ceylon, and distinguished in commerce as Ceylon cinnamon. The best is obtained from branches about three years old.

Used in *medicine* as a carminative and astringent, chiefly as an adjuvant to other medicines, *e.g.* with chalk, in diarrhœa.

Dose. 10 to 20 grains.

Obs. Owing to the high price of this drug, it has become a general practice to substitute the bark of cassia (*Cassia; Cortex cinnamomi cassia*) for it, which so closely resembles it in flavour that the uninitiated regard them as the same. Cassia, however, is not only thicker and coarser than cinnamon, but its fracture is short and resinous, and its flavour is more biting and hot, whilst it lacks the peculiar sweetish taste of cinnamon. The thickness of cinnamon seldom exceeds that of good drawing paper.

CITRATE. A salt in which the hydrogen of citric acid is replaced by a metal or other basic radical.

CIT'RIC ACID. $H_3C_6H_5O_7$. *Syn.* ACID OF LEMONS, CONCRETE A. OF L.; AC'IDUM LIMO'NIS, ACIDUM CIT'RICUM (B.P.), L.; ACIDE CITRIQUE, Fr.; CITRONENSAÜRE, Ger. An acid peculiar to the vegetable kingdom. It is obtained in large quantity from the juice of lemons, and other fruits of the genus *Citrus*; it is found in gooseberries, currants, &c., in conjunction with malic acid.

Prep. The citric acid manufacture consists in separating it from the mucilage, sugar, and other foreign matter with which it is combined in the juice of lemons and limes.

1. (Ph. L. 1836,—Scheele's process.) Take of lemon juice, 4 pints; prepared chalk, 4½ oz.; diluted sulphuric acid, 27½ fl. oz.; distilled water, 2 pints. Add the chalk by degrees to the lemon juice, made hot, and mix well; set by, that the powder may subside, and, afterwards, pour off the supernatant liquor. Wash the precipitated citrate of lime frequently with warm water; then pour upon it the diluted sulphuric acid, mixed with the distilled water, and boil the whole for 15 minutes, in glass, stoneware, or lead; press the mixture strongly through a linen cloth, and filter it. Evaporate the filtered liquor with a gentle heat, and set it aside, that crystals may form. To obtain the crystals pure, dissolve them in water a second and a third time; filter each solution, evaporate, and set it apart to crystallise.

2. (Ph. L. 1851.) Merely placed in the materia medica.

3. (Ph. E. 1841.) Similar to that of Ph. L. 1836, except that the washed citrate of lime is ordered to be squeezed in a powerful press, and that the filtered solution of citric acid is ordered to be tested with nitrate of baryta, and if the precipitate is not nearly all soluble in nitric acid, to add a little citrate of lime to the whole liquor, till it stands this test.

4. (Ph. D. 1826.) Same as that of Ph. L. 1836.

5. (Ph. D. 1851.) Included in the materia medica.

6. (Dr. Price.) The crude juice is saturated with ammonia, potassa, or soda (carbonates), or with the ammoniacal product distilled from gas liquor; chalk 150 parts, or hydrate of lime, 90 parts, are then added for every 192 parts of citric acid contained in the liquor, and the whole stirred well together; heat is next applied, and the ammonia distilled into another quantity of lemon juice; the citrate of lime thus obtained is then decomposed with dilute sulphuric acid, and the whole process conducted as before. When potassa or soda is used, the distillation is omitted, and the expressed liquor, after filtration, used to decompose fresh lemon juice.

7. (Ordinary manufacturing process.) To crude lemon or lime juice, mixed with water, is added ground chalk; the precipitate is washed to free it from the impurities dissolved in the water, and afterwards decomposed by sulphuric acid. If the citric acid is not sufficiently white, it is decolorised by digestion with animal black.

Obs. If the lemon or lime juice be allowed to ferment a short time, the mucilage and other impurities will, to a certain extent, separate and subside. See *Concluding remarks.*

Prop., Uses, &c. Citric acid forms rhomboidal prisms, which are clear colourless, odourless, sour, and deliquescent in a moist atmosphere. It is an agreeable acid, at once cooling and antiseptic. It is much used in medicine as a substitute for lemon juice, and to form effervescing draughts, citrates, &c.

17 grs. citric acid, in crystals, or ½ fl. oz. of lemon juice,

are equivalent to

25 grs. bicarbonate of potash;
20 „ carbonate of potash;
15 „ carbonate of ammonia;
20 „ bicarbonate of soda;
35 „ carbonate of soda.

The bicarbonate of potassa is that generally preferred for making saline draughts with citric acid; and when flavoured with a little tincture of orange peel and simple syrup, or syrup of orange peel alone, it forms a most delicious effervescing beverage. Citric acid in pure crystals or in lime juice is much used by the calico-printer, being the best known 'resistant' for iron and alumina mordants.

Pur. Citric acid is frequently met with adulterated with tartaric acid; the fraud is easily detected by dissolving the acid in a little cold water, and adding to the solution a small quantity of acetate of potassa. If tartaric acid be present, a white, crystalline precipitate of cream of tartar will be produced on agitation. When pure, it is devoid of colour, is entirely, or almost entirely, decomposed by heat. It is soluble in water and in spirit, and what is thrown down from its watery solution by acetate of lead, is dissolved by nitric acid. No salt of potassium precipitates anything with citric acid except the tartrate. When a few drops of a solution of citric acid are added to lime water, a clear liquid results, which, when heated, deposits a white powder, soluble in acids without effervescence. By the action of nitric acid, citric acid is converted into oxalic acid.

Estim. See ACIDIMETRY and LIME JUICE.

Tests. See *above.*

Concluding remarks. The preparation of citric acid has now become an important branch of chemical manufacture, from the large consumption of this article in various operations in the arts. In conducting the different steps of the process some little expertness and care are, however, necessary to ensure success. The chalk employed, which should be dry, and in fine powder, is added to the juice, from a weighed sample, until the latter is perfectly neutralised, and the quantity consumed is exactly noted. The precipitated citrate of lime is next thoroughly washed with water, and the sulphuric acid, diluted with 6 or 8 times its weight of water, whilst still warm, is poured upon it, and thoroughly mixed with it. The agitation is occasionally renewed for 8 or 10 hours or longer, when the solution of citric acid is poured off, and the residuum of sulphate of lime thoroughly washed with warm water, the washings being added to the liquid acid. This last is then poured off from the impurities that may have been

deposited, and evaporated in a leaden boiler, over the naked fire, or by high-pressure steam, until it acquires the gravity of 1·13, when the process is continued, at a lower temperature, until a syrupy aspect is assumed, and a pellicle appears on the surface of the liquor. Without great care at this part of the process, the whole batch may be carbonised and spoiled. At this point the concentrated solution is emptied into warm and clean crystallising vessels, set in a dry apartment, where the thermometer does not fall below temperate. At the end of 4 days the crystals are found ready for removal from the pans. They are thoroughly drained, redissolved in as little water as possible, and after being allowed to stand for a few hours to deposit impurities, again evaporated and crystallised.

The acid of the second crystallisation is usually sufficiently pure for the market; when this is not the case, a third, or even a fourth crystallisation must be had recourse to. The mother-liquors from the several pans are now collected together, and a second or third crop of crystals obtained from them, by evaporation, as before.

A frequent cause of difficulty in obtaining crystals from the solutions, is the employment of too little sulphuric acid to decompose the whole of the citrate of lime; the consequence of which is, that a little of that salt is taken up by the free citric acid, and materially obstructs the crystallisation. 40 parts of dry sulphuric acid are required to decompose 50 parts of chalk. Commercial sulphuric acid (oil of vitriol) is usually of the sp. gr. of 1·845, and it therefore requires 49 lbs. of this acid for every 50 lbs. of chalk employed in the process. In practice, it is found that a very slight excess of sulphuric acid is preferable to a preponderance of undecomposed citrate of lime.

The first crop of crystals is called 'brown citric acid,' and is chiefly sold to the calico-printers. Sometimes a little nitric acid is added to the solution of the coloured crystals, for the purpose of whitening them, but in this way a minute quantity of oxalic acid is formed. A more general plan is to bleach the citrate of lime, by exposing it in shallow vessels to the sun's rays, covered with a weak solution of chloride of lime, and to re-wash it before decomposing it with the sulphuric acid. A safer plan is to dissolve the crude citric acid, digest with animal charcoal, and again concentrate the solution to the crystallising point.

Good lemon juice yields about 6½% of crystallised lemon acid; 2 galls. yield fully 1 lb. of crystals. See LEMON JUICE, LIME JUICE, &c.

CIT'RON. The fruit of the citron tree (*Citrus medica*) is acidulous, antiseptic, and antiscorbutic; it excites the appetite, and stops vomiting; and, like lemon juice, has been greatly extolled in chronic rheumatism, gout, and scurvy. Mixed with cordials, it is used as an antidote to the manchineel poison.

Citron, Oil of. See OIL.

Citron Peel. This is prepared in the same way as candied orange and lemon peel, which it for the most part resembles.

Citron. *Syn.* LEM'ON COLOUR. The term applied to a pale and delicate shade of yellow. See YELLOW DYES, &c.

CIT'RONELLE. See LIQUEURS and OILS (Lemon-grass).

CITRUS. A genus of plants belonging to the natural order *Aurantiaceæ*, the species of which yield useful fruits. From *Citrus Aurantium*, and its varieties, all the various descriptions of sweet oranges are obtained. The species *C. Bigaradia* or *vulgaris* yields the bitter or Seville orange; *C. Limonum*, and its varieties, yield the lemons; *C. Limetta* is the source of the lime; *C. medica*, of the citron; *C. Decumana*, of the shaddock; *C. paradisi*, of the forbidden fruit; *C. Pampelmos*, of the Pampelmoose; and *C. japonica*, of the kumquat.

Citrus Bergamia. (Ind. Ph.) *Syn.* THE LIME TREE. *Habitat.* Commonly cultivated in India and other tropical countries.—*Officinal part.* The fruit (*lime*) closely resembles the lemon, but is smaller, with a smoother, thinner rind, and of somewhat less fragrant odour. Its juice (*lime juice*) has the same pungent acid taste, and contains the same ingredients, as lemon juice, though in somewhat different proportions, that of the citric acid being larger, and that of the mucilage less in quantity. Much of the article imported into England under the name of lemon juice is obtained from the lime.—*Properties and Uses.* Very similar to those of the lemon, the juice being equally refrigerant and antiscorbutic; indeed, it is preferred by many tropical practitioners. The fresh juice of the lime is procurable in almost every portion of the tropics, and is considered more effectual than preserved lemon juice.

Lime juice may be advantageously employed in the manufacture of citric acid, the proportion of this acid being larger than in lemon juice.

CIV'ET. *Syn.* CIVET'TA, ZYBETH'UM, L. A perfume, obtained from the civet cat (*Viverra civetta*,—Linn.), a fierce, carnivorous quadruped, somewhat resembling a fox, found in China and the East and West Indies. The civet is secreted in a sort of pouch between the anus and the sexual organs. "Several of these animals have been brought into Holland, and afford a considerable branch of commerce, especially at Amsterdam. The civet is squeezed out in summer every other day, in winter twice a week; the quantity procured at once is from 2 scruples to 1 drachm or more."

Civet is frequently adulterated with spermaceti and butter, and a similar substance to civet, but of a darker colour, obtained from the polecat. When pure it has an odour intermediate between that of musk and am-

bergris, but less refined; a pale-yellow colour; an acrid taste; and the consistence of honey. It is used in perfumery.

CLAIRET. See LIQUEUR.

CLAR'ET RAGS. *Syn.* TOURNESOL EN DRAPEAU, Fr.; BEZET'TA CŒRU'LEA, L. 1. Pieces of clean linen coloured with Auvergne —or ground archil.

2. Pieces of linen dipped into the juice of mulberries, blood-red grapes, lees of red wine, &c. *Used* to colour jellies, confectionery, the rind of cheeses, &c.

CARIFICA'TION. The act of clearing or making bright; commonly applied to the process of 'clearing' or 'fining' liquids by chemical means, instead of by filtration. The substances used for this purpose are popularly known as 'clarifiers' or 'finings.'

The substances employed in the clarification of liquids, operate by either mechanically embracing the feculous matter, and subsiding with it to the bottom of the vessel, or by inducing such a change in its nature or bulk that it subsides by its own density, in each case, leaving the liquor transparent. Albumen, gelatin, the acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used, under the form of white of egg, for the clarification of syrups, as it combines with the liquid when cold, but on the application of heat rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and liqueurs, particularly the red wines and more limpid cordials. Gelatin, under the form of isinglass, dissolved in water or weak vinegar, is used to fine white wines, beer, cider, and similar liquors that contain a sufficient quantity of either spirit or astringency (*tannin*), to induce its precipitation. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg or gelatin, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled manufacturers, of using certain salts of lead and potassa to clear their liquors; especially those that are expected to sparkle in the glass, as 'cordial gin,' &c. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards a little more than ½ its weight of sulphate of potassa, also dissolved in water, is added, and the liquor is again 'roused' up. By standing, the sulphate of lead, formed by this mixture, subsides, and leaves the liquor clear. Bullock's blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, the acids, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts, partly like the above, and partly like albumen, or gelatin, by enveloping and forcing down the suspended matter. Sand is often sifted over liquors (especially cordials and syrups), for the simple purpose of acting by its gravity, but appears to be quite useless, as it sinks too rapidly. The juices of plants are clarified by heat, which coagulates the albumen they contain. Marl or clay is frequently used to clear cider and perry. A strip of isinglass is generally employed to clarify coffee. See WINE, BREWING, CORDIAL, COFFEE, FININGS, INFUSION, &c.

CLAY. Clay is formed from the disintegration of felspathic rocks, by the combined action of air and water. Its plasticity, when moist, and its capability of being made hard by heat, are properties which render it available for many useful purposes. The purest kind of clay is kaolin, or China clay, which consists almost entirely of silicate of aluminum. It is found in China; but a precisely similar substance is obtained from deposits in Cornwall and some parts of France. Pipe clay, a white clay nearly free from iron, is found in large quantity in the island of Purbeck. Potter's clay is found in many parts of Britain; that of Devonshire and Dorsetshire is much valued. Brick clay contains varying proportions of iron; hence the different colours of the bricks used in different counties. See ALUMINIUM, FULLER'S-EARTH, OCHRE, &c.

CLEAN'ING. In domestic economy, the best way to clean a house is to keep it clean by a daily attention to small things, and not allow it to get into such a state of dirtiness and disorder as to require great and periodical cleanings. Some mistresses, and also some servants, seem to have an idea that a house should undergo regular cleanings, or great washing and scrubbing matches, once every three or six months, on which occasions the house is turned almost inside out, and made most uncomfortable. All this is bad economy, and indicates general slovenliness of habits. (Chambers.) For hints upon cleaning, see CARPETS, CLOTHES, &c.

CLEAN'LINESS. See ABLUTION, BATHING, and SICKNESS.

CLOTHES. Economy and cleanliness require due attention to be paid to every article of clothing, but more especially to those which are the most exposed to dirt and the weather. The following remarks, having reference chiefly to woollen articles, may prove useful to the reader:—If very dusty, hang them on a horse or line, and gently beat them with a cane; then lay them on a clean board or table and well brush them, first with a stiff brush, to remove the spots of mud and the coarsest of the dirt, and next with a softer one, to remove the dust and to lay the nap properly. If clothes are wet and spotted with dirt, dry them before brushing them, and then rub out spots with the hands. The hard brush should be used as little as possible, and then with a light hand, as it will, if

roughly and constantly employed, soon render the cloth threadbare. Spots of tallow-grease on the clothes may be taken off with the nail, or, if that cannot be done, have a hot iron with some thick brown paper, lay the paper on the part where the grease is, then put the iron upon the spot; if the grease comes through the paper, put on another piece, till it ceases to soil it. Moths may be prevented attacking clothes, by putting a few cloves or allspice into the box or closet with them. See CLOTHES BALLS, SCOURING, &c.

CLO'THING. In our changeable climate great care should be taken to clothe the body effectually; for when the skin is chilled, the blood is determined in increased and injurious quantity to the internal organs, causing colds and inflammations. The ordinary materials for clothing are cotton, linen, woollen, and silk. Cotton is generally employed for under-garments, for which its softness and warmth render it well adapted. Linen is not nearly so warm, but it keeps its colour better; it is more expensive, and although it wears much longer, it is not so economical as cotton. Woollen garments are, in cold and variable climates, almost essential to comfort; the warmth obtained by wearing flannel next the body is very beneficial, and the slight stimulating effect arising from its roughness tends to keep the skin in healthy action.

CLOVE. *Syn.* CARYOPH'YLLUM (B. P.), L. The flower-buds of the *Caryophyllus aromaticus* (Linn.), or clove tree, collected before they open, dried, and smoked. Cloves are aromatic, stimulant, carminative, and stomachic; and according to some, possess febrifuge properties. They are chiefly used as an adjuvant in compound medicines. A few cloves kept in a closet or box prevent moths or mould attacking furs, woollens, &c.

It is a common practice to adulterate this spice in the same manner as cinchona bark. Cloves from which the oil has been distilled, are dried and rubbed between the hands, previously moistened with a little sweet oil, to brighten their colour, after which they are mixed up with fresh spice for sale.

Cloves, Mother of. The unripe fruit of the clove tree; they are frequently imported preserved (preserved mother of cloves), and are reputed stomachic and antispasmodic.

Cloves, Oil of. *Syn.* O'LEUM CARYOPH'YLLI (B. P.), L. This possesses similar virtues to the unexpanded flower-buds, and is esteemed as a remedy for the tooth-ache. *Used* to flavour liqueurs and confectionery.

CLYSTERS. See ENEMAS.

COAL. The varieties of this valuable substance may be conveniently described under the three heads ANTHRACITE, LIGNITE, and PIT-COAL (which *see*). See also FUEL.

CO'BALT. Co. *Syn.* REG'ULUS OF COBALT; COBALT'UM, L. A metal discovered by Brandt, in 1733. It generally occurs in the same ore as nickel, and the separation of the two metals is a task requiring great patience and expertness. Speiss cobalt and cobalt glance are the ores from which the metal is commonly extracted.

Prep. 1. Dissolve oxide of cobalt in hydrochloric acid, and pass sulphuretted hydrogen gas through the solution, until all the arsenic is thrown down; filter, and boil with a little nitric acid, then add carbonate of potassium, in excess, and digest the precipitate in a solution of oxalic acid, to remove any oxide of iron; wash and dry the residuum (oxalate of cobalt), and expose it to great heat, in a covered crucible lined with charcoal; the product is pure metallic cobalt.

2. Mix equal parts of oxide of cobalt or roasted Cornish cobalt ore, and soft soap, and expose them to a violent heat in a covered crucible.

3. Pass hydrogen gas over oxide of cobalt strongly heated in a porcelain tube.

Prop., Use, &c. Cobalt is a white, brittle metal; unchanged in the air; feebly acted on by dilute hydrochloric and sulphuric acids; has a high melting-point, and is strongly magnetic; sp. gr. 8·5. It is seldom employed in the metallic state, from the great difficulty of reducing its ores, but its oxide (black oxide) is largely employed in the arts. It forms salts with the acids, which are interesting from the remarkable changes of colour which they exhibit. See INK, SMALT, ZAFFRE, and *below*.

Char., Tests. Solutions of the salts of cobalt are known as follows:—1. Ammonia gives a blue precipitate, slightly soluble in excess, giving a brownish-red colour.—2. Potassa gives a blue precipitate, turning to violet and red when the solution is heated.—3. Carbonate of ammonium and carbonate of sodium give pink precipitates; that from the former is soluble in excess.—4. Cyanide of potassium gives a yellowish-brown precipitate, soluble in excess; and the clear solution, after being boiled, is unaffected when mixed with hydrochloric acid.—5. Sulphuretted hydrogen produces no change in acid solutions.—6. Sulphydrate of ammonium gives a black precipitate in neutral solutions.—7. Melted with borax, before the blowpipe, it gives a head of a magnificent blue colour, almost verging on black, if much is present. Phosphate of sodium and ammonium give a similar bead; but the colour is less intense.

Cobalt, Ac'etate of. $Co(C_2H_3O_2)_2$. *Prep.* From the carbonate or protoxide and acetic acid. It forms a sympathetic ink which turns blue when heated.

Cobalt, Car'bonate of. $CoCO_3$. *Prep.* By adding an alkaline carbonate to a solution of the nitrate or sulphate. A pale peach-coloured powder, soluble in acids. It contains some hydrate.

Cobalt, Chlo"ride of. $CoCl_2$. *Syn.* HYDROCHLO"RATE OF C., MU"RIATE OF C. *Prep.* By dissolving the carbonate or protoxide in hydrochloric acid; the solution deposits deep

duced which is capable of forming an emulsion with boiling water. The following are the principal varieties of the so-called soluble cocoa:—

1. Cocoa, Granulated. From cocoa nibs and sufficient sugar and arrow-root to keep the fatty particles from forming a pasty mass. As it is impossible to granulate the nibs without the admixture of some other substance, those makers who declare that their granulated cocoas are perfectly pure do not act honestly towards their customers.

2. Cocoa, Homœopathic. A kind of soluble cocoa prepared with arrow-root, but without sugar.

3. Cocoa, Iceland-moss. From cocoa and Iceland moss, freed from its bitter principle, cetrarine. This form of cocoa was introduced by Messrs. Dunn and Hewett, and is said to form a very valuable article of diet for invalids.

4. Cocoa, Maravilla. This is stated to be "the perfection of prepared cocoa." It consists of cocoa, sugar, and sago flour, the last two being in great excess.

5. Cocoa, Caraccas. This is similar to the last, being a mixture of cocoa, sugar, and sago flour. The cocoa used in its manufacture is said to be imported from the Caraccas, on the north coast of South America, and to possess a peculiarly delicious flavour.

The amount of flour or starch in these so-called soluble cocoas frequently exceed 40 per cent., and the amount of sugar 20 per cent. They have been, not inaptly, called "soups."

Within the past year or two a new variety of soluble cocoa has been brought into the market. It is sold under various names, thus, 'Theobromine, or Concentrated Cocoa, 'Cocoa Essence,' 'Cocoatina,' &c. We have examined many of these varieties, and find them to consist of pure cocoa deprived of about two thirds of its fat. It appears very suitable for people of weak digestion.

Obs. No warm drink that we take approaches cocoa in its nutritive character, because, while performing to a certain extent the exhilarating work of coffee or tea, it presents to the stomach a very considerable quantity of nitrogenous and carbonaceous matter; this advantage is partly due to the fact that cocoa is taken in the form of an emulsion, instead of an infusion or decoction.

Cocoa for the table is readily prepared from the soluble varieties by simply pouring boiling water upon the powder. From cocoa nibs, or flaked cocoa, the beverage is prepared by first pouring boiling water upon them, and then allowing the mass to simmer from 4 to 6 hours. The cocoa must on no account be allowed to boil, for in that case a coagulum will be formed, which cannot be dissolved in water.

COCOA-NUT OIL. A species of vegetable butter obtained from the common cocoa nut—the fruit of *Cocos nucifera*, the cocoa palm. It is separated from the dried kernel by hydraulic pressure. It contains olein, and a solid fat often used as a candle material. Large plantations of the cocoa palm, connected with Price's candle company, exist in Ceylon. Cocoa-nut oil is often confounded with cocoa- or cacao-butter, which is the produce of a very different plant, namely, *Theobroma cacao*. See Cocinic Acid, Cocoa, Stearic Acid, &c.

COD. *Syn.* Ga'dus Mor'rhua (Ph. L.), Mor'rhuavulgaris (Linn.), Asel'lus (Pliny), L. A fish common in the seas of the northern hemisphere, from about 40° to 75° of latitude. The flesh forms a most wholesome and excellent article of food. The best fish are very thick about the neck; and, when fresh, are marked by the redness of the gills, freshness of the eyes, and the whiteness and firmness of the flesh. The fish so largely imported from Newfoundland (Newfoundland fish) are cod, beheaded, split open, gutted, and salted. They are caught by millions on the 'Grand Bank.' Cod-sounds are pickled in brine and also made into isinglass. The spawn is made into caviare, and the liver is both pressed and boiled for its oil (see *below*).

Cod is generally cooked by boiling it, but is sometimes baked, or cut into slices and broiled or fried. Cod's head and shoulders with oyster sauce is a favorite dish. Shrimp and anchovy sauce are also good additions.

COD-LIVER OIL. *Syn.* Mor'rhuæ o'leum, B. P.; O'leum jecor'is Asel'li, L.; Huile de Morue, Fr. The oil obtained from the liver of the common cod (*oleum e jecore comparatum*).

Prep. 1. The livers being removed from the fish, are piled on layers of fir-twigs placed in tubs perforated at the bottom, and are allowed to remain for a considerable time exposed to the sun and air. As the livers putrefy, the oil runs out and flows through the holes in the tubs into vessels placed to receive it.

2. The partially decomposed livers, cut into pieces, are heated in iron pots without water, and the oil is poured off and set aside to deposit impurities.

3. (Savory.) The livers taken from the fresh fish are carefully washed. The large veins are then divided through their whole length, and any blood in them is carefully rinsed away. The livers are now cut into pieces, again washed and drained, and afterwards placed with a small quantity of water in vessels gently heated by steam. As the heat increases, the oil separates and rises to the surface, from which it is skimmed off; and after well cooling, to allow the deposit of some of the margarine, it is repeatedly filtered through flannel bags and finally through paper. This process gives a fine, clear, straw-coloured oil, having but a slight smell and taste.

4. (Donovan.) The perfectly fresh livers are

placed in a metallic vessel and heated with constant stirring to 180° Fahr., by which treatment they break down into a uniform pulpy, liquid mass. This mass is immediately transferred to calico bags, whence the oil drains out; after filtration, while still warm, this oil is sufficiently pure for use.

Obs. Three kinds of cod-liver oil are usually distinguished—the pale yellow, pale brown, and dark brown. The latter is the most impure; its odour and taste are extremely disagreeable. The most conflicting opinions have been expressed by medical men as to the relative value of the light-brown and yellow varieties. Ozonised cod-liver oil is said to be prepared by passing oxygen into the oil, and then exposing it to sunlight. Dr. Letheby has applied the most delicate tests to this much-vaunted remedy, but has not been able to detect the slightest trace of ozone.

Prop. and Uses. Cod-liver oil has acquired much reputation for its remedial powers in pulmonary consumption, scrofulous and other glandular affections, chronic gout and rheumatism, certain skin diseases, and several other ailments. It is generally supposed that the iodine and bromine, which are present in minute quantities in this fish, are the substances to which it owes its efficacy. "Dr. De Jongh refers its virtues to the presence of both iodine and the elements of the bile. Our own researches lead us to infer, that one of its most active constituents is free phosphorus. Good cod-liver oil contains fully ·02 of this substance, as well as about ·09 of phosphoric acid. Now, the marked action of minute doses of phosphorus on the nervous, vascular, and secreting organs, is well known to every experienced surgeon. The difficulty, however, of bringing it into a form adapted for administration, has hitherto prevented phosphorus being extensively employed as a therapeutic agent. This obstacle is removed by the employment of cod-liver oil. Nature has here provided a simple remedy, which the ingenuity of man has failed to produce artificially. This opinion is borne out by the facts, that cod-liver oil cures those forms of scrofula and other diseases which do not yield to iodine, and that those varieties of the oil are the most active which contain the most free phosphorus. We, therefore, think it reasonable to conclude, that the efficacy of cod-liver oil depends on the joint action of the minute quantities of iodine, phosphorus, and the elements of the bile, which it contains, and not on any one separately; and that no substance, at present known, can be used as a substitute for it." (Cooley.)—*Dose.* 1 to 8 drms., on water, syrup, or orange juice; or made into an emulsion with 1 fl. oz. of peppermint water.

CODEIA. $C_{18}H_{21}O_3$. Aq. *Syn.* CODE'INE. An alkaloid discovered by Robiquet associated with morphia.

Prep. Dissolve commercial hydrochlorate of morphia in water, and precipitate the morphia with ammonia. Codeia is left in solution, and is obtained in octahedral crystals by spontaneous evaporation. It may be further purified by solution in ether. By the addition of a little water to the ethereal solution, and spontaneous evaporation, it may be obtained quite pure and in a crystalline state.

Obs. The morphia may be recovered by digesting the precipitate in weak solution of potassa.

Prop., &c. Freely soluble in alcohol and ether; soluble in 80 parts of cold and 17 parts of boiling water. Its solution in the latter, by slow evaporation, yields large, transparent octahedra. With the acids it forms crystallisable salts. These possess the singular property of producing a general and violent itching of the surface of the body when administered internally. The same symptoms frequently follow the exhibition of opium and hydrochlorate of morphia, and are referred to the presence of codeia. The commercial muriate of morphia frequently contains 3% to 4% of codeia.

Tests. It is distinguished from morphia by not becoming blue on the addition of sesquichloride of iron, nor turning red with nitric acid; and by not being precipitated by ammonia, when dissolved in hydrochloric acid and mixed with a large quantity of water. Unlike morphia, it is insoluble in weak solution of potassa, and is soluble in ether. The salts of codeia are known by tincture of galls throwing down a copious precipitate from their solutions; this does not occur with the salts of morphia. It is distinguished from meconia by its aqueous solution showing an alkaline reaction with test-paper.

COFFEE. The seeds or berries of the *Coffea arabica* (Linn.) or coffee plant; a shrub of the natural order *Cinchonaceæ*, sub-order *Coffeæ*, indigenous in the low mountainous districts of Arabia Felix, and largely cultivated in various other parts of the world. About 40 millions of pounds of coffee are annually consumed in this country, and the consumption for the whole world has been estimated at about 600 millions of pounds. The seeds are roasted and ground, and used in the form of a decoction or infusion. The term coffee is applied to the prepared beverage as well as to the seeds. The valuable properties of coffee are mainly due to the presence of the alkaloid CAFFEIA or CAFFEINE.

Prep., &c. The finest kind of coffee is that called mocha, from Aden, but that in common use is principally supplied from the British plantations in the West Indies. The selection being made, the berries are carefully roasted in revolving cylinders by a gradually applied heat, until the aroma is well developed, and the toughness destroyed. Too much heat is avoided, as the volatile and aromatic properties of the coffee, and, consequently, the flavour, are thereby injured; whilst, on the other hand, if the berries are roasted too

little, they produce a beverage with a raw, green taste, very liable to induce sickness and vomiting. When properly roasted, coffee has a lively chocolate-brown colour, and should not have lost more than 18% of its weight by the process. If the loss exceeds 20%, the flavour suffers in proportion. The roasted coffee should be placed in a very dry situation, and excluded from the air as soon as possible. It loses flavour by keeping, and also powerfully absorbs moisture from the atmosphere by reason of its hygrometric power.

Qual., &c. Coffee promotes digestion, and exhilarates the spirits, and when strong, generally occasions watchfulness, but in some phlegmatic constitutions induces sleep. Drunk in moderation, especially if combined with sugar and milk, it is perhaps the most wholesome beverage known. The various qualities that have been ascribed to it by some persons, such as dispelling or causing flatulency, removing dizziness of the head, attenuating the blood, causing biliousness, &c., appear to be wholly imaginary. In a medical point of view, it has been regarded as a cerebral stimulant and anti-soporific, and as a corrector of opium. As a medicine, it should be strong, and is best taken only lukewarm.

Adult., &c. The principal substances used for the purposes of adulteration, are caramel, roasted chicory, roasted locust beans, roasted corn, &c. Chicory being now charged with the same amount of duty as coffee, is not considered, in a revenue point of view, an adulteration; nevertheless, when we contrast coffee with chicory, we at once see the vast superiority of the former over the latter, thus:—

Coffee is the fruit of a tree, whilst chicory is the root of an herbaceous plant, and it is well known that more virtues exist in fruits and seeds than in roots.

Coffee contains three active principles, viz. an essential oil, caffeia, and tannic acid, and these exercise a powerful influence on the system, retarding the waste of the tissues of the body, exciting the brain to increased activity, and exhilarating without intoxicating. Chicory contains none of these constituents.

Coffee exerts on the system highly beneficial physiological effects; chicory possesses medicinal properties, which are not desirable in an article of food.

Chicory, therefore, is very objectionable, and when a dealer sells a mixture of coffee and chicory for pure coffee, as is almost invariably the case, he is guilty of selling an adulterated article, and ought to be punished accordingly.

The adulteration with caramel or chicory may readily be detected as follows:—

1. A spoonful of pure coffee placed gently on the surface of a glass of cold water will float for some time, and scarcely colour the liquid; if it contains caramel or chicory, it will rapidly absorb the water, and, sinking to the bottom of the glass, communicate a deep reddish-brown tint as it falls. Another method of applying this test is by expertly shaking a spoonful of the suspected coffee with a wine-glassful of cold water, and then placing the glass upon the table. If it is pure, it will rise to the surface, and scarcely colour the liquid, but if caramel or chicory is present, it will sink to the bottom, and the water will be tinged of a deep red, as before.

2. The brown colour of decoction or infusion of roasted coffee becomes greenish when treated with a per-salt of iron; and a brownish-green, flocculent precipitate is formed. The colour of chicory is only deepened, but not otherwise altered, and no precipitate is formed, under the same treatment. A mixture of chicory and coffee retains a brownish-yellow colour after the precipitate has subsided, and the liquid appears brownish-yellow by refracted light. The addition of a little weak ammonia water aids the subsidence of the precipitate.

3. Under the microscope, the presence of chicory may be readily detected by the size, form, and ready separation of the cells of the cellular tissue, and by the presence and abundance of the pitted tissue or dotted ducts, which are absent from coffee, and by the size of the spiral vessels, which are very small in coffee. The most characteristic structure, however, and that by which chicory can be easily identified, is the lacticiferous tissue. Roasted corn, and other amylaceous substances, may also be detected, in the same way, by the peculiar size and character of their starch grains.

Roasted corn, beans, &c., may be detected by the cold decoction striking a blue colour with tincture of iodine. Pure coffee is merely deepened a little in colour by this substance.

Obs. A few years ago the attention of the scientific world was drawn to the value of roasted coffee leaves, as furnishing materials for a beverage unexcelled in excellence by the coffee berry itself. It appears that the leaves, prepared for use, may be purchased for 1½*d.* per lb., or packed ready for export at 2*d.* per lb. "That this preparation contains a considerable amount of the nutritious principles of coffee is evident from the analysis; but as the leaves can only be collected in a good state at the expense of the coffee-bush, it is doubtful whether the coffees produced by the berries be not, after all, the cheapest, as it certainly is the best." (Jury Report, Exhibition, 1851.) Coffee for the table is best prepared with the aid of a French cafetière, or coffee biggin, furnished with a percolator or strainer, which will permit a moderately rapid filtration. To produce this beverage in perfection, it is necessary to employ the best materials in its preparation—fresh roasted and fresh ground. "At least 1 oz. of coffee should be used to make 3 common-sized coffee-cupfuls, with 1 teaspoonful of freshly roasted and ground

chicory. If desired strong, the quantity of both should be doubled." (Cooley.) Many habitual coffee drinkers cannot tolerate the use of chicory, which is a doubtful improver of coffee. The prevailing fault of the coffee made in England is its want of strength and flavour. The coffee-pot should be heated previously to putting in the coffee, which may be done by means of a little boiling water. The common practice of boiling coffee is quite unnecessary, for all its flavour and aroma is readily extracted by boiling hot water. Indeed, all the "useful and agreeable matter in coffee is very soluble; it comes off with the first waters of infusion, and needs no boiling." (Ure.) Should prejudice, however, induce the housewife or cook to boil her coffee, it should be only just simmered for a minute, as long or violent boiling injures it considerably.

When coffee is prepared in a common pot, the latter being first made hot, the boiling water should be poured over the powder, and not, as is commonly the plan, put in first. It should then be kept stirred for 4 or 5 minutes, when a cup should be poured out and returned again, and this operation repeated 3 or 4 times, after which, if allowed to repose for a few minutes, it will generally become fine of itself. In all cases, when a percolator is not used, the liquor should be well stirred up several times before finally covering it up to settle for use.

Coffee is sometimes clarified by adding a shred of isinglass, a small piece of clean eel- or sole-skin, or a spoonful of white of egg. An excellent plan, common in France, is to place the vessel containing the made coffee upon the hearth, and to sprinkle over its surface half a cupful of cold water, which from its greater gravity descends, and carries the 'foulness' with it. Another plan sometimes adopted is to wrap a cloth, previously dipped into cold water, round the coffee-pot. This method is commonly practised by the Arabians in the neighbourhood of Yemen and Moka, and rapidly clarifies the liquor, unless a very large quantity of chicory is present. It should be recollected that the use of isinglass, white of egg, and all like artificial finings, remove much of the astringency and vivacity of the liquor.

The French, who are remarkable for the superior quality of their coffee, generally allow an ounce to each large coffee-cupful of water, and they use the coffee both newly ground and freshly roasted. A shred of saffron, or a little vanilla, is frequently added, whilst the percolating coffee-pot is generally employed. When the Parisian uses a common coffee-pot, he generally divides the water into 2 parts. The first portion he pours on boiling hot, and allows it to [illegible] for 4 or 5 minutes; he then pours this [illegible] as clear as possible, and boils the grounds [illegible] or 3 minutes with the remaining half of [illegible]er. As soon as this has deposited the [illegible], it is decanted, and mixed with the [illegible]. The object of this process is to obtain the whole of the strength as well as the flavour. The infusion is thought to contain the latter, and the decoction the former; a plausible, but erroneous idea, since both of them were carried off by the first water.

A much better method, and one we can recommend from experience, is to divide the coffee into 2 parts. Boil the first portion in the coffee-pot, for 4 or 5 minutes, then add the other portion, and allow it to infuse slowly for about 10 minutes, the coffee-pot lid being kept well closed. This gives a coffee possessing a flavour which even the French cannot excel.

Coffee, Essence of. A highly concentrated infusion of coffee, prepared by percolation with boiling water, gently and quickly evaporated to about ⅓rd or ¼th of its bulk, and mixed with a thick aqueous extract of chicory and syrup of burnt sugar, so as to give the whole the consistence of treacle. The proportions of the dry ingredients should be—coffee, 4 parts; chicory, 2 parts; burnt sugar (caramel), 1 part. It should be kept in well-corked bottles in a cool place. This preparation is very convenient for making extemporaneous coffee; but the beverage so made, though superior to much of that sold at coffee-houses, is inferior in flavour, aroma, and piquancy, to that we are accustomed to drink at home. Much of the so-called 'Essence of Coffee' is simply treacle and burnt sugar, flavoured with coffee.

Coffee, Searle's Patent. This is prepared by mixing condensed milk with a very concentrated essence of coffee and evaporating at a low temperature (*in vacuo*, if possible), until the mixture acquires the consistence of a syrup (coffee syrup), paste (coffee paste), or candy (coffee candy). The last may be powdered (coffee powder, dry essence of coffee).

Coffee, Substitutes for. These are numerous, but are now seldom employed, owing to the cheapness of the genuine article, and the stringency of the revenue laws. Among the principal are the following:—

1. COFFEE, ACORN. From acorns deprived of their shells, husked, dried, and roasted.

2. COFFEE, BEAN. Horse-beans roasted along with a little honey or sugar.

3. COFFEE, BEET-ROOT. From the yellow beet-root, sliced, dried in a kiln or oven, and ground with a little coffee.

4. COFFEE, DANDELION. From dandelion roots, sliced, dried, roasted, and ground with a little caramel.

5. COFFEE, GERMAN. *Syn.* SUCCORY C., CHICORY C. From chicory or succory. *Used* both for foreign coffee, and to adulterate it.

Obs. All the above are roasted, before grinding them, with a little fat or lard. Those which are larger than coffee-berries are cut into small slices before being roasted. They possess none of the exhilarating properties or medicinal virtues of foreign coffee.

COINS. See MEDALS and ELECTROTYPING.

COKE. Charred or carbonised coal. The principle of its manufacture is similar to that

of charcoal. There are three varieties of coke:—

1. KILN-MADE COKE; STIFLED COKE. Made by burning pit-coal in a pile, kiln, or stove. It has a dull-black colour, and produces an intense heat when used as fuel. By condensing the bituminous vapours which are given off during the process, about 3% of tar may be obtained from common coal, and from some strong coal, by careful treatment, fully 10% of its weight. The screenings, or dust coal, separated from the better kinds of bituminous coal, is the sort commonly used for making coke in ovens.

2. GAS COKE; DISTILLED COKE. The cinder left in the gas-retorts. Gray; produces a weak heat, insufficient to smelt iron.

3. SHALE COKE; MINERAL CARBON. From bituminous shale, burned in covered iron pots, in a similar way to that adopted for making bone-black; or in piles. Black and friable. *Used* to clarify liquids, but is vastly inferior to bone-black, and does not abstract the lime from syrups. See FUEL, PIT-COAL, &c.

COLCHICIN'A. *Syn.* COL'CHICINE, COLCHI'CIA. A peculiar principle discovered by Gieger and Hesse in the seeds of the *Colchicum autumnale* or common meadow saffron. It also exists in the corms or bulbs.

Prep. Macerate the bruised seeds in boiling alcohol, add magnesia, to throw down the alkaloid, digest the precipitate in boiling alcohol, and filter. By cautious evaporation colchicine will be deposited, and may be purified by re-solution and crystallisation in alcohol.

Prop., &c. Odourless; bitter; soluble in water and alcohol; forms salts with the acids. It is very poisonous. $\frac{1}{10}$th of a grain, dissolved in spirit, killed a cat in 12 hours. It differs from veratria in being soluble in water and crystalline, and in the non-production of sneezing when cautiously applied to the nose. Strong oil of vitriol turns this alkaloid of a yellowish-brown; nitric acid turns it of a deep violet, passing into indigo-blue, green, and yellow. It is not used in medicine.

COL'CHICUM. *Syn.* MEA'DOW SAF'FRON; COLCHICUM AUTUMNALE (Linn.), L. The recent and dried corms or bulbs (*colchici cormus*), as well as the seeds (*colchici semina*), are official in the British Pharmacopœia. The corms are ordered to be dug up in the month of July, or before the autumnal bud has projected. The dry coatings having been torn off, cut the cormus transversely in thin slices, and dry, at first with a gentle heat, but afterwards slowly increased to 150° Fahr.

Dose (of the corms), 2 to 8 or 9 grs.; (of the seeds), 2 to 7 grs., made into a pill or bolus with syrup or conserve; chiefly, as a specific in gout, to alleviate or check the paroxysm. This drug forms the base of almost all the advertised gout nostrums. It is, however, an active poison, and its administration requires care. "After all that has been said respecting colchicum in gout, and admitting that it rarely fails to allay pain and check a paroxysm, I would record my opinion that he who would wish to arrive at a good old age, should eschew it as an *ordinary* remedy, and consider that he is drawing on his constitution for a temporary relief, with a certainty of becoming prematurely bankrupt in his vital energies." (Collier.)

COL'COTHAR. See OXIDES OF IRON.

COLD. *Syn.* FRI'GUS, L. The privation of heat. The term is also applied to the sensation and effects which this privation produces.

When the body of an animal is immersed in an atmosphere at a temperature below the healthy standard, a sensation of coldness is experienced, produced by the passage of the caloric or heat of the body into the colder medium. If this abstraction of caloric exceeds the quantity produced by the vital system, the temperature of the body decreases, until it sinks below the point at which the functions of life can be performed. This declination of the heat of the body is gradual; the extreme sensation of coldness changes into a disinclination for voluntary motion; next comes drowsiness, followed by numbness and insensibility. At this point, if the sufferer is not rescued, and remedial measures had recourse to, death inevitably and rapidly ensues.

The prevention of the effects of cold consists in the use of ample food and clothing proportioned to the inclemency of the weather, the exposure to be endured, and the habits of the wearer. The circulation of the blood should be promoted by active exercise, and an avoidance of position to sleep shaken off by increased exertion. The principal endeavour should be to keep the extremities and chest warm. If this can be accomplished, no danger need be feared.

In cases of asphyxia produced by cold, the patient should be laid in a room remote from the fire, and bathed with salt-and-water, or water to which some salt or vinegar has been added; after which the body should be wiped dry, and friction assiduously applied by the hands of the attendants (warmed); as many operating at once as can conveniently do so. Gentle stimulants may be administered by the mouth, and the lungs excited by some mild, stimulating clyster. The lungs should also be inflated, and efforts made to re-establish the respiration. As soon as symptoms of returning animation are evinced, and the breathing and circulation restored, the patient should be laid in bed between blankets, and a little wine-and-water administered, and perspiration promoted by heaping an ample quantity of clothes on the bed. Should the patient have suffered from hunger as well as cold, the appetite should be appeased by the administration of a small quantity of light food, taking especial care to avoid excess, or anything indigestible or irritating. See ASPHYXIA, BRONCHITARRH, &c.

COLD CREAM. A snow-white, bland ointment, about the consistence of good lard, and an admirable substitute for that excipient where expense is no object, especially for applications about the face. It is commonly sold as a lip-salve and as a healing application to abraded and chapped surfaces generally. The ordinary receipts are given under the head of COSMETIC CERATE (which *see*). The following produces a superior article.

Prep. (Dr. L. Turnbull.) From white wax, 1 oz.; oil of almonds, 4 oz.; rose-water, 2 oz.; borax, ½ dr.; oil of roses, 5 drops. Melt, and dissolve the wax in the oil of almonds by a gentle heat; dissolve the borax in the rose-water, which is then to be warmed a little and added to the heated oil; lastly, add the oil of roses, stirring.

COL'IC. *Syn.* COL'ICA, L. The belly-ache or gripes. The name is popularly given to all severe griping abdominal pains, without reference to the cause. There are several varieties of this disease, as noticed below.

Colic, Accident'al. Produced by improper food, and poisons. The treatment may be similar to that recommended for bilious or flatulent colic.

Colic, Bil'ious. In this variety the pain is intermittent and transient, accompanied by constipation, nausea, and vomiting. The fæces, if any, are bilious, dark-coloured, and offensive. The common remedies are, a full dose of blue pill, calomel, colocynth, or aloes, followed by a sufficient quantity of Epsom salts or Glauber's salts. Warm fomentations are also serviceable.

Colic, Flat'ulent. Marked by constipation, and the irregular distension of the bowels by gas, accompanied by a rumbling noise, &c. It is commonly produced by the use of indigestible vegetables and slops. The remedies are, a full dose of tincture of rhubarb combined with a few drops of essence of peppermint. If this does not afford relief, an Abernethy pill may be taken, washed down with a glass of any cordial water, as peppermint, cinnamon, or caraway. When the pain is extreme, warm fomentations to the belly, or a carminative clyster, will generally give relief.

Colic, Paint'er's. *Syn.* PLUMB'ER'S COLIC, DEVONSHIRE C., LEAD C.; COL'ICA PICTO'NUM, L. The dry belly-ache. It is marked by obstinate costiveness, acrid bilious vomitings, violent pains about the region of the navel, convulsive spasms in the intestines, and a tendency to paralysis in the extremities. It is most prevalent in the cider counties, and amongst persons exposed to the fumes of lead. The remedies are the same as for the spasmodic variety. Should these fail, after the bowels have been thoroughly evacuated, small doses of camphor and opium may be administered, and sulphuric beer or sweetened water very slightly acidulated with sulphuric acid, had recourse on, as a beverage. Mr. Benson, the managing director of the British White-lead Works at Birmingham, says:—"Although during several weeks after the addition of the sulphuric acid to the treacle beer, drank at the works, little advantage seemed to be derived, yet the cases of lead colic became gradually less frequent, and since October of that year, or during a period of fifteen months, not a single case of lead colic has occurred amongst the people." ('Lancet.') See SULPHURIC BEER and SULPHURIC ACID.

Colic, Spasmod'ic. Marked by a fluctuating pain about the navel, which goes away and returns by starts, often leaving the patient for some time. The belly is usually soft, and the intestines may often be felt in lumps, which move about under the hand, or are wholly absent for a time. It is unaccompanied by flatulency. The remedies are warm fomentations, warm clysters, and carminatives, accompanied by small doses of camphor and opium.

Colic, Stercora'ceous. Marked by severe griping pains and constipation of the bowels. The remedies are powerful cathartics, as full doses of calomel, aloes, colocynth, jalap, &c., followed by purgative salts, as sulphate of magnesia, or sulphate of soda.

COLLO'DION. *Syn.* COLLO'DIUM, L., B. P. A viscid fluid formed by dissolving pyroxylin (Schönbein's gun-cotton) in a mixture of ether and alcohol. In *surgery*, it is used in its natural state, and combined with certain elastic and medicinal substances. In *photography*, it is used in combination with agents that render it sensitive to the action of light.

Collodion. *Syn.* PLAIN COLLODION. The following are the best methods of preparing plain collodion for surgical purposes:—

Prep. 1. (Ph. U. S.) Nitrate of potassa, in powder, 10 oz.; sulphuric acid, 8½ fl. oz.; triturate together in a wedgwood mortar until uniformly mixed; then add of fine carded cotton (free from impurities), ½ oz.; and by means of the pestle or a glass rod, saturate it thoroughly with the liquor for a period of about 3 or 4 minutes; next transfer the cotton to a vessel containing water, and wash it in successive portions of pure water, with agitation and pressure, until the washings cease to affect litmus paper or a solution of chloride of barium; it is then to be spread out and dried by a very gentle heat, and dissolved by agitation in a stoppered bottle with rectified sulphuric ether, 1 quart, to which rectified spirit (alcohol), 1 fl. oz., has been previously added.

2. (Mialhe.) Nitrate of potassa, 40 parts; concentrated sulphuric acid, 60 parts; carded cotton, 2 parts; proceed as last until the dry cotton is obtained, then take of the prepared cotton, 8 parts; rectified sulphuric ether, 125 parts; mix in a well-stoppered bottle, and agitate it for some minutes; then add, gradually, rectified alcohol, 1 part; and continue to shake until the whole of the liquid acquires a syrupy consistency. It may be now passed through a cloth; but a better way to prevent

loss is to let it repose for a few days, and then decant the clear portion.

3. (Lauras.) This process only differs from No. 2 in the following particulars:—The cotton is immersed for 12 minutes, then rinsed 2 or 3 times in cold water, and afterwards immersed in a solution of carbonate of potassa, 4 parts, and water, 200 parts. Lastly, it is plunged again into simple water, and dried at a temperature of 77° to 86° Fahr.

4. (B. P.) Pyroxylin, 1 part; rectified spirit, 12 parts; ether, 36 parts; mix the ether and spirit, and add the pyroxylin.

5. (Parrish.) Thoroughly saturate clean carded cotton, ½ oz., with fuming nitric acid and sulphuric acid, of each, 4 fl. oz., previously mixed and allowed to become cool; macerate for 12 hours; wash the cotton in a large quantity of water; then free it from the water by successive washings in alcohol, and dissolve in ether, 3 pints.

Obs. For success in the manufacture of collodion, it is absolutely necessary to avoid the presence of water. The ordinary commercial oil of vitriol, sp. gr. 1·84, may be used. Professor Procter, of Philadelphia, gives preference to the process with the mixed acids (No. 5), and directs that the cotton should be allowed to macerate for four days. In drying the cotton great care should be taken to prevent an explosion.

Uses, &c. In *surgery*, plain collodion is employed as a dressing for wounds, and as a protection to abraded surfaces. On drying, it unites the former closely, and preserves the latter from the action of the air. It is impervious to water, and being transparent, it admits of the progress of the wound being inspected when necessary. Such is its adhesive power, that a piece of cloth cemented with it to the dry palm of the hand will support a weight of 25 to 30 lbs. The parts to which it is applied should be freed from moisture. See COLOURED, ELASTIC, MEDICATED, and VESICATING COLLODIONS (*below*).

Collodion, Blis'tering. See VESICATING COLLODION.

Collodion, Col'oured. *Syn.* COLLODIUM TINCTUM, L. *Prep.* (Cutan. Hosp.) Collodion, 2 oz.; palm oil, 1 dr.; alkanet root, q. s. to colour (say 15 grs.); digest and decant the clear. Colour bears a greater resemblance to the skin than that of common collodion, whilst it is more flexible; but it is weaker than the latter.

Collodion, Elas'tic. *Prep.* 1. (Lauras.) Heat together Venice turpentine, 2 parts; castor oil, 2 parts; and white wax, 2 parts; add sulphuric ether, 6 parts; and mix all with the product of No. 3 (*above*), that is, to the collodion formed with 8 parts of prepared cotton, 125 ether, and 8 alcohol.

2. (C. S. Rand.) Dissolve prepared cotton (No. 5, *above*), 2 drs., in sulphuric ether, 5 fl. oz.; then add, Venice turpentine, 2 drs., and complete the solution by slight agitation.

Obs. The collodion made by either of the above processes, when applied to the skin, forms a transparent pellicle, more pliable and more difficult to remove than that of ordinary collodion.

Collodion, Med'icated. It has been proposed to medicate collodion in several ways, but the practice has not found much favour with the medical profession. The following preparations have been described:—

COLLODION, ACONITE. From aconite root, by a similar formula to that of BELLADONNA C. (*below*).

COLLODION, BELLADONNA. *Prep.* Macerate select belladonna leaves, powdered, 8 oz., in ether, 12 fl. oz., with alcohol (95%), 4 fl. oz., for six hours. Pack in a percolator, and pour on alcohol till a pint of tincture is obtained; in this dissolve pyroxylin (gun-cotton), 1 dr., and Canada balsam, ½ oz. *Used* as a substitute for BELLADONNA PLASTER.

COLLODION, CANTHARIDIN. See VESICATING COLLODION.

COLLODION, IODINE. *Prep.* Dissolve iodine and Canada balsam, of each, ½ oz., in collodion, 1 pint. *Used* as a substitute for IODINE OINTMENT.

Collodion, Photograph'ic. There are so many methods adopted for preparing photographic collodion, that a large volume might be filled with notices of them. We will merely give Mr. Hardwich's forms, which are much esteemed by practical photographers. The preparation of a sensitive collodion, whether positive or negative, includes three distinct operations, namely, the formation of the pyroxylin or gun-cotton, the conversion of this into plain collodion, and the final process of iodising the collodion.

1. **Collodion, Pos'itive.** (Hardwich.) To form the PYROXYLIN.—Take sulphuric acid, sp. gr. 1·845, at 60° Fahr., 12 fl. oz.; nitric acid, sp. gr. 1·45, at 60°, 12 fl. oz.; water, 3½ fl. oz.; mix, and allow the temperature to fall to 140°; then immerse cotton, 300 grains. (If the cotton is found to gelatinise or dissolve in the acid mixture, the quantity of water is too great, and may be reduced to 3 fl. oz.) The cotton should be well pulled out in pieces, weighing about 30 grains each; and should be left in the acid for about 8 minutes, the vessel being covered over. It is taken out with a glass spatula, squeezed to remove acid, washed for at least 24 hours by a stream of water, then squeezed in a cloth, and pulled out to dry. To form the PLAIN COLLODION:—Shake up the dry pyroxylin, 48 grains, with alcohol, sp. gr. ·805, 1½ fl. oz., and then add ether, sp. gr. ·725, 4½ fl. oz. The solution should be allowed to rest for a week or ten days, when the clear fluid should be decanted from the sediment. To prepare the IODISING SOLUTION:—Take of iodide of ammonium, 1½ dr.; iodide of cadmium, 1½ dr.; bromide of ammonium, 40 grains; powder, and dissolve in alcohol, sp. gr. ·805 to ·816, 10 fl. oz. The collodion is

iodised by adding the solution to it in the proportion of 1 part solution to 3 parts collodion. The iodised collodion should be kept for at least six weeks before using. If required for immediate use, add a few drops of an alcoholic solution of iodine, formed by dissolving 5 grains of iodine in 1 fl. oz. of alcohol.

Obs. Mr. Hardwich recommends that the cotton, before being converted into pyroxylin, should be cleansed by boiling for two hours in a solution of caustic potassa (2 oz. to the gallon), and by being afterwards repeatedly washed and dried. The purest nitric acid, sp. gr. 1·45, should be employed, but the ordinary commercial sulphuric acid (oil of vitriol) is sufficiently pure for use. To purify the ETHER, and to get rid of a certain ozonised principle, which would decompose the iodising solution, Mr. Hardwich recommends the following process:—Take the best washed ether of commerce, and agitate it thoroughly with a small portion of dilute sulphuric acid, and then introduce it into a retort, and distil over one third. The alcohol used is of the strength of that sold for absolute alcohol; it should be pure.

2. **Collodion, Neg'ative.** (Hardwich.) To form the PYROXYLIN:—Take of sulphuric acid, sp. gr. 1·845, at 60°, 18 fl. oz.; nitric acid, sp. gr. 1·475, at 60°, 6 fl. oz.; water, 5½ fl. oz.; cotton, 300 grains. Mix, and allow the temperature to fall to 150° Fahr. The weight of the pyroxylin ought to be 375 grains. To form the PLAIN COLLODION:—Take alcohol, sp. gr. ·806, ½ gallon; ether, sp. gr. ·725, 1 gal.; pyroxylin, 1900 grains. Saturate the pyroxylin with the alcohol, then pour in half a gallon of the ether, agitate for 3 or 4 minutes, and repeat the process in adding the remainder. Decant the clear liquid from the sediment after a week or ten days' rest. The following forms for IODISING SOLUTIONS are recommended:—*a.* (Potassium Iodiser.) Iodide of potassium, 135 grains; alcohol, sp. gr. ·816, 10 fl. oz. Powder and dissolve in the alcohol, previously heated to 140°.—*b.* (Cadmium Iodiser.) Iodide of cadmium, 170 grains; alcohol, sp. gr. ·816, 10 fl. oz. Dissolve in the cold, and filter.—*c.* (Bromo-iodiser.) Bromide of ammonium, 40 grains; iodide of ammonium, 90 grains; iodide of cadmium, 90 grains; alcohol, sp. gr. ·816, 10 fl. oz. Pulverise, and dissolve in the cold. To sensitise the collodion, add to three parts one part of either *a*, *b*, or *c*.

Obs. Most of the practical directions given under the head of POSITIVE COLLODION apply equally to NEGATIVE COLLODION. Nothing but patient and intelligent practice will ever lead to success in preparing collodion for photographic purposes. Although formulæ of undoubted excellence may be used, it continually happens that the results are entirely nugatory from some trifling cause. See PHOTOGRAPHY.

Collodion, Ves'icating. *Syn.* BLIS'TERING COLLODION, CANTHAR'IDIN C.; COLLO'DIUM VES'ICANS, L. *Prep.* 1. (Tichborne.) Coarsely powdered cantharides, 6 oz., are placed loosely in a displacement apparatus (provided with a tap to regulate the flow), and treated with ether from methylated spirit, 13 fl. oz., and glacial acetic acid, 2 fl. oz., previously mixed together. After the fluid has passed through, it will be found that the *débris* has retained by absorption 7 fl. oz., which must be displaced by the gradual addition of methylated spirits of wine, 7 fl. oz. If properly managed, there is not the least danger of the admixture of the spirits with the percolated menstruum, as the animal substance of the flies swells considerably under the prolonged influence of the spirits of wine, so that the same bulk will be insufficient to quite displace the ether. The ethereal solution should be made to measure exactly 15 fl. oz. with a little spirit, and may then be converted into a collodion by the addition of pyroxylin, ½ oz.

Obs. The glacial acid plays a double part in this preparation. It dissolves the cantharidin, and at the same time gives to the collodion film the essential property of porosity. Ordinary collodion is useless as an excipient, for it produces a tough and contractile film, which really screens the skin from the action of the greater part of the blistering material.

2. (Ilisch.) Cantharidin, 15 grs.; pyroxylin, 20 grs.; rectified ether, 1½ oz.; acetic ether, ½ oz.; dissolve.

3. (Œttinger.) Ether of cantharides and collodion, equal parts.

Use. Vesicating collodion is used as an irritant. No. 1 was introduced in 1862, and has many advantages over the other two. Mr. Tichborne thus described the most effectual method of using it in the 'Pharm. Journ.':—"The part upon which the blister is to be raised should be painted with the vesicant to the desired extent, bearing in mind that the blister produced always extends to about one tenth of an inch beyond the margin of the space covered. Care should be taken to give a coating of considerable thickness, and to ensure this result the brush should be passed over and over again, until about ½ dr. has been used to the square inch, or less when operating upon a tender epidermis. It is desirable to place over the intended blister a piece of oil silk, or, what is still better, a piece of sheet gutta percha, somewhat larger than the surface painted, as this will stop the exhalations of the skin, and so render it moist and permeable. In ten minutes, or a quarter of an hour if the cuticle is hard, the collodion should be wiped off with a little cotton-wool moistened with ether, when the blister will almost instantly rise."

COL'LOID. See DIALYSIS.

COLLYR'IUM. [L.] In *medicine* and *pharmacy*, a topical remedy for diseases of the eye.

Formerly the term collyrium was applied to any medicament employed to restrain defluxions.

Collyr'ium, Dry. *Syn.* EYE POWDER; COLLYR'IUM SIC'CUM, L. *Prep.* 1. (Dupuytren.) White sugar, 1 dr.; red oxide of mercury, 10 grs.; oxide of zinc, 20 grs.; mix.

2. (Lagneau.) Sugar candy, 2 parts; nitrate of potassa, 1 part.

3. (Falconer.) Chloride of barium, 1 gr.; sugar candy, 1 dr.

4. (Radius.) Calomel and white sugar, of each, ½ dr.; opium, 10 grs.

5. (Recamier.) Oxide of zinc and sugar candy, equal parts.

6. (Velpeau.) Trisnitrate of bismuth and sugar candy, equal parts.

7. (Wiseman.) Acetate of soda, 10 grs.; powdered opium, 1 gr.; sugar candy, ½ dr.

Obs. It is absolutely necessary that the ingredients in the above preparations should be reduced to an impalpable powder, by careful trituration in a wedgwood mortar. For use, a small pinch is placed in a quill or straw, and blown into the eye previously opened with the fingers. On the whole, they may be regarded as unnecessary preparations, and are unsafe, except in skilful hands.

Collyrium, Liq'uid. See WATER (Eye).

Collyrium, Unct'uous. See OINTMENT (Eye).

COL'OCYNTH (-sinth). *Syn.* (COLOCYNTH PULP., COLOCYNTHIDIS PULPA, B. P.) BIT'TER AP'PLE, BITTER GOURD, BITTER CU'CUMBER, PEELED COLOCYNTH; COLOQUINT'IDA, COLOCYNTH'IS (B. P.), L. The decorticated fruit or pulp of the *Citrullus Colocynthis* (Schrad.—Ph. L.), or *Cucumis Colocynthis* (Linn.—Ph. E. & D.). It is an acrid, drastic purge and hydragogue, and cannot be given alone with safety; but, in combination with other substances, it forms some of our most useful cathartic medicines.

COLOCYNTH'IN. *Syn.* COLOCYNTH'IUM, L. The bitter, purgative principle of colocynth.

COL'OPHENE. Formed by distilling oil of turpentine with concentrated sulphuric acid. A colourless, viscid, oily liquid; with a high boiling-point; and exhibiting a bluish tint by reflected light.

COL'OPHONY. See RESIN.

COLOUR BLINDNESS. *Syn.* DAL'TONISM. A curious defect of vision, from which the eye is incapable of distinguishing colours. It is of three kinds:—1. An inability to distinguish any colour properly so called, the person being only able to distinguish white and black, light and shade. 2. An inability to distinguish between the primary colours, red, blue, and yellow, or between these and the secondary or tertiary hues, such as green, purple, orange, and brown. 3. An inability to distinguish nicer shades and hues, as grays and neutral tints. The first form is rare; the second and third are common. Dr. George Wilson found that of 1154 persons examined by him in Edinburgh, 65, or 1 in 177, were colour blind; of these, 21 confounded red with green, 19 brown with green, and 25 blue with green.

COL'OURING. *Syn.* BRANDY COLOURING, BREWER'S C., SPIRIT C., CAR'AMEL; ESSEN'TIA BI'NA, L. *Prep.* Brown sugar is melted in an iron vessel over the fire, until it grows black and bitter, stirring it well all the time, after which water is added, and it is boiled to a syrup. In the making of brandy colouring white sugar is more frequently used.

Obs. Some persons use lime-water to dissolve the burnt sugar. Care must be taken not to overburn it, as a greater quantity is thereby rendered insoluble. The heat should not exceed 430°, nor be less than about 400° Fahr. The process, for nice experiments, is best conducted in a bath of melted tin, to which a little bismuth has been added to reduce its melting-point to about 435°; a little powdered resin or charcoal or a little oil being put upon the surface of the metal, to prevent the oxidisement of the alloy. See CARAMEL.

COL'OURS. White light from the sun is of a compound nature, and may be decomposed into rays of different colours. Newton distinguished seven PRIMITIVE COLOURS, namely, violet, indigo, blue, green, yellow, orange, and red. Sir D. Brewster is disposed to think that four of these colours are really compound, and that three, namely, blue, yellow, and red, alone deserve the name of primitive. The colours of natural objects are supposed to result from the power possessed by their surfaces of absorbing some of the coloured rays of light, while they reflect or transmit, as the case may be, the remainder of the rays. Thus, an object appears red because it absorbs or causes to disappear the yellow and blue rays composing the white light by which it is illuminated. Black and white are not colours, strictly speaking.

A body is said to be black when it absorbs or quenches a large proportion of all the rays of white light falling upon it. A body is said to be white when it receives the white light, and reflects all the rays with moderate strength. Gray may be regarded as a luminous black, or dark white. The names given to colours are far from being satisfactory, for although many thousand shades may be distinguished by a practised eye, it is a question whether there are fifty names which would convey the same idea of shade to any ten colourists in the world. The names taken from natural coloured objects, as indigo, violet, orange, lilac, amber, emerald, &c., are the least objectionable. M. Chevreul has devised an ingenious system of naming and classifying colours. He employs only 6 fundamental names, which are those of the three elementary colours, red yellow, and blue; and of the three secondary colours, orange, green, and violet. By the direct union of the elementary and secondary colours, 6 tertiary colours are formed. He arranges the twelve colours in a circle, like

the spokes of a wheel, commencing with the red, and going to the right, thus:—Red, red-orange, orange, yellow-orange, yellow, yellow-green, green, blue-green, blue, blue-violet, violet, red-violet. The chromatic circle is completed by placing 5 shades between the red and red-orange, 5 between the red-orange and orange; and so on between each of the other couples. This chromatic circle of 72 colours is not imaginary, but actually exists, composed of dyed wools. The shades are distinguished by numbers; thus there are red, 1 red, 2 red, 3 red, 4 red, and 5 red, &c. Each of the 72 shades has, moreover, 20 different degrees of depth, from the lightest that can be discerned from pure white to the most intense depth, approaching to brown and black. These degrees of depth are called tones or tints. The addition of these tones to the chromatic circle brings up the number of tints to 1440. To indicate any one of these tints, we have merely to write the number of the shade, and after it the number of the tone, as, for example, 3 blue-violet, 13 tone. By mixing each of the 1440 tints with gray or black, so as to darken it in different degrees, a total of 14,440 colours may be defined. This part of the system is generally regarded as unnecessary. Mr. O'Neill, in his valuable 'Dictionary of Calico Printing and Dyeing' (to which work we refer the reader for a full account of Chevreul's classification), gives a long list of colours and coloured bodies, which are pretty well defined in common language with the names of the colours, according to this ingenious system. We select from this list the following examples:—

Amber in mass=2 orange, 12 tone.
Amethyst=5 blue-violet, from 3 to 16 tone.
Blood, ox=1 red, 13 and 14 tones.
Butter=yellow-orange, 2 to 3 tone.
Carrot=orange, 7 tone.
Chocolate in cake=5 orange, 18 tone.
Emerald=2 green, 11 tone.
Green, apple=4 yellow-green, 8 tone.
Isabelle=1 yellow-orange.
Mauve=3 violet, 8 tone.
Red-lead=yellow-orange, 20 tone.
Ruby=red, 11 tone.
Yellow, canary=1 yellow, 6 tone.

For notices of DYES, PIGMENTS, &c., refer to the principal colours.

Colours, Complement'ary. *Syn.* ACCIDENT'AL COLOURS. Colours are said to be complementary to each other which, by blending together, produce the perception of whiteness. According to Mayer, all colours are produced by the admixture of red, yellow, and blue light, in certain proportions; and by intercepting either one or more of these coloured rays in a beam of light, those which meet the eye will consist of the remaining coloured rays of the spectrum. Thus, by intercepting the red rays in a beam of white light, the remaining yellow and blue rays will produce a green colour; by intercepting the blue rays, the remaining yellow and red will give an orange; and so on of other cases; so that red and green, blue and orange, are COMPLEMENTARY COLOURS. If we look for some time, with one eye, on a bright-coloured object, as a wafer, placed on a piece of paper, and subsequently turn the same eye to another part of the paper, a similarly shaped spot or mark will be seen, but the colour will vary, though it will be always the same under like circumstances. Thus, if the original spot or wafer be of a red colour, the imaginary one will be green; if black, it will be white; the imaginary colour being always complementary of that first gazed upon. The colour so perceived is often called an ACCIDENTAL COLOUR, to distinguish it from the real colour. It is a general maxim in design that "colours look brightest when near their complementary colours."

Colours, Drug'gists' Show. See SHOW BOTTLES.

Colours, Flame. See FIRES (Coloured).

COLTS'FOOT. This popular herb is the *Tussilago farfara* of Linnæus. It is a demulcent bitter, and is slightly stomachic and tonic. It is much esteemed by the lower classes in coughs, shortness of breath, and other affections of the chest. The leaves form the basis of most of the British herb tobaccos, and have been recommended to be smoked in asthma and difficulty of breathing.—*Dose.* One or two wine-glassfuls of the tea or decoction (1 oz. to the pint) *ad libitum.*

COLUM'BIC ACID. See TANTALIC ACID.

COLUM'BIUM. See TANTALUM.

COMBINA'TION. In *chemistry*, the union of dissimilar substances. The great general laws which regulate all chemical combinations admit of being laid down in a manner at once simple and concise. The laws of COMBINATION BY WEIGHT are as follows:—

"1. All chemical compounds are definite in their nature, the ratio of their elements being constant.

"2. When any body is capable of uniting with a second in several proportions, these proportions bear a simple relation to each other.

"3. If a body, A, unite with other bodies, B, C, D, the quantities of B, C, D, which unite with A, represent the relations in which they unite among themselves, in the event of union taking place.

"4. The combining quantity of a compound is the sum of the combining quantities of its components." (Fownes.)

There is a remarkable relation between the specific gravity of a body in the gaseous state and its chemical equivalent or combining proportion—a relation of such a kind that quantities by weight of the various gases, expressed by their equivalents, or, in other words, quantities by weight which combine occupy, under similar circumstances of pressure and tempera-

ture, either equal volumes or volumes bearing a simple proportion to each other. This relation accounts for the law of COMBINATION BY VOLUME discovered by Gay-Lussac, and thus expressed:—

When gases combine, chemical union invariably takes place, either between equal volumes or between volumes which bear a simple relation to each other.

Gerhardt assumes that equal volumes of the elementary gases and vapours, when compared under similar conditions of pressure and temperature, contain the same number of atoms. See AFFINITY, ATOMIC THEORY, EQUIVALENTS, &c.

CONCENTRA'TION. The volatilisation of part of a liquid in order to increase the strength of the remainder. The operation can only be performed on solutions of substances of greater fixity than the menstrua in which they are dissolved. Many of the liquid acids, solutions of the alkalies, &c., are concentrated by distilling off their water.

In *pharmacy*, the term CONCENTRATED is commonly applied to any liquid preparation possessing more than the usual strength. Thus, we have concentrated infusions, decoctions, liquors, solutions, tinctures, and essences, most of which are made of 8 times the common strength. This is generally effected by using 8 times the usual quantity of the ingredients, with a given portion of the menstruum, and operating by digestion or percolation; the latter being generally adopted when the articles are bulky. When the menstruum is water, a little spirit is added, to make the product keep. See DECOCTION, INFUSION, &c.

CON'CRETE. A compact mass or cement, composed of pebbles, lime, and sand, employed in the foundations of buildings. The best proportions have been said to be—60 parts of coarse pebbles, 25 of rough sand, and 15 of lime; but Semple recommends 80 parts of pebbles, 40 parts of river sand, and only 10 parts of lime. The pebbles for concrete should not exceed about ½ lb. each in weight.

CON'DIMENTS. Substances taken with the food, to season or improve its flavour, or to render it more wholesome or digestible. The principal condiments are COMMON SALT, VINEGAR, LEMON-JUICE, SPICES, AROMATIC HERBS, OIL, BUTTER, SUGAR, HONEY, and SAUCES. Most of these, in moderation, promote the appetite and digestion, but their excessive use tends to vitiate the gastric juice, and injure the stomach.

CONFEC'TION. *Syn.* CONFECTIO, L. Anything prepared with sugar; a sweetmeat, or candy. In *medicine*, the name is commonly applied to substances, usually pulverulent, mixed up to the consistence of a soft electuary, with powdered sugar, syrup, or honey. In the 'London Pharmacopœia' (1836 and 1851) both CONSERVES and ELECTUARIES are included under this head, though there appears to be some little distinction between them.

In the *preparation* of confections all the dry ingredients should be reduced to very fine powder, and passed through a sieve, not coarser than 80 holes to the inch; and the pulps and syrups used to mix them up should be perfectly homogeneous, and of a proper consistence. The mixture should be intimate and complete, in order that the characteristic constituents may be equally distributed throughout the mass. The consistence of the newly made confection should be sufficiently solid to prevent a separation of the ingredients, and yet soft enough to allow of it being easily swallowed without previous mastication.

Confections should be *preserved* in stone jars covered with writing paper, and placed in a cool and not too dry a situation. Without this precaution, they are apt to mould on the top. If at any time the mass ferments and swells up, the fermentative process may be arrested by placing the jar in a bath of boiling water, for an hour or two, or until the whole becomes pretty hot; when it should be removed from the heat, and stirred occasionally until cold. Should the sugar crystallise out of the confection, or 'candy,' as it is called, the same method may be followed. Or, the mass may be well rubbed in a mortar until the hard lumps of sugar are broken down, and a uniform consistence again produced. On the large scale it may be passed through the mill.

As *remedial agents*, the officinal confections possess little value, and are chiefly used as vehicles for the administration of more active medicines. See CONSERVES and ELECTUARIES.

Confection of A'corns. *Syn.* CONFEC'TIO SEM'INUM QUER'CUS, L. *Prep.* (Bories.) Powdered acorns, 3 oz.; red coral and catechu, of each, 1½ oz.; confection of dog-rose, 10 oz.; syrup of red roses, q. s. to make a confection. —*Dose.* 1 dr., every 4 hours; in chronic diarrhœa, &c.

Confection of Al'monds. *Syn.* ALMOND PASTE, CONSERVE OF ALMONDS; CONFEC'TIO AMYG'DALÆ (Ph. L.), CONSER'VA AMYGDALA''RUM (Ph. E.), CONFEC'TIO AMYGDALA''RUM (Ph. D. 1826), L. *Prep.* (Ph. L.) Sweet almonds, 8 oz.; white sugar, 4 oz.; powdered gum arabic, 1 oz.; macerate the almonds in cold water, then remove the skins, and beat them with the other ingredients until reduced to a smooth confection. The Ph. E. form is similar.

Uses, &c. To prepare EMULSION or MILK OF ALMONDS. A little of this paste or powder, triturated with a sufficient portion of water, and strained through a piece of calico, forms emulsion of almonds. "This confection will keep longer sound, if the almonds, first decorticated (blanched), dried, and rubbed into the finest powder, be mixed with the acacia and

sugar, separately powdered, and the mixed ingredients be kept in a well-stoppered bottle." (Ph. L.) The same effect may be arrived at by simply well drying the blanched almonds before mixing them with the gum and sugar. The addition of even a small quantity of water or syrup causes the confection "to become soon mouldy, or rancid, or both." (Brande.)

Confection of Al'um. *Syn.* CONFECTIO ALU'MINIS, L. *Prep.* 1. (St. B. H.) Alum (in fine powder), 1 dr.; conserve of roses, 6 drs.

2. (Foy.) Alum, 1 dr.; conserve of roses, 1 oz.—*Dose.* 1 dr., 2 or 3 times a day; in lead colic, and as an astringent in diarrhœa and other affections.

Confection, Aromat'ic. *Syn.* AROMATIC ELEC'TUARY; CONFEC'TIO AROMAT'ICA (Ph. L. & D.), ELECTUA''RIUM AROMAT'ICUM (Ph. E.), L. *Prep.* 1. (Ph. L.) Nutmegs, cinnamon, and hay-saffron, of each, 2 oz.; cloves, 1 oz.; cardamoms, ½ oz.; prepared chalk, 16 oz.; white sugar, 2 lbs.; reduce the whole to a very fine powder, and keep it in a closed vessel. When wanted for use, mix it with water to the consistence of a confection.

2. (Ph. E.) Aromatic powder (Ph. E.), 1 part; syrup of orange peel, 2 parts; mix.

3. (Ph. D.) Aromatic powder and simple syrup, of each, 5 oz.; clarified honey, 2 oz.; powdered saffron, ½ oz.; mix, and add, oil of cloves, 30 drops.

4. (Commercial.)—*a.* Hay-saffron, cassia, and turmeric, of each, 4 oz.; cardamoms, 1 oz.; starch, 8 oz.; precipitated chalk, 2 lbs.; white sugar, 4 lbs.; oil of nutmeg, 2 drs.; oil of cloves, 3 drs.; reduce the dry ingredients to fine powder, and pass it through a sieve (80 holes); then add the oils, and after well mixing them in, pass the whole through a coarse sieve (about 40 holes to the inch), to ensure perfect admixture.

b. Hay-saffron, 4 oz.; turmeric, 3 oz.; powdered starch, 8 oz.; precipitated chalk, 2 lbs.; white sugar, 4 lbs.; oil of cloves and cassia, of each, 3 drs.; oil of nutmeg, 2 drs.; essence of cardamoms, 1 oz.; boil the saffron turmeric in 1 gallon of water, placed in a bright copper pan, for 10 minutes, then, without straining, add the chalk, starch, and sugar; mix well, and continue stirring until the mixture becomes quite stiff, then break it up, dry it thoroughly by the heat of a steam or water bath; next reduce it to fine powder, which must be passed through a fine sieve, as before; the oils and tincture are now to be added, and after being well mixed, and passed through a coarse sieve, it should be placed in a jar or bottle, and bunged up close. Very bright coloured.

Obs. In the wholesale trade this article is kept under two forms—one, in powder, as ordered by the College, and commonly called for distinction sake PULV'IS CONFECTIO'NIS AROMAT'ICÆ; the other, mixed up ready for use. In preparing the latter, it is a common plan to make a strong infusion or decoction of the saffron, and to use it to mix up the other ingredients, adding the aromatics last. (See 4, *b.*) When the price of precipitated chalk is an objection to its use, prepared chalk may be used instead. There is much anxiety evinced by the wholesale druggists to prepare this confection of a rich colour, without an undue expenditure of saffron, which is generally economised on account of its costliness. This confection is cordial, stimulant, antacid, and carminative.—*Dose.* 10 to 60 grs., either as a bolus or stirred up with a glass of water; in diarrhœa, acidity of stomach, heartburn, and any like affection, if accompanied by looseness of the bowels. In diarrhœa, English cholera, and flatulent colic, ¼ gr. of powdered opium may be added to each dose.

Confection of Bark. *Syn.* CONFEC'TIO CINCHO'NÆ, L. *Prep.* 1. Yellow bark and white sugar, of each, 1 oz.; capsicum, 1 dr.; simple syrup, 4 oz.

2. (St. B. Hosp.) Yellow bark, 6 drs.; ginger, ½ dr.; treacle, 3½ oz.—*Dose.* 1 to 6 drs., where the use of bark is indicated.

Confection of Cas'sia. *Syn.* CONFEC'TIO CAS'SIÆ (Ph. L.), L. *Prep.* (Ph. L.) Prepared cassia, ½ lb.; manna, 2 oz.; prepared tamarinds, 1 oz.; syrup of roses, 8 fl. oz.; mix with heat, and evaporate to a proper consistence.—*Dose.* 2 drs. to 6 drs.; or more, as a laxative.

Confection of Cat'echu. *Syn.* CONFEC'TIO CAT'ECHU COMPOS'ITA (Ph. D.), L. *Prep.* (Ph. D.) Compound powder of catechu, 5 oz.; simple syrup, 5 fl. oz.—*Dose.* 10 grs. to 20 grs.; as an astringent, in diarrhœa, &c.; either alone or combined with chalk.

Confection of Copai'ba. *Syn.* CONFEC'TIO COPAI'BÆ, L. *Prep.* 1. (Berton.) Copaiba and powdered cubebs, of each, 2 oz.; alum, 1 oz.; opium, 5 grs.; mix well.

2. (Swediaur.) Turpentine, 1 oz.; copaiba, ½ oz.; mix; add mucilage of gum arabic, 1 oz.; triturate to an emulsion, and further add, conserve of roses, 4 oz.

3. (Traill.) Copaiba, 2 oz.; oatmeal, q. s. to form an electuary; then add, conserve of roses, 1 oz.

4. (Voght.) Copaiba and powdered cubebs, of each, 4½ drs.; yolk of 1 egg; conserve of roses, ½ oz. All the above are excellent medicines in gonorrhœa.—*Dose.* 1 to 3 drs., three or four times a day, made into boluses, and covered with the fresh emptied skin of a prune before being swallowed; in gonorrhœa, gleet &c.

Confection of Cream of Tar'tar. *Syn.* CONFECTION OF BITAR'TRATE OF POTAS'SA; CONFEC'TIO POTAS'SÆ BITARTRA'TIS, L. *Prep.* 1. Cream of tartar and powdered sugar, of each, 1 oz.; simple syrup, 2 oz.; 1 nutmeg, grated.—*Dose.* 2 drs. to 6 drs.

2. (St. B. Hosp.) Bitartrate of potassa and simple syrup, of each, 3 oz.; ginger, 1 dr.

—*Dose.* 1½ dr. to 5 drs. Both are laxatives well adapted for women and children.

Confection of Hem'lock. *Syn.* CONFEC'TIO CO'NII, L. *Prep.* (Marshall Hall.) Fresh hemlock leaves beaten up with an equal weight of sugar.—*Dose.* 10 to 20 grs., as a bolus, 2 or 3 times daily, where the use of hemlock is indicated. The confection of other narcotic plants may be made in the same way.

Confection of Hips. *Syn.* CON'SERVE OF HIPS, CONFECTION OF DOG-ROSE, CONSERVE OF D.-R.; CONFEC'TIO RO'SÆ CANI'NÆ (Ph. L.), CONSER'VA RO'SÆ FRUC'TÛS (Ph. E.), L. *Prep.* 1. (B. P.) Hips, 1 part; refined sugar, 2 parts; heat the hips in a stone mortar, rub the pulp through a sieve, add the sugar, and mix thoroughly.—*Dose.* 60 grains or more.

2. (Ph. L.) Fruit of the dog-rose, without the seeds (carpels), 1 lb.; pound it to a pulp, add, gradually, powdered white sugar, 20 oz.; and beat them together until thoroughly incorporated.

3. (Ph. E.) Pulp of hips, 1 part; white sugar, 3 parts; as No. 1.

4. (Wholesale.) Pulped hips, 2 cwt.; fine white sugar, 3 cwt.; incorporate them without applying heat.

Obs. Both this and the confection of red roses have a brighter colour, if made without heat, or touching metallic vessels. On the small scale, it is generally made by beating the ingredients together in a marble mortar, but in large quantities by grinding in a mill. Great care must be taken to remove the seeds (carpels) with the hair surrounding them, before pulping the fruit, as they are apt, like the hairs of cowhage, when swallowed, to produce vomiting, itching about the anus, &c. This conserve is slightly laxative, and is principally used for forming pills. It is very apt to candy by keeping.

Confection of Ipecacuan'ha. *Syn.* CONFEC'TIO IPECACUAN'HÆ, L. *Prep.* (Bories.) Ipecacuanha, 12 grs.; sulphur, 20 grs.; orris root, 1 dr.; syrup of mallows and manna, of each, 2 oz.—*Dose.* A teaspoonful, 2 or 3 times daily; in hooping-cough, dyspepsia, &c.

Confection of Jal'ap. *Syn.* CONFEC'TIO JAL'APÆ, C. J. COMPOS'ITA, L. *Prep.* (St. B. Hosp.) Jalap, 4 drs.; ginger, 1 dr.; bitartrate of potassa, 3 oz.; treacle, 5 oz.—*Dose.* 1 to 3 drs., as a purgative.

Confection of Mer'cury. *Syn.* CONFEC'TIO HYDRAR'GYRI, C. MERCURIA'LIS, L. *Prep* 1. Stronger mercurial ointment (Ph. L.), 1 part; conserve of roses, 3 parts.

2. (Dr. D. Davis.) Mercury and manna, equal parts; treacle, q. s.; triturate until the globules of mercury disappear.

Dose, &c. The same as those of mercurial pill.

Confection of Ni'tre. *Syn.* CONFEC'TIO POTAS'SÆ NITRA'TIS, L. *Prep.* 1. Nitre, 1 part; confection of roses, 6 parts; oil of juniper, a few drops.

2. (St. B. Hosp.) As the last, without the juniper. Both are used in gonorrhœa.

Confection of O'pium. *Syn.* CONFEC'TIO O'PII (B. P.), ELECTUA''RIUM O'PII (Ph. E.), L. *Prep.* 1. (B. P.) Compound powder of opium, 192 grs.; syrup, 1 oz.

2. (Ph. L.) Powdered opium, 6 drs.; long pepper, 1 oz.; ginger, 2 oz.; caraways, 3 oz.; tragacanth, 2 drs.; reduce to fine powder, and keep it in a closed vessel; for *use*, add to it by degrees, hot syrup, 16 fl. oz. (*i. e.*, 3½ drs. of the powder to each fl. oz. of syrup). It contains 1 gr. of opium in every 36 grs.

3. (Ph. E.) Aromatic powder, 6 oz.; senega, 3 oz.; opium, diffused in a little sherry, ½ oz.; syrup of ginger, 1 lb. Contains 1 gr. of opium in every 43 grs.

Uses, &c. This confection is intended as a substitute for the once celebrated Mithridate, philonium, and theriaca of the old Pharmacopœias. It is stimulant, anodyne, and narcotic. —*Dose.* 5 to 30 grs.; in flatulent colic and diarrhœa unaccompanied by fever.

Confection of Or'ange Flow'ers. *Syn.* CONFEC'TIO FLOR'UM AURAN'TII, L. *Prep.* 1. Orange flowers, 1 part; white sugar, 2 parts; beat together to a confection.

2. (Tadei.) Orange flowers, 1 part; simple syrup, 3 parts; evaporate to a proper consistence. Both are used as agreeable adjuncts or vehicles for other medicines. The first is the best article.

Confection of Or'ange Peel. *Syn.* CONFECTION OF ORANGE, CONSERVE OF ORANGE PEEL; CONFEC'TIO AURAN'TII (Ph. L.), CONSER'VA AURAN'TII (Ph. E.), CONSER'VA AURANTIO''RUM (Ph. L. 1824), L. *Prep.* (Ph. L. and E.) External rind of the fresh orange, separated by rasping, 1 lb.; beat it in a stone mortar with a wooden pestle to a pulp, then add, white sugar, 3 lbs.; and beat them together until incorporated.

Uses, &c. This confection is an agreeable tonic and stomachic; it is much used as an adjunct to bitter and purgative powders, and as a vehicle for the sesquioxide of iron.

Confection of Pep'per. *Syn.* CONFECTION OF BLACK PEPPER, CONSERVE OF B. P.; WARD'S PASTE; CONFEC'TIO PIP'ERIS (B. P.), C. P. NI'GRI (Ph. D. & Ph. L. 1836), ELECTUA''RIUM PIP'ERIS (Ph. E.), L. *Prep.* 1. (B. P.) Black pepper, in fine powder, 2 parts; caraway, in fine powder, 3 parts; clarified honey, 15 parts; triturate.—*Dose.* 60 to 120 grs.

2. (Ph. L.) Black pepper and elecampane, of each, 1 lb.; fennel, 3 lbs.; white sugar, 2 lbs.; reduce to a very fine powder, and keep it in a covered vessel; for *use*, add it, gradually, to honey, 2 lbs.; and beat the whole to a paste (*i. e.*, 2 oz. of honey to each 7 oz. of powder).

3. (Ph. E.) As the last, but using liquorice powder instead of elecampane, and at once making a confection.

4. (Ph. D.) Black pepper and liquorice root, of each, ½ oz.; refined sugar, 1 oz.; oil of fennel, ½ fl. oz.; honey, 2 oz.; mix.—*Dose*, of each of the above, 1 to 3 drs., two or three times daily, for 3 or 4 months; in piles,

fistula, &c., unaccompanied with inflammatory symptoms. Or, it may be used as a suppository.' It is intended as a substitute for the once celebrated nostrum, 'Ward's Paste for the Piles.'

Confection of Pep'permint. *Syn.* CONFECTIO MEN'THÆ PIPERI'TÆ, L. Green peppermint, 4 oz.; white sugar, 12 oz. Anti-emetic and anti-flatulent; in colic, diarrhœa, &c.; in the form of a bolus, or made into a mixture.

Confection of Res'in. *Syn.* CONFEC'TIO RESIN'Æ, L. *Prep.* (Dr. Watson.) Powdered resin, 1 oz.; balsam of copaiba, ½ oz.; honey, 5 oz.—*Dose.* 1 to 3 drs.; in piles and gleet. It is best combined with a little confection of orange peel, which effectually covers the taste of the copaiba.

Confection of Ro'ses. *Syn.* CONFECTION OF RED ROSES; CONFEC'TIO RO'SÆ (Ph. L. & D.), CONSER'VA RO'SÆ (Ph. E.), CONFECTIO RO'SÆ GAL'LICÆ (B. P.), CONSERVA R. G. (Ph. L. 1824), L. *Prep.* 1. (B. P.) Fresh red-rose petals, 1 lb.; white sugar, 3 lbs.; mix as confection of hips.

2. (Ph. E.) Fresh petals, 1 part; sugar, 2 parts.

3. (Ph. D.)—*a.* Fresh petals, 3 oz.; sugar, 8 oz. Or—

b. Dried petals, 1 oz.; water, 2 fl. oz.; macerate for 2 hours; then add refined sugar, 8 oz.; and beat to a mass, as before.

Obs. It is astringent and tonic, but is principally used as an elegant vehicle for more active medicines. It keeps well, and does not candy like confection of hips.—*Dose.* 1 to 2 drs., eaten off a spoon, either alone or combined with chalk; in slight cases of diarrhœa, vomiting in pregnancy, &c. See CONSERVE.

Confection of Rue. *Syn.* CONFECTIO RU'TÆ (Ph. L.), L. *Prep.* (Ph. L.) Fresh rue (bruised), caraways, and laurel berries, of each, 1½ oz.; prepared sagapenum, ½ oz.; black pepper, 2 drs.; honey, 16 oz.; water, q. s.; rub the dry ingredients to a fine powder, then add, gradually, the sagapenum, previously dissolved in the water and honey over a slow fire, and mix well. In the Ph. L. 1836, dried rue was ordered. Carminative and antispasmodic. In flatulent colic, and in the convulsions of children, when there is no inflammation.—*Dose.* 15 to 60 grs.; either by the mouth, or made into an enema with gruel.

Confection of Scam'mony. *Syn.* CONFEC'TIO SCAMMO''NII (B. P.), ELECTUA''RUM SCAMMO''NII (Ph. D.). *Prep.* (B. P.) Scammony, in fine powder, 24 parts; ginger, in fine powder, 12 parts; oil of caraway, 1 part; oil of cloves, ½ part; syrup, 24 parts; clarified honey, 12 parts; rub the powders with the syrup and the honey into a uniform mass, then add the oils, and mix.—*Dose.* 10 grs. to 30 grs.; as a warm cathartic, and in worms, &c.

Confection of Sen'na. *Syn.* LEN'ITIVE ELEC'TUARY, ELEC'TUARY OF SENNA; CONFEC'TIO SEN'NÆ (Ph. L. & D.), ELECTUA''RIUM SEN'NÆ (Ph. E.), L. *Prep.* 1. Senna, 8 oz.; corianders, 4 oz.; rub them together, and by a sieve separate 10 oz. of the mixed powder; also boil figs, 1 lb., and fresh liquorice, bruised, 3 oz., in water, 3 pints, until reduced to one half; press, strain, and evaporate the strained liquor in a water bath to 24 fl. oz.; then add sugar, 2½ lbs.; dissolve, and further add, prepared tamarinds, cassia, and prunes, of each, ½ lb.; remove from the heat, and when the whole has considerably cooled, add the sifted powder, by degrees, and stir until the whole is thoroughly incorporated.

2. (Ph. E.) Senna, 8 oz.; corianders, 4 oz.; liquorice root, 3 oz.; figs and pulp of prunes, of each, 1 lb.; white sugar, 2½ lbs.; water, 3½ pints.

3. (Ph. D.) Senna leaves, in fine powder, 2 oz.; corianders (in fine powder), 1 oz.; oil of caraway, ½ dr.; mix, and add them to pulp of prunes, 5 oz.; pulp of tamarinds, 2 oz.; brown sugar, 8 oz.; water, 2 fl. oz.; previously brought to a smooth paste by the heat of a water bath.

Uses, &c. Confection of senna is a gentle and pleasant purgative, and well adapted for persons suffering from piles, and as a laxative during pregnancy. The dose is 1 dr. to ½ oz., taken at bedtime or early in the morning.

Obs. There is no one pharmacopœial preparation which it is more difficult to obtain of good quality than confection of senna. The absolute cost of an article prepared according to the directions of the Colleges, is greater than the price at which many wholesale houses are vending the drug. Dr. Paris very truly remarks that, "the directions of the Pharmacopœia are very rarely followed." Considerable quantities are manufactured, into which unsound and spoilt apples enter as a principal ingredient; whilst the substitution of jalap for the whole, or a portion of the senna, is a very common practice. We have seen the following forms employed in the trade.

4. Powdered senna, pulp of tamarinds, cassia, and prunes, of each, 1½ lb.; powdered corianders, ¾ lb.; Spanish juice, ½ lb.; simple syrup, 12 lbs.

5. As the above, but omitting the cassia pulp, and adding 2 lbs. more tamarind pulp. Both these articles are labelled "P. L." and sent out as genuine, and that when no competition as to price exists. The cheaper article is made as follows:—

6. Common prunes and tamarinds, of each, 16 lbs.; treacle, ¾ cwt.; species (a compound of senna dust and small senna, mixed with 3 lbs. of coriander seeds, and strengthened with jalap; all ground to a fine powder), 18¼ lbs. To this is frequently added, of rotten or inferior apples, ¼ cwt., which are pulped with the prunes and tamarinds. This article is commonly labelled "CONF. SENNÆ VER." by its manufacturer.

Confection of Sponge. *Syn.* ELEC'TUARY OF BURNT SPONGE; CONFEC'TIO SPONGII, C. S. US'TÆ, L. *Prep.* 1. Burnt sponge, 3 parts; confection of orange peel and hips, of each, 1 part; simple syrup, q. s.

2. (St. B. Hosp.) Burnt sponge, made into a confection with syrup of orange peel. The first form produces the most agreeable confection.—*Dose*, of either, ½ dr. to 2 drs., twice or thrice daily; in scrofula, &c.

Confection of Steel. *Prep.* 1. CONFEC'TIO FER'RI SESQUIOX'IDI, L.—*a*. From confection of orange and sesquioxide of iron (Ph. L.), of each, 2 oz.; white sugar, 3 oz.; syrup, 1½ oz.; mix.—*Dose*. 1 dr. to 3 drs.

b. (St. B. Hosp.) Sesquioxide of iron, 1 oz.; treacle, q. s.—*Dose*. ½ dr. to 1 dr. Both are given in the usual cases wherein iron is indicated; especially in anæmia, chlorosis, and amenorrhœa.

2. (CONFEC'TIO FER'RI TARTARIZA'TI,—St. B. Hosp.) Cream of tartar, 1½ oz.; tartrate of iron, 2 drs.; ginger, 1 dr.; treacle, 2½ oz., or q. s.—*Dose*. 1 dr. to 2 drs., 2 or 3 times daily.

Confection of Sul'phur. *Syn.* BRIMSTONE AND TREACLE; CONFEC'TIO SULPHU'RIS, L. *Prep.* 1. Sublimed sulphur, 2 oz.; treacle, 4 oz. —*Dose*. A spoonful night and morning for a week or longer, as an alterative or purifier of the blood; in skin diseases, &c.

2. (St. B. Hosp.) Precipitated sulphur, 1 oz.; cream of tartar, 2 drs.; honey or treacle, 2 oz. As the last.

3. (B. P.) Sublimed sulphur, 4 oz.; cream of tartar, 1 oz.; syrup of orange peel, 4 fl. oz. —*Dose*. 1 to 2 drs.; as a laxative, in piles, gonorrhœa, &c.

Confection of Tin. *Syn.* CONFEC'TIO STAN'NI, L. *Prep.* (Hosp. Form.) Powdered tin, 1 oz.; confection of roses, 2 oz.; mix.—*Dose*. 2 to 4 drs., every morning; in worms.

Confection of Turpentine. *Syn.* CONFEC'TIO TEREBINTH'INÆ, L. *Prep.* (B. P.) Oil of turpentine, 1 fl. oz.; liquorice powder, 1 oz.; triturate together, then add clarified honey, 2 oz.—*Dose* and *use*, as the last.

Confection of Worm-seed. *Syn.* CONFEC'TIO CIN'Æ, C. S. CINÆ, L. *Prep.* 1. (Ph. Slesvico-Holsat. 1831, and Ph. Suec. 1845.) Worm-seed, 2 oz.; heat it in a pan over a gentle fire, add white sugar, boiled to a low candy height, 4 oz.; and stir together until they become dry; then pick out those seeds which are covered with sugar, and repeat the process with the others.

2. Powdered worm-seed and syrup of orange peel, equal parts.—*Dose*. 1 to 2 drs., night and morning, followed by a brisk purge; in worms.

CONFEC'TIONERY. See CANDIES, DROPS, LOZENGES, SUGAR, &c.

CONGELA'TION. The conversion of a substance from the fluid to the solid state by the abstraction of heat. See ICE and REFRIGERATION.

CONGLU'TINUM (Bracy Clarke's). Sulphate of zinc (white vitriol), 4 oz.; dissolved in water, 1 pint. *Used* as an astringent lotion in veterinary practice, and, much diluted with water (a dessert-spoonful to ½ pint or more of water), as a collyrium in chronic inflammation of the eyes.

CO'NIA. $C_8H_{15}O$. *Syn.* CO'NINE, CON'ICINE. An alkaloid, discovered by Gieseke in hemlock. It exists in every part of the plant, but is present in the largest quantity in the seed.

Prep. (Gieger.) The seeds of hemlock, or their alcoholic extract, is distilled with water and potassa. The conia passes over into the receiver, and floats on the top of the water, which also contains a little conine in solution. It is purified in the way directed for the volatile bases. (See ALKALOID.) When the alcoholic extract is employed, about half its weight of potassa should be used.

Prop., &c. Pure conia is an oily looking liquid, smelling intensely of hemlock, or rather of a combination of the odours of tobacco and mice; volatile at common temperatures; reddens turmeric; boils at about 340° Fahr., but readily distils over with water at 212°; sp. gr. ·89; with the acids it forms salts, some of which are crystallisable. 6 lbs. of fresh and 9 lbs. of dried seeds yielded 1 oz. of conia. (Gieger.) 40 lbs. of the ripe but green seeds yielded 2½ oz. of hydrated conia. (Christison.)

Conia is remarkably poisonous. 1 drop, placed in the eye of a rabbit, killed it in 9 minutes; 5 drops, poured into the throat of a dog, killed it in less than a minute. It has been employed in some convulsive and spasmodic diseases, but is now seldom used medicinally. "The plaintive cries, the contortions, and the rigidity of the limbs, which have always preceded death (caused by conia), leave no doubt as to the cruel pains which this kind of poisoning brings on." (Boutron-Chalard and Henry.) The *treatment* may be that recommended under ACONITE and HEMLOCK.

CON'SERVE. *Syn.* CONSER'VA, L. Recent vegetable matter, as flowers, herbs, roots, fruit, and seed, beaten with powdered sugar to the consistence of a stiff paste, so as to preserve them, as nearly as possible, in their natural freshness. Conserves are made both by the confectioner and the druggist; by the first, as SWEETMEATS; by the other, chiefly as vehicles for more active medicines. The London College of Physicians now includes both conserves and electuaries under the general head of CONFECTIONS. The term appears, however, in some cases, scarcely appropriate. The word confection has a more general application, and implies any sweatmeat or composition in which sugar is the principal ingredient. See CONFECTION and ELECTUARY.

Conserve of Ac'etate of Potas'sa. *Syn.* CONSER'VA POTAS'SÆ ACETA'TIS, L. *Prep.* (Bories.) Acetate of potassa, ½ oz.; sulphate of soda, 1 dr.; juices of scurvy grass, fumitory, and dandelion, of each, 2 oz. (reduced to one half by gentle evaporation?); sugar, q. s. to make a conserve. A teaspoonful, 2 or 3 times daily, as a diuretic aperient; in obstruction of the bowels, &c.

Conserve of Al'monds. See CONFECTIONS.

Conserve of Angel'ica. *Syn.* CORSER'VA

ANGEL'ICÆ, L. *Prep.* (Giordano.) Fresh angelica root, 2 parts; water, 16 parts; macerate for a few hours, clarify the liquor, add sugar, 3 parts; cook the root in the syrup, and preserve it in this state (confection), or dry it (to a candy). *Used* as an agreeable tonic, stomachic, and carminative.

Conserve, Antiscorbu'tic. *Syn.* CONSER'VA ANTISCORBU'TICA, L. *Prep.* (Selle.) Horse-radish, water-cress, and water-trefoil, orange-juice, and radish-juice, equal parts; powdered white sugar, q. s. to make a conserve. In scurvy, &c.

Conserve of A''rum. *Syn.* CONSER'VA A''RI, C. A. MACULA'TI, L. *Prep.* From fresh arum tubers (cuckow-pint or wake-robin), ½ lb.; sugar, 2½ lbs. As a diuretic and attenuant in dropsy, or as an expectorant in chronic coughs. —*Dose.* ½ teaspoonful, gradually increased.

Conserve of Broom. *Syn.* CONSER'VA SCOPA''RII, L. *Prep.* (Van Mons.) Broom flowers, 1 part; sugar, 2 parts.—*Dose.* ½ to 2 teaspoonfuls, 2 or 3 times a day; in dropsy, gout, rheumatism, &c.

Conserve of Hips. See CONFECTION.

Conserve of Lavender. *Syn.* CONSER'VA LAVENDU'LÆ, L. Lavender flowers, 1 part; powdered lump sugar, 3 parts; beaten together to a smooth paste. *Used* to sweeten the breath. In a similar way conserves are made from various other leaves and flowers; but mostly with only twice their weight of sugar, when they are not very odorous or active.

Conserve of Lem'on Peel. *Syn.* CONSERVA LIMO'NIS, C. L. CORT'ICIS, L. As CONFECTION OF ORANGE PEEL.

Conserve of Mal'lows. *Syn.* CONSER'VA MAL'VÆ, L. From the flowers, as CONSERVE OF LAVENDER.

Conserve of Or'ange Peel. See CONFECTION.

Conserve of Pep'permint. See CONFECTION.

Conserve of Rose'mary. *Syn.* CONSER'VA ROSMARI'NI, L. As CONSERVE OF LAVENDER.

Conserve of Roses. 1. See CONFECTION.

2. (ACIDULA'TED CONSERVE OF ROSES. CONSER'VA RO'SÆ AC'IDA, L.) *Prep.* (Hosp. F.) Confection of roses and powdered gum, of each, 1 oz.; sulphuric acid, 1 dr. to 1½ dr.; (diluted with water, 2 drs. An excellent substitute for tamarinds.

Conserve of Sav'in. *Syn.* CONSER'VA SABI'NÆ, L. *Prep.* (Ph. Han.) Fresh savin, 1 part; sugar, 2 parts. As an emmenagogue; in amenorrhœa, &c. Three parts of sugar make a better conserve.

Conserve of Scurvy Grass. *Syn.* CONSER'VA COCHLEA''RIÆ, C. C. HORTEN'SIS, L. *Prep.* (Ph. Aust. 1836.) Fresh scurvy grass, 1 lb.; sugar, 3 lbs. Stimulant and antiscorbutic.

Conserve of Sea Worm'wood. *Syn.* CONSERVA ABSINTH'II MARITI'MI, L. *Prep.* (Ph. [illegible]) From sea wormwood, as the last. [illegible]machic bitter and vermituge; in dys-[illegible]

[illegible] of Sloes. *Syn.* CONSER'VA PRU'NI SYLVES'TRI, L. *Prep.* (Ph. L. 1788.) From the pulp of the fruit, 1 part; sugar, 3 parts. Astringent. Useful in simple diarrhœa, &c.; either alone or combined with chalk.

Conserve of Squills. *Syn.* CONSER'VA SCILLÆ, L. *Prep.* (Ph. L. 1788.) Fresh squills, 1 oz.; sugar, 5 oz. Diuretic, attenuant, and expectorant; in dropsy, chronic coughs, &c.—*Dose.* 10 to 20 grs.

Conserve of Tam'arinds. *Syn.* CONSER'VA TAMARIND'ORUM, L. *Prep.* (P. Cod.) Tamarind pulp, 2 oz.; white sugar, 3 oz.; evaporate by the heat of a water bath to the consistence of honey.

Conserve of Vi'olets. *Syn.* CONSER'VA VIO'LÆ, C. V. ODORA'TÆ, L. *Prep.* (Soubeiran.) Flowers, 1 part; sugar, 3 parts; beat to a paste. Demulcent and laxative; used as a purge for infants, and by ladies to perfume the breath.

Conserve of Wa'ter-cress. *Syn.* CONSER'VA NASTUR''TII, L. *Prep.* (Ph. Græca, 1837.) From fresh water-cresses, as the last. In scurvy; taken *ad libitum*.

Conserve of Worm'wood. See CONSERVE OF SEA WORMWOOD.

CONSTIPA'TION. *Syn.* CONSTIPA'TIO, OBSTIPA'TIO, L. Surgeons distinguish between costiveness and constipation. The first applies to that condition of the body in which the bowels act tardily, and in which the fæces are abnormally and inconveniently indurated; the last implies the absence of the proper alvine evacuations. The one rapidly undermines the health; the other destroys life in a period varying from a few days to 3 or 4 weeks. In popular language, however, the words are frequently used synonymously. The use of bread containing alum, and water containing much lime (very hard water), and the want of sufficient exercise, are common causes of constipation.

Treatment. When the affection is merely accidental or occasional, a dose of some aperient or cathartic is the only treatment necessary; but when it is habitual it calls for further attention. Great benefit may generally be secured by adopting a diet free from astringents, and consisting of a large portion of green vegetables and ripe fruit; particularly avoiding the use of over-cooked, salted, or dried animal food. Brown bread may be eaten, as it acts as a gentle laxative, from the bran it contains. The occasional use of aperient and emollient enemata may be had recourse to; but their habitual administration, as well as that of purgative medicines generally, by the mouth, is not to be recommended. The bowels, accustomed to the continual use of stimulants, act but languidly or scarcely at all without their application. In females, especially of the higher classes, the want of proper exercise is commonly the chief cause of this affection. With such persons, a short walk, two or three times daily, will often do wonders, particularly if a little ripe fruit, a few raisins or tamarinds, or,

still better, 2 or 3 drum figs, be occasionally eaten. In some cases of obstinate constipation a cold-water dressing, placed over the pit of the stomach or the abdomen, will cause the bowels to act in the course of an hour or two. When the inactivity of the bowels arises from a deficiency of bile (one of the most common causes), no remedy is more natural, or more effective, than inspissated ox-gall. In cases complicated with nervous, hypochondriacal, or hysterical affections, in chlorosis, dyspepsia, depraved appetite, and numerous other ailments, this remedy frequently succeeds, after the most active articles of the materia medica have been tried in vain.

In the treatment of the constipation of infants, castor-oil (½ teaspoonful occasionally), or manna (¼ to ½ oz., sucked at will), may be given. The introduction (very gently) of a little slip of writing paper, parsley stalk, or suet, is a method sometimes adopted successfully by nurses. Friction on the stomach and bowels with the warm hand, or a piece of soft flannel, should also be employed. See GALL, PURGATIVE, &c.

CONSUMP'TION. See PHTHISIS.

CONTA'GION. See DISINFECTANT.

CONTU'SION. A hurt, or injury to the flesh, such as might be caused by a blunt instrument or by a fall, without breach or apparent wound. For *treatment*, see BRUISE.

COPAI'BA. *Syn.* COPAI'VA, COPAIVA BALSAM, CAPIV'I, BALSAM OF CAPIV'I; COPAI'BA (Ph. L. E. & D.), L.; BAUME DE COPAHU, Fr.; COBAIVA BALSAM, Ger. "The oleo-resin, of a brown colour, obtained by incision from the trunk of *Copaifera multijuga*." (B.P.) Most of the balsam of commerce is obtained from Para and Maranhao. It is packed in casks containing from 1 to 1½ cwt. each, or in large bottles, or in cylindrical tin boxes.

Prop., Purific., &c. Copaiba, though usually called a 'balsam,' is not correctly so named, as it contains no benzoic or cinnamic acid. It is correctly described in the B. P. as an 'oleo-resin.' Considerable variation exists in the colour, odour, consistence, and transparency, as well as in the proportion of oil and resin yielded by different samples, scarcely any two of which exactly agree. The sp. gr. varies from ·950 to ·996. Brazilian copaiba is thin, clear, and pale; whilst the West Indian variety is thick, golden yellow, less transparent, and has a less agreeable and somewhat terebinthinate smell. Some varieties are opaque, and continue so unless filtered. This is often a most troublesome operation. The opacity generally arises from the presence of water, which it retains with great tenacity. The following is the plan we have found to answer on the large scale:—Place the casks upon their ends in a warm situation, and leave them so for 10 days or a fortnight, or longer, if convenient. They may then be tapped a little above the bottom, when the contents of some of them will generally be found quite transparent, and may be drawn off and vatted, care being taken to avoid shaking up the bottom. The copaiva that remains foul must be filtered through one or more long Canton flannel bags, sunk in the bottom of a tin cistern, placed over a suitable receiver, in a similar way to that adopted for oils; a few pounds of coarsely powdered charcoal being mixed up with the first 5 or 6 gallons thrown in. This will rapidly fill up the pores of the bag, and make the balsam soon flow clear and pale. The "bottoms" of the casks, containing the water and impurities, may be poured into a large can or jar, and allowed to settle for a few days, when the copaiba may be poured off the top and filtered. A sudden change of temperature will frequently turn a transparent sample of this article opaque or milky; it is not, therefore, deemed fit to send out by the wholesale trade, unless it stands this test. To ascertain this point, a common practice is to fill a small bottle with the copaiba, and to leave it out of doors all night in an exposed situation.

Pur., Tests, &c. This substance is frequently adulterated; indeed, fully one half that sold for copaiba does not contain 10% of the genuine balsam. This is particularly the case with that sold in capsules, at low prices, in the shops. Pure balsam of copaiba may be recognised by the following characters:—

1. (Ph. E.) It is transparent; free of turpentine odour when heated; soluble in 2 parts of alcohol; and dissolves one fourth of its weight of carbonate of magnesia with the aid of a gentle heat, and continues translucent.

2. (Chevallier.) A drop of the balsam, placed on a piece of unsized paper, and heated until all the essential oil is expelled, forms a semi-transparent, well-defined spot; but if the balsam has been adulterated with a fatty oil, it is surrounded by an oily areola.

3. (Planche.) 2½ parts of balsam shaken with 1 part of solution of ammonia, sp. gr. ·965, forms a mixture which becomes clear and transparent in a few moments, and may be heated to 212° Fahr. without becoming opaque.

4. (Vigne.) Boiled with 50 times its weight of water for 1 hour, it should lose at least half its weight.

5. (Adder.) By agitating the suspected sample with a lye of caustic soda, and setting the mixture aside to repose, the balsam after a time rises to the surface, and the fatty oil present (if any) forms a soapy, thick mass below.

6. ('Journ. de Pharm.,' 1842.) Pure copaiba may be adulterated with 50 per cent. of a fat oil (nut, almond, or castor oil), without it ceasing to give a clear solution with 2 parts of alcohol; but it combines badly with magnesia and ammonia. Excess of alcohol, however, separates the oil in all cases. The best test for detecting the fat oils is the use of

pure alcohol, to which some caustic potash has been added.

Uses, &c. Balsam of copaiba is considered detersive, vulnerary, diuretic, and astringent; and appears to possess a sort of specific power over diseases of the mucous membranes of the urino-genital organs. It is hence a favorite remedy in gonorrhœa, as soon as the first inflammatory symptoms have subsided, antiphlogistic and soothing measures being previously adopted.—*Dose.* 20 to 60 drops on sugar, floating on water, or made into an emulsion with yolk of egg or gum arabic, 3 or 4 times daily, if the stomach will bear it. The addition of a few drops of sweet spirits of nitre and laudanum have been recommended, to allay the nausea. By adding 1 dr. of oil of orange (ol. aurantii) to each oz. of the balsam, its flavour becomes far from disagreeable, and it sits well upon the stomach. Copaiba is also given in capsules and pills. See CAPSULES, EMULSION, OIL, PILLS, &c.

Obs. Numerous preparations of this article are sold under such names as 'soluble copaiba,' 'specific solution,' 'salt of copaiba,' &c.; none of these appear to possess equal activity and certainty of operation to the natural balsam. As the whole virtue of copaiba as a medicine depends on the essential oil it contains, the value of any of these preparations may be estimated by the quantity of that article which is found in them. In the case of the first two articles above named, the quantity is very small indeed, and in the last it is wholly deficient.

The following forms are current in the trade for the reduction (adulteration) of balsam of capivi:—

1. Balsam of copaiba, 4 lbs.; castor oil, 3 lbs.; mix well.

2. Balsam, 7 lbs.; castor oil, 4 lbs.; yellow resin, 2 lbs.

3. Equal parts of balsam of copaiba and Canada balsam.

4. To the last add, Venice turpentine, 1 lb.

5. Balsams of Canada and copaiba, and nut or castor oil, equal parts.

6. Copaiba, 7 lbs.; nut oil, 3 lbs.; yellow resin, 2 lbs; Canada balsam, 1 lb. *Used* to fill the cheap capsules; and to sell in the lower parts of London and in the manufacturing districts. See also FACTITIOUS COPAIBA (*below*).

Copaiba, Facti″tious. *Syn.* COPAI'BA FACTI″TIA, BAL'SAMUM COPAI'BÆ FACTI″TIUM, L. *Prep.* 1. Castor oil (warm), 7 quarts; copaiba bottoms, 1 quart; mix, and filter through flannel.

2. Castor oil, 1 gal.; yellow resin, 3 lbs.; Canada balsam, 2 lbs.; oil of juniper, 2 oz.; oil of savin, 1 oz.; essences of orange and lemon, of each, ½ oz.; powdered benzoin, 2 oz.; melt the resin with the castor oil and benzoin, and when nearly cold add the essences.

3. Canada balsam, 9 lbs.; castor oil, 7 lbs.; yellow resin, 1 lb.; Venice turpentine, 2 lbs.; oils of rosemary, juniper, and savin, of each, 1 dr.; essential oil of almonds, 20 drops.

4. Canada balsam, 3 lbs.; Venice turpentine, 1 lb.; oils of fennel, juniper, and savin, of each, q. s.

Used chiefly to fill capsules. It is readily distinguished from balsam of copaiba by the proper tests. (See *above.*) Train oil or nut oil is frequently substituted for the castor oil.

Copaiba and Ka'li. *Syn.* COPAIBA CUM POTASSÂ, L. *Prep.* Carbonate of potassa and water, of each, equal parts; dissolve, and add, gradually, transparent balsam of copaiba, until the fluid, at first milky, turns quite clear. Resembles miscible copaiba (see *below*).

Copaiba, Mis'cible. *Prep.* From balsam of copaiba (pure and transparent), mixed with half its volume of solution of potassa made of double the strength ordered in the B. P.

Obs. As different samples of copaiba often require slightly different quantities of the solution of potassa, it is best to mix the two gradually and cautiously together. Should the mixture be opaque, a little more of one or other of the ingredients, as the case may be, will render it clear. No heat must be used. This article is miscible with water, with which it forms a kind of milk; and from containing all the volatile oil of the copaiba, is a very valuable preparation. Its activity is considered equal to that of the balsam itself, and it is given in similar doses.

Copaiba, Sol'uble. *Syn.* COPAI'BA SOLUBIL'IS, L. *Prep.* 1. Heat miscible copaiba in an earthen, glass, or bright-tinned copper vessel, to nearly the boiling-point, pour it while still hot into a separator, cover it up, and allow it to cool very slowly. After a few days, draw off the clear portion from a cock or hole placed at or near the bottom of the vessel, observing to reject the first few drops which pass through, and to stop the stream before any of the floating oil (*oleum copaibæ*) reaches the orifice. A very little concentrated liquor of potassa, added before applying the heat, renders it more soluble. Thick, transparent, soluble in pure water, and resembles the natural balsam in appearance.

2. Balsam of copaiba and solution of potassa (B. P.), equal parts, by volume; mix, boil for a few minutes, and then proceed as before. Thinner than the last.

Prop. Less powerful than miscible copaiba, but it sits better on the stomach, and is about four times as strong as specific solution of copaiba. See SOLUTION.

Copaiba, Res'in of. *Syn.* COPAI'BÆ RESI'NA, L. The residuum left in the process of distilling the oil of copaiba from the balsam. It consists principally of copaibic acid. It has been recommended for gonorrhœa, but is nearly inert, even in ½ oz. or ¾ oz. doses. See OIL.

Copaiba, Salt of. *Syn.* SAL COPAI'BÆ, L. There are two preparations sold under this name; the one, crude copaibic acid; the other,

copaibate of an alkali. Neither of them possesses the valuable properties of copaiba, which reside almost entirely in its essential oil. "We have taken the 'sal copaibæ,' and have watched its action on others, but have not been able to perceive any good effects to result from its administration." (Cooley.)

COPAI'BIC ACID. *Syn.* CAPIV'IC ACID, YELLOW RESIN OF COPAIBA. An amber-coloured, brittle, semi-crystalline, resinous substance, obtained from resin of copaiba, soluble in alcohol, rectified spirit, ether, and oils, reddens litmus paper, and forms salts with the bases, called copaibates.

CO'PAL. *Syn.* COPAL', GUM COPAL. A resinous substance, which exudes spontaneously from various trees belonging to the genera *Hymenæa, Guibourtia,* and *Trachylobium.* The varieties commonly met with in commerce are East Indian copal, or anime, which is the produce of *Hymenæa Courbaril,* and West Indian copal, obtained from numerous species.

Prop. When of good quality, it is too hard to be scratched by the nail, has a conchoidal fracture, and a sp. gr. ranging from 1·059 to 1·072. Unlike other resins, it is dissolved with difficulty by alcohol and essential oils; and this property, combined with its extreme hardness, renders it very valuable for making varnishes. See VARNISH.

COP'PER. Cu. *Syn.* CU''PRUM, L.; CUIVRE, Fr.; KUPFER, Ger.

Sources. Metallic copper (native copper) is found in many parts of the globe, diffused in isolated particles in the form of thin laminæ, in loose grains intermixed with quartz (copper sand, copper barilla), in dendritic pieces, and in solid blocks, occasionally of many tons weight. The richest deposits of native copper are those of Lake Superior, in North America. More frequently and more abundantly it occurs as an ore, *e. g.* red oxide, black oxide, green carbonate of copper or mal'achite, blue carbonate of copper, vitreous sulphide of copper, purple copper, copper pyrites, or yellow copper ore, with sulphur, antimony, or arsenic, and other metals (true gray copper ore or fah'lerz), as an impure hydrated silicate (chrys'ocolla), and as an impure hydrated oxychloride (atac'amite). The most abundant and important ore is copper pyrites. It is principally obtained from the mines of Cornwall, Devonshire, and Cuba. The carbonates of copper are now largely imported from Australia. The metal produced by smelting them is generally of the best quality.

Prep. We shall not attempt to give a minute description of the complex processes by which the reduction of copper from its ores is effected, but will merely give an outline of the common or Welsh process. This process includes six distinct operations, as follows:—1. The ore (copper and iron pyrites), containing from 8 to 10% of copper, is roasted in a reverberatory furnace, called a 'calciner,' by which much of the sulphide of iron is converted into oxide. 2. The calcined ore is melted with 'metal slag' (a product of a subsequent operation—No. 3), in a melting furnace called the 'ore furnace.' The products are a regulus, termed 'coarse metal,' containing about 35% of copper, and 'ore-furnace slag,' which is thrown away. Much of the iron, and the whole of the so-called earthy matter of the ore, are thus separated, as slag. 3. The coarse metal, having been granulated by causing it to flow from the furnace into water, is calcined with free access of air in a calciner, and a considerable amount of sulphur is expelled. 4. The calcined, granulated, coarse metal is melted, with the addition of matters rich in oxides of copper, namely, 'roaster' and 'refinery slags' (from the two remaining operations, Nos. 5 and 6, respectively), and native carbonates of copper, or ores containing oxide of copper. The products are a regulus, termed 'metal,' which contains about 75% of copper, and metal slag (see No. 2). The metal should be in the state of 'white metal,' compact and brittle, with a feeble metallic lustre and a dark bluish-gray colour. It is tapped off into sand moulds. 5. The pigs of regulus obtained by the last operation are roasted in a furnace through which air passes. The temperature is so regulated that the regulus may be melted in from 6 to 8 hours. The slag is skimmed off, and after a time the heat is lowered, to allow the regulus to solidify. It is again melted and tapped into sand moulds, the product being called 'blister copper.' 6. This, the last operation, is termed 'refining.' From 6 to 8 tons of blister copper, in pigs, are melted in a furnace, and kept exposed for about 15 hours to the oxidising influence of the air. The slag is skimmed off through the end opening. When the oxidation has been sufficiently prolonged, anthracite or free-burning coal, as pure as possible, is thrown upon the surface of the metal, and after a short time the thick end of a long birch or oak pole is plunged into the molten mass. This part of the operation is termed 'poling.' The wood in contact with the copper is rapidly decomposed; much gas is evolved, which causes the metal to be splashed about, and every part of it to be exposed to the reducing action of the coal. When the refiner finds the metal to be at the state of 'tough pitch,' the pole is taken out, and the coal pushed back from the end opening, through which the copper is then ladled out as quickly as possible, and cast into suitable moulds. For full details of this and other processes, the reader is referred to Dr. Percy's work on 'Metallurgy.'

In the laboratory, copper is commonly employed under the following forms:—

1. BEAN-SHOT COPPER. Produced by simply lading the melted copper from the refining furnace into hot water. In small lumps like peas and beans; hence its name. Used to make alloys, solutions, &c.

2. ELECTROTYPE COPPER. A very pu

form, obtained by decomposing sulphate of copper in an electrotype apparatus. It does not contain lead, whereas most varieties of commercial copper do contain that metal.

3. FEATHER-SHOT COPPER, GRANULATED C. Produced by lading the refined copper from the furnace into cold water. In small pieces, with a feathered edge. *Used* to make calamine, brass, solution of copper, &c.

4. COPPER IN PLATES OR FOIL. Those of commerce (best, annealed) are generally employed.

5. COPPER IN POWDER.—*a.* A solution of sulphate of copper is heated to the boiling-point, and precipitated with distilled zinc; the precipitated copper is then separated from the adherent zinc by dilute sulphuric acid, washed with water, and dried by exposure to a moderate temperature.

Prop., &c. Copper has a brilliant yellowish-red colour, a nauseous, styptic taste, and emits a disagreeable odour when rubbed; is very malleable and ductile; unchanged in dry air; in damp air it soon becomes covered with a greenish rust (carbonate of copper); slightly soluble in dilute sulphuric and hydrochloric acid; freely soluble in boiling oil of vitriol (sulphurous anhydride being evolved); dilute nitric acid dissolves it readily with copious evolution of nitric oxide; heated to redness in the air, it rapidly becomes covered with a black scale (oxide); it fuses at a full red heat; its crystals are either octahedra or dodecahedra; sp. gr. 8·8 to 8·96; it forms numerous compounds (alloys and salts) with other bodies, all of which are more or less poisonous; its salts are either blue or green, and most of them (when neutral) are soluble in water.

Tests. Metallic copper may be recognised by the above properties; its oxides, salts, &c., by the following characters and reactions:—The solutions of copper possess a blue or green colour, which they retain even when considerably diluted with water:—With caustic potassa they give a light-blue, bulky precipitate, turning blackish-brown or black on boiling the liquid:—Ammonia and carbonate of ammonium produce a bluish-white precipitate, soluble in excess, yielding a rich deep-blue solution:—The carbonates of potassium give a like precipitate, insoluble in excess:—Ferrocyanide of potassium gives a reddish-brown precipitate:—Sulphuretted hydrogen and sulphydrate of ammonium give blackish-brown or black ones:—A polished rod of iron, on immersion in an acidulated solution, quickly becomes coated with metallic copper.

Estim., &c. Copper is generally WEIGHED under the form of black oxide, but sometimes as pure metal:—By throwing it down from its solution by pure potassa, after which it must be carefully collected, washed, dried, ignited in a platinum crucible, and weighed therein as soon as it is cold. Every 5 parts of the ignited precipitate (oxide) represents 4 parts of copper (nearly); or, more accurately, every 39·7 parts are equal to 31·7 of pure metallic copper:—By immersing a piece of polished steel in the solution, and weighing the resulting precipitate of the copper (see *above*). Less delicate than the preceding.

Copper can be separated from the other metals by means of the following processes:—

From lead. By adding sulphuric acid to the nitric solution, and evaporating to dryness, when water digested on the residuum will dissolve out the sulphate of copper, but leave the sulphate of lead behind. From this solution the oxide of copper may be thrown down as before.

From tin. By digestion with hot nitric acid, which dissolves out the tin.

From zinc. By sulphuretted hydrogen, which throws down the sulphide of copper from an acid solution.

From silver. By digesting it in the state of filings or powder in a solution of chloride of zinc, which dissolves the first, but leaves the last unchanged.

Copper may be separated, in a state of great purity, from ANTIMONY, ARSENIC, BISMUTH, LEAD, IRON, TIN, ZINC, &c., as it exists in bell-metal, brass, bronze, gun-metal, mosaic gold, and other commercial alloys, by fusing it in a crucible for about half an hour, along with copper scales (black oxide) and ground bottle-glass, or other like flux. The pure metal is found at the bottom of the crucible, whilst the impurities are either volatilised or dissolved in the flux. The proportions for refining commercial copper are, metal, 10 parts; copper scales and bottle-glass, of each, 1 part. The Society of Arts conceived this process to be so valuable, that they presented one of their gold medals to its inventor, Mr. Lewis Thompson.

Uses, &c. The ordinary uses of copper are well known. In *medicine*, 3 or 4 grs. of the filings or powder were formerly given in rheumatism, and to prevent hydrophobia. Some of its salts are still used as astringents, emetics, and caustics. Its alloys are of great value. With zinc it forms BRASS; with tin, BRONZE, BELL-METAL, GUN-METAL, and SPECULUM-METAL. WHITE COPPER is formed by the addition of metallic arsenic, and GERMAN SILVER is a mixture of nickel, zinc, and copper.

Ant. Copper in the metallic state is almost inert, but all its compounds are poisonous. The antidotes are the white of egg, milk, or flour, mixed with water. The hydrated sulphides of iron, iron filings, and ferrocyanide of potassium have also been strongly recommended, and are exhibited in the same way. Sugar is likewise highly spoken of as an antidote. In all cases a strong emetic should be first given.

Obs. Culinary and pharmaceutical vessels are very commonly made of copper, but too much caution cannot be exercised in their employment. Acid syrups, vegetable juices,

aqueous extracts, soups, stews, &c., prepared in copper saucepans, or boilers, receive a metallic contamination proportional to the length of time they are exposed to the action of the metal. Such vessels are frequently tinned, for the purpose of protecting the copper from contact with their contents, but this film of tin is necessarily very thin, and soon becomes imperfect by constant use. When copper vessels are allowed to remain wet or dirty, or, more especially, greasy, a poisonous green rust forms upon the surface, somewhat similar to verdigris. If articles are prepared in them in this state, serious consequences may ensue. Cases of poisoning from this cause are frequently met with, and instances of vomiting following the use of such articles are almost of daily occurrence, without the reason being suspected. We have occasionally seen confections and extracts, prepared in copper pans, deposit a coating of that metal upon the knives used to stir them. The ashes of the inspissated juices of fresh vegetables, and especially the pulps of fruit, prepared in vessels of this metal, have exhibited the presence of copper on the application of chemical tests. Ketchup is frequently rendered poisonous in this way. The most wholesome material for culinary utensils is thin sheet iron, or tinned iron-plate (TIN), which is very durable if kept clean and dry when not in use. Copper vessels of every kind should be cleaned out, immediately before use, even though they may not appear to require it, and on no account should they be employed for any fluids that are the least acidulous, or that may have to remain long in them.

Copper, Neu'tral Acetate of. $Cu(C_2H_3O_2)_2$. *Syn.* NOR'MAL CU'PRIC ACETATE, ACETATE OF COPPER, CRYS'TALLISED VER'DIGRIS. *Prep.* Dissolve common verdigris or cupric hydrate in hot acetic acid, so as to form a highly concentrated solution; filter, and place in a cool situation to crystallise.

Prop. Beautiful dark, bluish-green prisms, which dissolve in 14 parts of cold and 5 parts of boiling water.

Copper, Ba'sic Acetates of. *Syn.* BA'SIC CU'PRIC ACETATES, SUB-AC'ETATES OF COPPER. Common verdigris is a mixture of several basic acetates which have a green or blue colour. One of these (SESQUIBASIC ACETATE) is obtained by digesting powdered verdigris in tepid water, filtering, and leaving the soluble part to spontaneous evaporation. It may also be obtained in a state of purity by adding liquor of ammonia in small portions to a boiling concentrated solution of the neutral acetate till the precipitate is just redissolved, and leaving the solution to cool. It forms a blue, crystalline mass, but little soluble in cold water. The green, insoluble residue of the verdigris, after treatment with tepid water, contains another acetate (TRIBASIC ACETATE); this may be formed by digesting neutral acetate of copper with the hydrated oxide. A third salt (DIBASIC ACETATE, BLUE VERDIGRIS) is prepared on a large scale in France by exposing copper to the air in contact with fermenting wine-lees.

Copper, Ammo"nio-sul'phate of. *Syn.* SULPHATE OF CUPRAMMONIUM, CU'PRO-SULPHATE OF AMMO"NIA; CU'PRI AMMO"NIO-SULPHAS, L.; CUIVRE AMMONIACAL, Fr.; KUPFER SALMIAK, Ger. *Prep.* Sulphate of copper, 1 oz.; sesquicarbonate of ammonium, 1½ oz.; rub together until carbonic acid ceases to be evolved, then wrap it in bibulous paper, and dry it in the air.

Pur. Pulverulent; dark blue; at an intense heat it is changed into oxide of copper, at first sesquicarbonate of ammonia, and, afterwards, sulphate of ammonia, being thrown off. It is soluble in water to a splendid purple-blue solution, from which the salt is precipitated by alcohol in blue crystals. This solution has the peculiar property of dissolving CELLULOSE (cotton, paper, &c.). The cellulose may be precipitated from the solution in colourless flakes by the addition of acids.

Uses, &c. It is occasionally employed in *pyrotechny*. In *medicine*, it has been given in chorea, epilepsy, hysteria, &c., but is now principally used as an injection, as a wash for foul ulcers, and as a collyrium, in opacity of the cornea.—*Dose.* ¼ gr., gradually increased to 5 grs., twice a day. Great care must be taken in drying, as it is apt not only to lose a large portion of its weight, but to become of an inferior colour. Both the ingredients should be separately reduced to powder before mixing them.

Copper, Ar'senite of. $Cu(AsO_2)_2$. See GREEN PIGMENTS (Scheele's Green).

Copper, Car'bonate of. $CuCO_3$. *Syn.* DIBA'SIC CARBONATE OF COPPER, DICARBONATE OF C.; CUPRI CARBONAS, L. *Prep.* Add carbonate of soda in excess to a solution of sulphate of copper, and warm the mixture till the pale-blue, flocculent precipitate becomes sandy and assumes a green tint. *Used* as a pigment. See GREEN PIGMENTS and VERDITER.

Obs. As prepared above, the carbonate contains 2 equivalents of water. The beautiful green mineral, MAL'ACHITE, has a similar composition, but contains only 1 equiv. of water. Another carbonate (TRIBASIC C., BLUE C.), occurs as a natural ore in large, transparent crystals, of the most intense blue; it has not yet been artificially imitated.

Cuprous Chloride. CuCl. *Syn.* DICHLORIDE OF COPPER, SUBCHLORIDE OF COPPER. *Prep.* By exposing the neutral chloride of copper to the action of heat.

Prop. White; fusible; slightly soluble in water; and decomposed by exposure to the air.

Copper, Chloride of. $CuCl_2$. *Syn.* NEUTRAL CHLORIDE OF COPPER. *Prep.* From copper scales or black oxide of copper dissolved in hydrochloric acid, and the solution evaporated and crystallised.

Prop., &c. Green, acicular crystals; deli-

quescent; soluble in alcohol, the flame of which it colours green. When gently heated, it loses water, and assumes the form of a yellowish-brown powder (ANHYDROUS CUPRIC CHLORIDE, or CHLORIDE OF COPPER); at a high temperature it loses half its chlorine, and becomes converted into cuprous chloride.

Cupric Iodide. Cu_2I. *Syn.* IODIDE OF COPPER, DINI'ODIDE OF COPPER; CU'PRI IODI'DUM, L. *Prep.* By adding iodide of potassium to a solution of sulphate of copper, and washing out with alcohol the free iodine from the precipitate formed. A greenish-white precipitate.

(Commercial.) To a solution of sulphate of copper, 1 part, and protosulphate of iron, 3 parts, add a solution of iodide of potassium, and wash and dry the precipitate. This is the preparation commonly known in trade by the name of 'iodide of copper.'

Cupric Nitrate. $Cu(NO_3)_2$. *Syn.* NITRATE OF COPPER; CU'PRI NI'TRAS, L. *Prep.* By dissolving the copper in dilute nitric acid to saturation; evaporating to dryness; redissolving in distilled water; filtering, evaporating, and allowing to crystallise; or from black oxide of copper and nitric acid in the same manner.

Prop., Uses, &c. Deep-blue prismatic crystals, very soluble in water and deliquescent, soluble in alcohol. Generally used in medicine externally, in injections, or as a caustic, but sometimes given internally, dissolved in mucilaginous liquids.—*Dose.* $\frac{1}{8}$ to $\frac{1}{4}$ gr.

Cuprous Oxide. Cu_2O. *Syn.* RED OXIDE OF COPPER, DINOX'IDE, SUBOXIDE; CUPRI SUBOX'YDUM, L. *Prep.* Add grape sugar to a solution of sulphate or acetate of copper, then further add caustic potassa, in excess; the blue solution heated to ebullition deposits the suboxide, which must then be collected, washed, and dried.

A solution of cane sugar, 27 parts, in water, 60 parts, is poured over hydrated oxide of copper (weighed in the compressed and still moist state), 9 parts; a solution of caustic potassa, 18 parts, in water, 60 parts, is then added, and the whole mass well agitated together at the ordinary temperature, and strained through linen. If the dark-blue filtrate is next heated (continually stirring), over a water bath, anhydrous cuprous oxide is disengaged, and the liquor becomes nearly colourless.

Prop., Uses, &c. A superb red powder, with a metallic lustre. It often occurs in beautiful transparent, ruby-red crystals, associated with other ores of copper, and can be obtained in this state by artificial means. It is used as a pigment and a bronze, and as a stain for glass and enamels, to which it gives a rich red colour. By heat it is converted into the black oxide. With ammonia it forms a colourless solution, which rapidly becomes blue from the action of the air.

Cupric Oxide. CuO. *Syn.* OX'IDE OF COPPER, BLACK OXIDE, PROTOXIDE; CU'PRI PROTOX'YDUM. *Prep.* By heating the nitrate or carbonate of copper to redness. When it ceases to lose weight the conversion is completed, and the oxide appears as a heavy, black powder.

By heating in the air the hydrated oxide thrown down from solutions of copper by pure potassa.

By adding caustic potassa, in excess, to a solution of a cupric salt, and heating the whole to a boiling-point; the precipitate is then collected, washed and dried. A heavy, dark-brown powder.

Uses, &c. Protoxide of copper is unchanged by heat, unless combustible matter is present, when it readily parts with its oxygen; hence its general use in ORGANIC ANALYSIS as a source of that element. It communicates a beautiful green colour to glass and enamels. With the acids it produces the ordinary salts of copper.

Cupric Sulphate. $CuSO_4.5Aq$. *Syn.* SULPHATE OF COPPER, BLUE COP'PERAS, B. VIT'RIOL; CU'PRI SUL'PHAS, L.; SULFATE DE CUIVRE, Fr.; KUPFER VITRIOL, Ger.; NEELA TOOTIA, Hind. *Prep.* (Commercial.) The sulphate of copper of commerce is obtained by the oxidation of native sulphide of copper (COPPER PYRITES); by the joint action of air, heat, and moisture, the copper is converted into an oxide, and the sulphur into sulphuric acid. The resulting salt is washed out, and the solution evaporated and crystallised. The water found in and issuing from copper mines often furnishes such a solution ready to the hands of the manufacturers. A large quantity of sulphate of copper is also obtained as a secondary product in the refining of silver, and is occasionally prepared by dissolving in sulphuric acid an oxychloride of copper, made for the purpose, by exposing sheets of copper to the joint action of air and hydrochloric acid.

(Pure.) By the direct solution of the metal, or preferably, of its oxide or carbonate, in sulphuric acid, or by purifying the commercial salt by recrystallisation, &c.

Prop., Uses, &c. Fine blue crystals, slightly efflorescent, having an intensely styptic and metallic taste. By heat the blue salt loses its water of crystallisation, and becomes a white, anhydrous powder. It dissolves in 4 parts of water at 60° Fahr., and in 2 parts at 212°; is insoluble in alcohol and ether; and is decomposed at an intense heat into protoxide of copper, sulphurous acid, and oxygen. It has been used to prevent the dry rot in timber, and in dyeing. It is largely employed as a source of metallic copper in the ELECTROTYPE. Grain is steeped in a weak solution of it by the farmer, to prevent the 'smut.' As a medicine, it is employed chiefly as a styptic (in solution) and caustic (in substance) to destroy 'proud flesh;' and, less frequently, as an astringent or tonic (from $\frac{1}{4}$ gr. to 2 grs.), and an emetic (3 or 4 grs. to 10 or 12 grs.). It is exceedingly poisonous.

COP'PERAS. This is a generic name for the CRUDE METALLIC SULPHATES. When used

without a qualifying adjective, it generally means sulphate of iron.

Copperas, Blue. Crude sulphate of copper. See COPPER (*above*).

Copperas, Calcined'. From green copperas, heated in an unglazed earthen pot until it becomes white and dry. *Used* as an astringent and 'drier,' and in making ink and dyeing.

Copperas, Green. *Syn.* COPPERAS. Crude sulphate of iron. See IRON.

Copperas, White. Crude sulphate of zinc. See ZINC.

COP'PERING. Iron may be covered with a thin film of copper by merely immersing it (previously scoured clean) in an acidulated solution of sulphate of copper, after which it must be rinsed in clean water. This film soon rubs off, but still it lasts long enough to deceive the travelling tinker's customers, who imagine that their copper kettles are properly repaired. Metals may be conveniently coated with compact copper to any desired thickness by means of voltaic electricity. See ELECTROTYPE.

COP'ROLITE. *Syn.* DUNG'STONE, FOSSIL MANURE. This mineral is the petrified dung of carnivorous reptiles. (Buckland.) Coprolites are found in all the secondary and tertiary strata. They contain a considerable proportion of phosphate of lime, for which reason they are largely employed in the manufacture of artificial manures. They form the bases of Lawes' SUPERPHOSPHATE OF COPROLITE MANURE. The nodules, after being washed, are ground to powder in a mill, and mixed with an equal weight of oil of vitriol.

COPTIS TEETA. (Ind. Ph.) *Syn.* COPTIS, or MISHMI TITA. *Hab.* Mishmel mountains, east of Assam. *Officinal part.* The dried root (*Coptidis Radix*), imported into Bengal from Assam, in small rattan baskets, each containing from 1 to 2 ounces of the drug. This consists of pieces of a woody rhizome, of the thickness of a small goose-quill and from 1 to 2 inches in length, often contracted at one extremity into a short woody stem; the surface is usually rough, irregular, more or less annulated, and marked with the remains of rootlets in the shape of short spiny points. Externally, yellowish-brown; internally, much brighter, frequently of a golden-yellow colour, exhibiting on fracture a radiated structure. Taste, persistently bitter, and when chewed tinges the saliva yellow. Contains neither tannic nor gallic acid, but abounds with a yellow, bitter principle, soluble in water and alcohol.—*Prop.* Pure bitter tonic.—*Therapeutic uses.* In debility, convalescence after fevers, and other debilitating diseases, atonic dyspepsia, and in mild forms of intermittent fevers.—*Dose.* 10 to 15 grs. of the powdered root, thrice daily.

Tincture of Coptis (*Tinctura Coptidis*). Take of coptis root, in coarse powder, 2½ oz.; proof spirits, 2 pints. Macerate for 7 days in a closed vessel, with occasional agitation; strain, press, filter, and add sufficient proof spirit to make 1 pint.—*Dose.* ½ to 2 fl. oz.

Infusion of Coptis (*Infusum Coptidis*). Take of coptis root, in coarse powder, 5 drs.; boiling water, 1 pint. Infuse in a covered vessel for 2 hours, and strain.—*Dose.* 1 to 2 fl. oz., thrice daily.

COR'AL. *Syn.* CORAL'LIUM, L. The comprehensive term for all calcareous or stony structures secreted by the marine asteroid polypes, or zoophytes. The RED CORAL of commerce, which is so largely employed for beads, ear-rings, and other ornaments, may be described as the internal skeleton of *Corallium rubrum.*

Coral, Red (Facti"tious). *Syn.* CORAL'LIUM RU'BRUM FACTI"TIUM, L. Prepared chalk, coloured with a little sesquioxide of iron or rose pink, and passed through a sieve. Sold by the druggists for powdered coral.

Coral, Prepared' Red. *Syn.* CORAL'LIUM RU'BRUM PREPARA'TUM. Levigated coral was formerly used in medicine as an antacid or absorbent, and is still occasionally employed as a dentifrice. It consists almost entirely of carbonate of lime, coloured with red oxide of iron, and possesses no advantage over good chalk. It is prepared in a similar manner as chalk.

CORD'IALS. *Syn.* CARDI'ACA, L. Warm, stimulating, restorative medicines, that tend to raise the spirits and promote the circulation. The principal cordial medicines are noticed under the heads TINCTURE and SYRUP. See also PATENT MEDICINES.

Cordials. Aromatised and sweetened spirits used as beverages. See LIQUEUR.

CORIAN'DER. *Syn.* (CORIANDER FRUIT, CORIANDRI FRUCTUS, B. P.); CORIANDERS, C. SEED; CORIANDRUM (Ph. L. E. & D.), L. "The ripe fruit of the *Coriandrum sativum*, dried." (B. P.) Coriander is chiefly used by confectioners and distillers as a flavouring ingredient. In the East it is much employed as a condiment, being an ingredient in CURRY POWDER. It is aromatic, carminative, and stimulant; and more effectually covers the taste of senna than any other substance.—*Dose.* 20 to 60 grs.; chiefly used as a corrective or adjuvant in compound medicines.

CORK. The outer bark of the *Quercus Suber* or *cork oak*, a tree common in southern France, Italy and Spain. The bark obtained from the younger branches of the same tree is employed for tanning. See ALCORNOCO.

Cork. A stopple or plug for a bottle or jar cut from the above substance. The common practice of employing inferior corks for the purpose of stopping the mouths of bottles is often productive of considerable loss, from the air being only partially excluded, and the contents suffering in consequence. Many a large bin of valuable wine has become, from this cause, in less than a year, little better than sour 'Cape.' Chemical preparations often suffer from a similar cause. The best

corks are those called 'velvet corks,' and of these the finest qualities are imported from France. No pains should be spared to obtain sound and soft cork for connecting the combustion- and drying-tubes used in organic analysis.

Several attempts have been made to introduce cork-cutting by machinery, but they have hitherto failed to supersede hand labour.

Cork-bo″rer. A thin brass tube, filed to a cutting edge, used for piercing holes through corks. Several tubes of different sizes, which fit into each other, are generally sold together. This simple and convenient instrument was introduced into the laboratory by Dr. Mohr.

CORN. *Syn.* CLA′VUS, L. A horny induration of the skin, with a central nucleus, very sensitive at the base. The common cause of corns is continued pressure over the projection of the bones, from tight or stiff boots or shoes. They are of two kinds, hard and soft. The first grow on the exposed portions of the joints; the last, between the toes.

Preven. This consists in keeping the feet clean, by frequent ablution with warm water, and in the use of easy, soft boots and shoes. Without the latter precaution, corns will generally return, even after they appear to have been perfectly removed.

Treatment. After soaking the feet in warm water for a few minutes, pare the corns as close as possible with a sharp knife, taking care not to make them bleed. They may now be touched over with a little lunar caustic, or nitric acid, or a little concentrated acetic acid or aromatic vinegar. The last two do not stain the skin. The first is used by merely rubbing it on the corns, previously slightly moistened with water; the others, by moistening the corns with them, by means of a small strip of wood, or, preferably, a rod of glass; due care being taken not to allow the liquid to touch the neighbouring parts. This treatment, adopted every 3 or 4 days for 10 days or a fortnight, accompanied by the use of soft, loose shoes, will generally effect a cure. It has been recommended to remove large corns by ligatures of silk, applied as close to their base as possible, and tightened daily until they drop off; but this plan is tedious, and often inconvenient, and is not always successful. Another mode of extirpation is, the application of a small blister, which will frequently raise them with the skin out of their beds. In this case the exposed surface must be dressed with a little simple ointment. Soft corns may be removed by applying ivy leaf, previously soaked in strong vinegar, changing the piece every morning; or by placing a dressing of soap cerate, spread on a bit of lint or old rag, between the toes. One of the simplest and best remedies for hard corns, and which has received the sanction of high medical authority, is to wear upon the toe or part affected a small, circular piece of soft leather, or, still better, a piece of amadou, spread with diachylon, or some other emollient plaster, and having a hole cut in the centre, corresponding to the size of the corn. (Sir B. Brodie.) By this means the pressure of the boot or shoe is equalised, and the apex of the corn protected from injury. The following are among the most useful of the POPULAR REMEDIES FOR CORNS:—

Corns, Caus′tic for. *Prep.* From tincture of iodine and chloride of antimony, of each, 1 dr.; iodide of iron, 3 grs.; mix. It is applied with a camel-hair brush, after paring the corn. 2 to 4 applications are said to effect a cure.

Obs. Most of the remedies noticed below really act as caustics.

Corns, Lo′tion for. *Prep.* 1. A solution of sal-ammoniac, 1 part; in proof spirit, 4 parts.

2. A concentrated aqueous solution of sulphate of copper. To be applied night and morning.

Corn Plasters. *Prep.* 1. From white diachylon, 3 parts; yellow resin, 2 parts; verdigris, 1 part; melted together, and spread on leather.

2. From galbanum plaster, 1 oz.; verdigris, 1 dr.; as the last.

3. From resin plaster, 2 oz.; black pitch, 1 oz.; verdigris and sal-ammoniac, of each, ½ dr.

4. To the last add powdered opium, 1 dr. Recommended to allay pain, &c.

5. (W. Cooley.) A piece of spread adhesive plaster is placed upon a table, and a piece of card paper having a round hole cut in it the size of the central portion of the corn is laid upon it; the exposed part is then softened by holding a piece of heated iron for a second or two near it; the card paper is then instantly removed, and nitrate of silver, in fine powder, is sprinkled over the part which has been warmed. As soon as the whole is cold, the loose powder is shaken off, and the plaster is ready for use. Very cleanly and convenient. Two or three applications seldom fail to effect a cure.

6. (MECHANICAL CORN PLASTERS.) From common adhesive plaster spread on buckskin, amadou, or vulcanised India rubber, cut into pieces, and a circular hole corresponding to the size of the corn punched in each.

Corn Sol′vent. *Prep.* 1. Carbonate of potassa or pearlash, contained in an open jar or bottle, set in a damp place, until it deliquesces into an oil-like liquid (oil of tartar). Applied by means of a feather, or a small piece of rag dipped in it is bound on the corn.

2. Hydrate of potassa, 1 dr.; rectified spirit, 1 oz.; dissolve. As No. 1.

3. Carbonate of potassa, with smalts, ochre, or bole, q. s. to give it the required colour. It must be kept dry, in a well-corked bottle. A pinch is placed on the corn, and confined by means of adhesive plaster or rag.

4. Carbonate of soda, 1 oz., finely powdered.

and mixed with lard, ½ oz. Applied on linen rag every night.

5. (Sir H. Davy's.) Carbonate of potassa, 2 parts; salt of sorrel, 1 part; each in fine powder; mix, and place a small quantity on the corn for four or five successive nights, binding it on with a rag.

Obs. Care must be taken, in all cases, to pare the corn moderately close before applying the remedy; but in *no case should any of the above be applied to a raw surface.*

Corns, Pommade' for. *Prep.* 1. Powdered verdigris, 1 dr.; savine ointment, 7 drs.

2. Dried carbonate of soda, 3 drs.; lard, 5 drs.; verdigris or smalts, q. s. to give a slight tinge of green or blue. Applied on a piece of rag.

CORRO'SIVE SUBLIMATE. See MERCURY.

CORUN'DUM. See EMERY.

COSMET'ICS. *Syn.* COSMET'ICA, L.; COSMETIQUES, Fr. External applications employed for the purpose of preserving or restoring personal beauty. The term is generally understood to refer to substances applied to the cuticle, to improve the colour and clearness of the complexion; but some writers have included under this head every topical application used with the like intention. Hence cosmetics may be divided into—CUTANEOUS COSMETICS, or those applied to the skin; HAIR COSMETICS, or such as are employed to promote the growth and beauty of the hair; and TEETH COSMETICS, or such as are used to cleanse and beautify the teeth. See BALDNESS, COSMETIQUE, DENTIFRICE, DEPILATORY, HAIR-DYE, POMMADE, TOOTH POWDER, &c.

COSMETIQUE. [Fr.] Hard pomatum, formed into a cake or stick for the toilet. It is sometimes coloured black or brown, the pigments being added in the state of an impalpable powder.

1. (BLACK—COSMETIQUE NOIR.) From good lard, 5 parts; wax, 2 parts; (or, hard pomatum, 7 parts;) melt, stir in levigated ivory black, 2 parts; and pour it into moulds of tinfoil; which are afterwards to be placed in paper sheaths.

2. (BROWN—COSMETIQUE BRUN.) As the last, but using levigated umber for 'plain brown,' and levigated terra di Sienna for 'auburn' and 'chestnut.'

3. (WHITE, OR PLAIN—COSMETIQUE BLANC.) The same, without colouring matter.

Obs. They are generally scented with musk, ambergris, or cassia.

Use. The above are used to colour moustaches, eyebrows, whiskers, &c., as well as to keep the hair in its place. The labels on the packets before us have—"pour fixer et lisser les cheveux." The application must be renewed daily, as the cosmetique is gradually removed by friction, and perfectly so by soap-and-water.

COTARN'INE. A crystallisable substance obtained from the mother-liquors of opianic acid. It is basic, very soluble, and bitter. Hydrochlorate of cotarnine is soluble and crystalline.

COT'TON. *Syn.* GOSSYPIUM, L. The cotton of which textile fabrics are made consists of hairs covering the seeds of certain plants belonging to the natural order *Malvaceæ*, or the Mallow family. Our commercial cotton appears to be derived from four distinct species, viz.:—

Gossypium arboreum. The tree cotton, an Indian species. Unlike the other cotton plants, it has the dimensions of a small tree. The cotton-hairs are remarkably soft and silky, and are woven by the natives into very fine muslin, used for turbans by the privileged classes only.

Gossypium Barbadense. The 'Barbadoes' or 'Bourbon cotton plant.' This is the species which yields all our best cotton. In the small American islands which fringe the coast from Charlestown to Savannah, this plant has produced the celebrated 'sea-island cotton,' which is unrivalled for the length of its 'staple,' its strength, and silkiness.

Gossypium herbaceum. The common cotton-plant of India. It produces the Surat cotton of commerce.

Gossypium Peruvianum or acuminatum. A species supposed to be indigenous to America. It furnishes the South American varieties of cotton, as Pernambuco, Peruvian, Maranham, and Brazilian.

Identif. See LINEN.

Dyeing. The fibres of cotton have nearly the same affinity for mordants and the colouring matter of dyed stuffs as linen, and may be treated in the same manner. See DYEING, LINEN, &c.

COTTON, GUN-. See PYROXYLIN.

COUGH. *Syn.* TUS'SIS, L. The sudden and violent expulsion of air from the lungs. It is generally symptomatic of other affections, but is sometimes idiopathic, or a primary disease. Many cases of cough depend upon the extension of catarrh to the trachea and bronchiæ, which thus become loaded with mucus or phlegm, which they endeavour to throw off by the convulsive effort called coughing. In some cases it is caused by a vitiation and inspissation of the secretions, arising from the imperfect action of the absorbents; this is the common cause of the dry cough of old people. Idiopathic cough is not considered dangerous in itself, or while running its regular course, but it is often productive of most serious consequences, by superinducing the inflammation of some organ, or laying the foundation of phthisis.

Cough is sometimes attended by copious expectoration, and at other times exists without any; it has hence been distinguished into moist or mucous cough, and dry cough.

Treatment. That of common catarrhal cough consists in allaying the irritation as much as possible, by demulcents and expectorants, as

mucilaginous drinks and lozenges, which act upon the glottis, and sympathetically upon the trachea and bronchiæ. Among the first may be mentioned, almond milk, barley water, refined Spanish juice, gum arabic, and a mixture of the last two made into lozenges; among the second, the most innocent and convenient is ipecacuanha, in the shape of lozenges, 2 or 3 of which may be sucked whenever the cough is troublesome. A light diet should be adopted, the bowels kept slightly relaxed by the use of gentle aperients, and a mild and equable temperature sought as much as possible. When this plan does not succeed, recourse may be had to an emetic, followed by small doses of Dover's powders, and extract or tincture of henbane, or squill pill. When a cough is troublesome at night, and unattended with fever, a small dose of laudanum, or tincture of henbane, taken on going to rest, will generally procure sleep. In the treatment of dry cough, the more stimulating expectorants are useful, as garlic, ammoniacum, styrax, and benzoin, combined with narcotics and sedatives, as henbane, hemlock, and opium. A diaphoretic opiate is also very useful, especially in the cough of old people. See DRAUGHT, EMULSION, MIXTURE, PILLS, &c.

COU'MARIN (kōō-). *Syn.* CU'MARIN. The odorous principle of the fruit or bean of *Dipteryx odorata* (tonquin bean). It exists in several other plants, as *Melilotus officinalis*, *Asperula odorata*, and *Anthoxanthum odoratum*.

Prep. From the sliced tonquin beans, by macerating in hot alcohol; straining through cloth, and distilling off the greater part of the spirit. The syrupy residue deposits, on standing, crystals of COUMARIN, which must be purified from fat oil by pressure, and then crystallised from hot water.

Prop. Slender, brilliant, colourless needles; fusible at 122° Fahr., and distilling at a higher temperature without decomposition. It has a fragrant odour and burning taste; it is very slightly soluble in cold water, more freely in hot water, and also in alcohol.

COUNTER-IR'RITANTS. In medicine and pharmacy, substances applied to the surface of the body to establish a secondary morbid action, with the view of relieving one already existing. In painful and spasmodic affections, as neuralgia, spasms, and cramp; in rheumatism, lumbago, swelled and painful joints; in headache, sore throat, sprains, languid glandular tumours, and many other cases, this class of medicines often proves extremely valuable. The counter-irritants which are best known are blisters, mustard poultices, hartshorn-and-oil, and liniment of ammonia.

COURT PLAS'TER. See PLASTER.

COW DUNG. This substance was formerly employed in large quantities by the calico printers. Recently, a mixture of sulphate, carbonate, and phosphate of lime and soda, with British gum or bran, has been successfully tested as a substitute for it, and has the advantage of cleanliness and economy.

COW'HAGE. *n.* COW'ITCH; MUCU'NA (Ph. L. E. & D.), D. "The hairs of the fruit *Mucuna pruriens*" (Ph. L.). "The hairs from the pods" (Ph. E.). "The hairy down" (Ph. D.). It occasions violent itching when it comes in contact with the skin, which can only be allayed by a solution of green vitriol, or by oil. It is frequently administered as a vermifuge, made into a confection, by scraping the hair off a pod into treacle, syrup, or honey, for a morning dose, which is repeated for 3 or 4 successive days, followed by a brisk purge. It acts more effectually if its administration has been preceded by a gentle emetic.

COWS. See DAIRY.

CRAB. See SHELL-FISH.

CRACK'NELS. Small, brittle cakes or biscuits, made by first boiling and then baking paste. *Prep.* To flour, 1 pint, add a little grated nutmeg, the yolks of 2 eggs, 2 or 3 spoonfuls of rose-water, and cold water, q. s. to make a paste; then roll in butter, ½ lb., and make it into shapes. In one hour put them into a kettle of boiling water, and boil them until they swim, then throw them into cold water; take them out, and when dry, bake them on tins. Those of the shops contain less butter, and the rose-water is omitted.

CRACK'NUTS. Thin and sweet cakes or wafers. *Prep.* 1. Flour, 1 lb.; sugar, ¼ lb.; melted butter, ½ lb.; 6 or 7 eggs, well beaten; make a paste with a glassful of raisin wine and a little water; add caraways, roll it out as thin as paper, cut it into shapes with a tumbler, wash the pieces with the white of egg, and dust them over with powdered sugar.

2. As the last, but using ½ lb. more flour.

CRAMP. See SPASMS.

CRAPE is cleaned by rinsing it in ox-gall and water, to remove the dirt; afterwards in pure water, to remove the gall; and lastly, in a little gum-water, to stiffen and crisp it. It is then clapped between the hands until dry.

CRAY-FISH. See SHELL-FISH.

CRAY'ONS. Colouring substances made up into small cylinders or any other convenient form for use in writing or drawing.

Crayons, Draw'ing. *Prep.* 1. Spermaceti, 3 oz.; boiling water, 1 pint; agitate together till they form a species of emulsion; add bone ash, 1 lb. (or more, previously reduced to an impalpable powder), and colouring matter, q. s. to give the proper tint; reduce the whole to a perfectly homogeneous paste, and form it into crayons.

2. Pipeclay and the finest prepared chalk, equal parts; or pipeclay alone, q. s.; colouring, a sufficient quantity; make them into a paste with pale mild ale.

3. White curd or Castile soap, cut into thin shavings, 1 oz.; boiling water 1 pint; dissolve, and when cold, add gradually, as much rectified spirit of wine as will render the liquid

barely transparent. With this fluid make equal parts of the finest elutriated clay and chalk into a stiff paste, adding colouring matter, q. s., as before. For common qualities, the spirit of wine may be omitted, but the mass will then dry more slowly.

4. Curd soap, 1½ oz.; gum arabic, ½ oz.; boiling water, 1¼ pint; dissolve, and use it as the last. General Lomet uses a similar mixture to work up the softest varieties of hematite, with which he thus forms superior red crayon.

5. (Process of the Brothers Joel, of Paris.) Shell-lac, 3 parts; spirit of wine, 4 parts; oil of turpentine, 2 parts; dissolve; add pure clay, 6 parts; colouring matter, q. s.; form the mass into crayons, and dry them by a stove heat.

6. Pale shell-lac, 5 parts; wood naphtha, 12 parts; dissolve, and with this fluid mix up the colouring powder, previously stirred up with an equal weight of fine pale-blue clay; dry by a stove heat, as before. When this process is well managed, it produces crayons equal to those of the best Parisian houses.

Obs. The composition may be formed into crayons by simply rolling it on a slab; but to ensure their solidity the manufacturers generally employ a metallic cylinder of 2 or 3 inches in diameter, with one end open and the other firmly secured to a perforated plate, having holes of the same size as the intended crayons. The crayon composition, in the state of a stiff paste or dough, is introduced into the open end, and is forced down and through the holes, by means of a small plug or piston, that exactly fits the inside of the cylinder, and which is driven by the equable motion of a small screw. The pieces that pass through the holes are then cut into lengths and dried.

The substances employed as colouring matters for crayons are very numerous, and their choice offers a wide field for the skill and fancy of the artist. The pigment having been selected, it may be reduced to any shade or tint by admixture with other pigments, and by 'dilution' with a proper quantity of elutriated or prepared chalk. As, however, crayon colours do not admit of being mixed together at the time of using them, like liquid colours, it is usual to make 3 to 6 different shades of each colour, so as to enable the artist at once to produce any effect he chooses.

CRAYONS, BLACK. From prepared black-lead, ivory-black, lamp-black, &c. Black chalk and charcoal are frequently made into crayons by simply sawing them into suitably sized pieces. They may then be put into a pipkin of melted wax, and allowed to macerate for an hour; after which they should be taken out, drained, and laid on a piece of blotting-paper to dry. Drawings made with these crayons are very permanent, and if warmed slightly on the wrong side, the lines will adhere, and become almost as durable as ink.

CRAYONS, BLUE. From indigo, smalts, Prussian blue, verditer, &c.

CRAYONS, BROWN. From umber (raw and burnt), terra di Sienna (raw and burnt), Cullen's earth, brown ochre, &c.; and some peculiar shades, from a mixture of black, carmine, and either of the above colours.

CRAYONS, GREEN. From a mixture of king's yellow, or yellow ochre, with blues.

CRAYONS, PURPLE. From any of the more brilliant blues, mixed with carmine, lake, or vermilion.

CRAYONS, RED. From carmine, carminated lakes, vermilion, hematite, and any of the earthy or mineral colours commonly used as pigments. Crayons of red chalk may be prepared in the manner pointed out for crayons of black chalk.

CRAYONS, WHITE. From pure clay and chalk.

CRAYONS, YELLOW. From king's yellow, Naples yellow, orpiment, yellow ochre, &c.

Crayons, Lithographic. *Prep.* 1. Tallow-soap, 7 parts; white wax, 6 parts; melt by a gentle heat, and add lamp-black, 1 part; keep it melted, with constant stirring, for 20 or 30 minutes, then let it cool a little, and cast it into moulds.

2. White wax, 4 parts; shell-lac and hard tallow soap, of each, 2 parts; lamp-black, 1 part; as last.

3. Spermaceti, white wax, and hard tallow-soap, of each, equal parts; lamp-black, q. s. to colour.

Obs. Some makers melt the soap, wax, and lamp-black, in an iron-ladle, over a brisk fire, and allow the mixture to blaze for a few seconds before adding the shell-lac, which is no sooner thoroughly incorporated than the heat is increased until the mass again kindles, when it is at once removed from the fire and stirred until it is cool enough to be poured into the moulds. This method leads to trouble and loss, without any corresponding advantage. These crayons are used to draw designs on lithographic stones.

Crayons for Writing on Glass. *Prep.* 1. From French chalk cut into suitable pieces. Marks made with these crayons, when obscured or rubbed out, may be several times revived by simply breathing on the glass.

2. (Brunquelle.) Spermaceti, 4 parts, tallow, 3 parts, wax, 2 parts, are melted together in a cup; and red lead, 6 parts, and carbonate of potassa (in fine powder), 1 part, stirred in; the mass is kept melted and stirred for about half an hour longer, then poured into glass moulds (tubes) of the thickness of a common pencil, and cooled as rapidly as possible. The mass may be screwed up and down in the tube, and cut to a point with a knife. A crayon is thus obtained which will readily write upon clean, dry glass.

CREAM. *Syn.* CREM'OR, C. LAC'TIS, FLOS LAC'TIS, L. The oleaginous portion of milk, which collects in a thin stratum upon the surface, when that fluid is left undisturbed for some time. By violent agitation, as in the

diaphoretic.—*Therapeutic uses.* Analogous to those of squill.

Juice of Crinum (*Succus Crini; Infusum Crini*, Beng. Ph.). Take of the fresh root of crinum, ½ an ounce; cold water, 2 ounces. Bruise the root in a stone mortar, gradually adding the water. Strain, with pressure, through calico.—*Dose.* From 2 to 4 fluid drachms, every twenty minutes, until the desired effect is produced.

Syrup of Crinum (*Syrupus Crini*). Take of the fresh root of crinum, sliced, 8 ounces; boiling water, 1 pint; refined sugar, 1 pound. Macerate the root in the water for two hours, bruise in a mortar, press through calico, add the sugar, and dissolve with the aid of gentle heat.—*Dose.* About 2 fluid drachms, repeated as required. *Used* as a nauseant and emetic for children.

CRO'TON OIL. *Syn.* OLEUM CROTO'NIS (B. P.), O. TIGLII (Ph. L. & D.), L. The "oil expressed from the seeds of *Croton tiglium*" or *purging croton.* This oil is a drastic purgative, and a powerful local irritant and rubefacient. Rubbed on the skin, it produces a pustular eruption, and frequently purges. In this way (diluted with thrice its weight of olive oil) it is occasionally used as a counter-irritant.—*Dose* (as a purge). 1 to 2 drops; in obstinate constipation, lead colic, &c.

CROUP. *Syn.* CYNAN'CHE LARYN"GEA, C. SUFFOCA'TIVA, C. TRACHEA'LIS, L. An inflammatory disease affecting the larynx and trachea.

Symp. A permanently laborious and suffocative breathing, accompanied by wheezing, cough, a peculiar shrillness of the voice, and more or less expectoration of purulent matter, which continually threatens suffocation. There are two varieties, acute croup and chronic croup. The latter is very rare.

Treat. Bleeding by leeches or cupping, over the region of the trachea, should be immediately had recourse to, when the symptoms are urgent; or violent local irritants, as pieces of lint dipped in strong acetic acid, or blisters, may be applied to the same part. In weakly subjects of irritable constitution, bleeding should be avoided. Dr. Larroque recommends repeated vomiting, in the croup of children; and M. Marotte and M. Boudet have adopted this plan with great success. The treatment consists in making the patient attacked with croup vomit a great number of times within the day, so as to detach the pseudo-membrane from the larynx nearly as fast as it is formed. For this purpose, M. Marotte employs one or other of the following formulæ:—

1. Tartar emetic, 1½ gr.; syrup of ipecacuanha, ½ oz.; water 2 oz.

2. Impure emetine, 3 grs.; syrup of ipecacuanha and water, of each, 1½ oz.

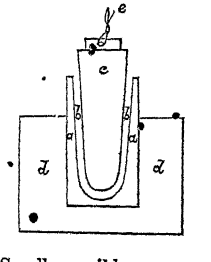
These draughts are administered by spoonfuls every ten minutes, until there has been a sufficient number of vomitings. In this manner he says he has been always able to make the patient expectorate a certain quantity of false membrane. This treatment is accompanied by the use of small doses of calomel, leeches to the throat, and blisters to the nape of the neck; but it is the opinion of M. Marotte that the vomitings alone effect the cure. Out of 25 cases that occurred at the Hôpital des Enfans, the only authenticated case of cure among all these was effected by emetics. (M. Boudet.)

The croup is a very dangerous disease, and medical aid should be immediately sought wherever it can be procured. It is principally confined to infancy, or to children under 9 years of age; but occasionally attacks adults. One of our early friends, a young medical practitioner of great promise, died of it, prematurely, after only about 20 hours' illness.

CRU'CIBLE. *Syn.* MELTING POT; CRUCIBULUM, L.; CREUSET, Fr. A vessel used by metallurgists and chemists for holding substances whilst they are exposed to a high temperature. The crucibles commonly used for fusing metals are formed of clay, or a mixture of plumbago and clay. For certain purposes, crucibles of platinum, gold, silver, iron, porcelain, and lime, are employed.

Crucibles, Earth'en. *Syn.* CLAY CRUCIBLES. From fire-clay, mixed with silica, coke, burnt clay, or other infusible matter.

Manuf. The materials, having been ground and kneaded, are generally moulded by hand upon a wooden block of the shape of the cavity of the crucible. Another method of shaping a crucible consists in ramming the ingredients into a suitable mould, formed of steel or gun-metal. (See *engr.*)



a a, External steel mould.

b b, Clay or composition for forming the crucible.

c, Internal steel mould.

d d, Wooden stand.

e, Cord or chain to withdraw the internal mould or plug.

Small crucibles are sometimes formed by pouring 'slip,' that is, clay mixed with sufficient water to give it the consistence of cream, into porous moulds, made of a species of stucco. A series of these moulds are placed upon a table and filled with the semifluid composition. By the time the whole (say 50 or 60) are filled, the 'slip' may be poured out of the one first filled, leaving only a very small quantity behind to give the requisite thickness to the bottom. The second and third may then be treated in the same way, until the whole number have been attended to. In

each mould a perfect crucible is formed, by the abstraction of the water of that portion of the 'slip' in immediate contact with the stucco, and the crucible is either thicker or thinner in proportion to the time this absorbent action has been allowed to go on. 70 or 80 crucibles may thus be easily made in less than 15 minutes. The moulds and their contents are next placed in a stove or slow oven. In a short time, from the contraction of the clay in drying, the crucibles may be removed, and the moulds, as soon as they have become dry, may be again filled; by care they will last for years.

Earthen crucibles are used both in the burnt and unburnt state. Small crucibles are generally kiln-burnt before they are used, but the large Stourbridge clay 'casting-pots,' which are extensively employed in brass foundries, are never previously burnt.

The following kinds of earthen crucibles are much used in the arts:—

Crucibles, Cornish. From Teignmouth clay, 1 part; Poole clay, 1 part; sand from St. Agnes's Beacon, Cornwall, 2 parts. When smaller and less refractory crucibles are needed, the same mixture is employed, with the addition of an eighth part of China clay, or Kaolinite from St. Austell. These crucibles are generally made round, and of two sizes, of which one fits into the other; the larger being 3 inches in diameter at the top, and 3½ inches high outside measure. They are coarse in grain, and of a grayish-white colour, spotted with dark specks. They are always kiln-burnt. Of all crucibles, none are more generally useful for metallurgical experiments.

Crucibles, Hessian. From a mixture of equal weights of Almerode clay and sand. They are generally triangular in shape, so that the melted metal may be conveniently poured out from each corner. They are usually sold in 'nests' of six crucibles, fitting one in another. In the character of their body, and in composition and qualities, they closely resemble the Cornish.

Crucibles, London. From a very refractory clay. They have a reddish-brown colour, and are close in grain. They are exceedingly useful in assaying, as they resist the action of fused oxide of lead much better than most clay crucibles. Being very liable to crack, they require to be used with care.

WHITE FLUXING-POTS. From a peculiar kind of foreign clay. They are manufactured by the Patent Plumbago Crucible Company, and are much esteemed by metallurgists, being well moulded and very refractory. They have a smooth surface, and withstand the action of fluxes satisfactorily.

Crucibles, Stourbridge-clay. From Stourbridge clay, 4 parts; burnt clay, obtained by pounding and grinding old glass pots, 2 parts; pipeclay and coke-powder, of each, ½ part.

Anstey's Patent. From Stourbridge clay 2 parts; hard gas-coke (previously ground and sifted through a sieve of ⅛th-inch mesh), 1 part.

Obs. These crucibles of Stourbridge clay are made large enough to hold forty pounds or more of melted brass. They are only dried, and not baked. For use, they are warmed, placed on the furnace, bottom upwards, the burning coke gradually heaped round them, and the firing continued until they acquire a full red heat. They are then quickly taken out of the furnace, and put in again with the mouth upwards. If placed in the furnace with the mouth upwards at first, they are sure to crack. After they have been once used, and allowed to become cold, they are worthless.

Crucibles, Plat'inum. These are indispensable instruments in the laboratory of the analytical chemist. They are chiefly employed in the ignition of precipitates, and in the fusion of silicates with carbonated alkalies to render them soluble, a preliminary step to their analysis. The most ordinary form of the platinum crucible is that of a cup with a flat bottom. They are always provided with lids, which are sometimes so constructed that they may be used, when separated from the crucibles, as capsules for ignitions and evaporations. Platinum crucibles are not acted on by carbonated alkalies at a high temperature, but they are liable to be seriously damaged by the caustic alkalies. Precipitates of the more reducible metals must never be ignited in these crucibles, as the reduction of the metals would infallibly destroy the vessels.

Crucibles, Gold, are exceedingly useful for many operations, on account of the way which they stand caustic and carbonated alkalies, and nitric acid, which destroy platinum or silver crucibles respectively. Their drawbacks are their great expense and ready fusibility.

Crucibles, Silver. These are much used for fusions of alkalies, being much less acted on than platinum crucibles, and also for water analyses, from their cheapness and light weight. They are easily destroyed, however, by acids.

Crucibles, Plumba'go. *Syn.* GRAPHITE C., BLACKLEAD C., BLUE POTS. From graphite, ground and sifted, mixed with sufficient refractory clay to render it plastic. They are shaped by hand on an ordinary potter's wheel, or by moulds of metal like that figured above under the head of EARTHEN CRUCIBLES.

Prop., &c. Good blacklead crucibles, even when of the largest size, support the greatest and most sudden alternations of temperature without cracking, and may be used after repeated heating and cooling. Their surface, within as well as without, may be made very smooth, so that particles of melted metal will not hang about the sides. They are now almost universally used for melting the precious metals.

Crucibles, Por'celain. These beautiful ves-

sels are now made in Germany and France of all shapes and sizes. They are formed of the most exquisitely white, thin, and hard porcelain, which does not crack when heated, and which is but little acted on by the most energetic chemical reagents. For some operations they supersede platinum crucibles, particularly in the ignition of the precipitates of the more reducible metals. They do not retain colouring matter, and are not porous. Their covers are excellently adapted for delicate cases of testing, the whiteness of the porcelain showing the changes of colour in a single drop of liquid most distinctly.

Crucibles, Iron. Used chiefly for preparing common reagents, as sulphide of iron, calcic chloride, &c., and also for preparing pure caustic potassa from the nitrate.

CRUMP'ET. A sort of muffin or tea-cake, very light and spongy. *Prep.* From flour, 2 lbs., made into a dough with warm milk-and-water, adding a little salt, 3 eggs (well beaten), and 3 teaspoonfuls of yeast, mixed to the consistence of thick batter; after standing before the fire for a short time, to rise, it is poured into buttered tins, and baked slowly to a fine yellow. For the table, crumpets are toasted lightly on both sides, buttered, piled on a hot dish, and cut into halves.

CRUST. The paste with which pies, tarts, &c., are made, or covered.

1. (FINE.) From flour, 1 lb.; sugar ¼ lb.; melted butter, ½ lb.; 3 eggs; milk, q. s. Requires little baking.

2. (RAISED CRUST, FOR MEAT PIES, &c.) As the last, but using 6 oz. of lard for the butter, and 2 instead of 3 eggs.

3. (SHORT.) From flour, 1 lb.; butter and sugar, of each, 2 oz.; eggs, 2 in no.; made into a stiff paste.

Obs. The quality is improved if the whole or a portion of the butter is employed in the way directed under PUFF PASTE. For further information hereon, consult the cookery books of Acton, Beeton, Rundell, and Soyer.

CRYOPH'ORUS. See REFRIGERATION.

CRYS'TAL. A solid body, having a regular geometrical form. The plane surfaces by which a crystal is bounded are termed faces; these intersect in straight lines or edges; and these again meet in points, and form angles. The axis of a crystal is an imaginary line passing through its centre, and terminating either in the middle of two faces or of two edges, or in two angles; and axes terminating in similar parts of a crystal are named similar axes. When the axes of a crystal are properly chosen, and placed in a right position, the various faces are observed to group themselves in a regular and beautiful manner around these axes, and to be all so related to them as to compose a connected series, produced according to definite laws. The multitudinous forms of crystals have been distributed by mineralogists and chemists into six primary classes or systems, distinguishable from one another by the relative positions and lengths of the three axes about which the planes or faces are arranged; while the different figures of any particular system are distinguishable by the arrangement of the planes in respect to the axes. Thus, the cube or hexahedron, the rhombic dodecahedron, and the octahedron, all belong to the regular system, which is characterised by 3 equal axes cutting one another at right angles. But in the cube each plane cuts 1 axis, and is parallel to 2 axes; in the dodecahedron each plane cuts 2 axes, and is parallel to a third; while in the octahedron each plane cuts the 3 axes. The names and definitions of the six crystalline systems are given below:—

1. REGULAR SYSTEM.	The 3 axes equal and rectangular.
2. SQUARE PRISMATIC S. 2 equal axes.	The 3 axes unequal and rectangular.
3. RIGHT PRISMATIC S. All unequal.	
4. RHOMBOHEDRAL S.	The 3 axes equal, but not rectangular.
5. OBLIQUE PRISMATIC S. 1 axis rectangular to 2.	The 3 axes not equal, and not rectangular.
6. DOUBLY O. P. S. None rectangular.	

CRYSTALLISATION. The act or process by which crystals are formed. The frequent reference to this subject in the pages of this work, and the constant employment of the process of crystallisation in the manufacture of salts, &c., in the laboratory, seem to point out the necessity of a few explanatory remarks thereon under this head. When fluid substances are suffered to pass with adequate slowness to the solid state, or when solutions of solids are slowly concentrated by evaporation, or the solvent powers of the menstruum, gradually lessened by cooling, the ultimate particles of matter frequently so arrange themselves as to form regular geometrical bodies, familiarly known by the name of crystals. This wonderful property, which is possessed by a great variety of substances in the mineral kingdom, and by nearly all saline bodies, is resorted to for many useful and important purposes in the chemical arts. It is by means of crystallisation that the majority of salts are obtained in a state of purity; for in the act of passing into the crystalline state, the foreign substances with which they are united are left behind in the mother-liquor.

Salts are crystallised, either by allowing their hot and saturated solutions to cool slowly, or by simply evaporating the menstrua as long as crystals form. In the first case, the liquid is commonly evaporated until a pellicle appears on the surface, when the vessel is set aside in some sheltered situation until cold, at which time the crystals are collected, and the process repeated for fresh crystals. In the second

case, the crystals are usually removed from the liquid as soon as they are deposited. The first method is adopted for those salts that are considerably more soluble in hot than in cold water, as carbonate of soda, Epsom salts, &c.; the last method, for those that possess nearly equal solubility in both cases, and also for many salts which are not required in handsome crystals; thus common salt and chromate of potash are crystallised in this way. Many of the alkaloids, and their salts, are obtained in crystals, by allowing their solutions (generally alcoholic or ethereal) to evaporate spontaneously. By repeating the processes of solution and crystallisation two or three times with the same body, the crystals obtained by the last operation will usually be found to be quite pure.

Many solids may be readily obtained in a crystalline state by melting them, and allowing them to cool very slowly. Thus, iodide of sulphur is crystallised by melting it in a flask placed in a salt-water bath, and allowing it to remain in the water until the whole becomes cold. Sulphur and many metals are crystallised by pouring them, in a state of fusion, into a hot vessel, having a plug in the bottom, which is withdrawn as soon as the surface becomes cool, when the liquid portion runs out, and leaves the under surface in the form of a mass of agglomerated crystals. Perfectly pure wax, stearine, and spermaceti, have a very pleasing appearance when treated in this way.

CRYS'TALLOID. See DIALYSIS.

CU'BEBIN. A peculiar substance obtained from cubebs.

Prep. From cubebs (from which the oil has been expelled by distillation), by digestion in alcohol, evaporating the resulting tincture to one fourth, filtering, and then evaporating the remaining fluid almost to dryness. The residuum is left in a cold place until it assumes a semi-crystalline appearance, when it is thrown on a filter, and the fluid portion (the 'cubebine' of M. Cassola) allowed to drain off. In 24 hours, the substance left on the filter is dissolved in 4 times its weight of boiling alcohol (sp. gr. ·90), the solution allowed to deposit its undissolved resin (still maintaining it near the boiling temperature), after which the clear portion is decanted. The crystals deposited as the liquid cools are cubebin. It is purified by redissolving it in boiling concentrated alcohol, and the addition of a little boiling water, and animal charcoal, when long, white needles will be deposited, if the solution is allowed to cool very slowly.

Prop., &c. It is insoluble in water, and nearly so in cold alcohol, but very soluble in boiling alcohol. It strikes a fine crimson colour with sulphuric acid, which remains unaltered for some hours; a property which distinguishes it from piperin. Its physiological action has been but little studied. According to Dr. Görres, this for the most part resembles that of cubebs.

CU'BEBS. *Syn.* CUBEBA OFFICINALIS, Miers; PIPER CUBEBA, Linn.; *Cubeba officinalis*, Raspail; *Cubeba vulgaris*, Rich.; *Cubeba canina*, Rumph.; *Cubeba*, Bauh.; *Cubebe*, Fr.; *Cubebenpfeffer*, Ger.; *Cubebe*, Ital.; *Cubebas*, Sp. The fruit of *Cubeba officinalis*, Miers (*Piper cubeba*, Linn.), a native of Java, Sumatra, Borneo, and Penang. It is a stimulant, stomachic, and diuretic, and is chiefly employed in affections of the bladder and urino-genital organs. In large doses it is said to act as a narcotic. It is also used in gleet and leucorrhœa, and in piles, &c. They may be quickly taken in the form of powder, mixed with water, milk, or bitter ale.

CU'CUMBER. The fruit of *Cucumis sativus* (Linn.). *Used* as a salad are sure to be indigestible, but when cooked, and dressed, with plenty of oil, it may be eaten without the slightest fear of evil consequences. The practice of pouring off the natural juice extracted from the cucumber by salt cannot be too strongly condemned. See ELATERIUM.

CUD'BEAR. *Syn.* PERSIO. A dye-stuff obtained from *Lecanora tartarea* and other lichens, by a process nearly similar to that used in making ARCHIL. The lichen is watered with stale urine or other ammoniacal liquor, and suffered to ferment for 3 or 4 weeks, after which the whole is poured into a flat vessel, and exposed to the air until the urinous smell has disappeared, and it has assumed a violet colour. It is then ground to powder. Its use is confined to a few cases of silk dyeing, where it is employed to yield shades of ruby and maroon; upon wool it gives deep-red shades. The colours produced by it are very fugitive. Like archil, there are two varieties of this dye-stuff—BLUE CUDBEAR and RED CUDBEAR. See ARCHIL.

CULM. In *mineralogy*, a slaty kind of ANTHRACITE, occurring in Wales and North Devon. The term is also applied to any impure, shaly kind of coal.

CU'MARIN. See COUMARIN.

CU'MIN. *Syn.* CYMINI SEMINA, CYMINUM, L. The fruit (seed) of *Cuminum cyminum*. It is carminative and aromatic, like the caraway and anise. See PLASTER.

CU'MINOL. A colourless, transparent oil, of powerful odour. It exists with CYMOL in OIL of CUMIN. See CUMIC ACID and CYMOL.

CU'MOL. See CUMIC ACID.

CU'PELLATION. The process of assaying gold and silver and their alloys by means of the CUPEL. See ASSAYING.

CUP'PING. This method of topical bleeding is performed as follows:—

The skin being softened by means of a sponge and warm water, and the hair and other extraneous substances being previously removed, one of the small bell-like glasses (CUPPING-GLASSES; CUCURBITU'LÆ), having the air contained in it rarified by being passed over the flame of a spirit-lamp, is immediately applied to the part. From the formation of a partial vacuum beneath the cup, the pressure

of the air on the surrounding surface causes that portion immediately under the cup to swell, and the vessels to become turgid. When this has taken place, the cup is removed, and several incisions are instantly made by means of a scarificator, an instrument containing three or more lancets, which, by means of a spring, make a number of incisions at the same moment, the depth of these incisions being regulated by means of a screw which protrudes or retains the lancets, according to the vascularity of the part, or the quantity of blood to be collected. The cupping-glass is now again applied, and when a sufficient quantity of blood has been collected in the cup, it is removed by introducing the nail of one of the fingers under the upper edge, by which means, air being allowed to enter, the cup becomes detached. The part being washed with warm water to remove any clots of blood, another cup is applied as before, and the operation continued until a sufficient quantity of blood is withdrawn. Sometimes, especially when applied to the scalp, the cups fill so rapidly with blood as to become detached almost immediately on being applied. This method of local bleeding is frequently called 'CUPPING WITH SCARIFICATIONS.'

When cupping-glasses are applied without the use of the lancet or scarificator, the operation is called 'DRY CUPPING,' and is much used to cause a speedy irritation of the skin and reaction, for the relief of oppressive breathing, local pains, &c. To obtain the full benefit from this operation, the cups should be suffered to remain upon the part until they cause an exudation of a small quantity of serum, or a considerable amount of irritation of the part. Dry cupping has been found extremely beneficial in poisoned wounds; as it acts not only by abstracting the poison, but also, by the pressure the glasses exercise on and around the part, in preventing the absorption of it.

Obs. For the operation of cupping, a basin of hot water, sponges, and clean, soft towels, should be provided. In clumsy hands, cupping is occasionally a severe and painful operation; but this is not the case with the skilful operator. A good cupper does not exhaust much of the air in the cup before applying it, but simply passes its mouth rapidly over the flame of the lamp. When it is held over the flame even for a few seconds, the compression of the edge of the cup upon the skin is so great, that it checks the flow of the blood to the scarified part. A good cupper also removes the cups without spilling the contents, and completes the whole operation quickly and neatly. There are, however, few persons, who are not professional cuppers, who are sufficiently expert to exhaust the air in the cup by means of the common lamp; although it is by far the best. A good plan is to rarify the air in the cup by means of a small cone of paper, dipped in spirits of wine, or strong brandy; this is ignited and thrown in the cup, which is instantly to be applied to the proper spot. Where cupping-glasses and the scarificator are not to be had, wine-glasses, or any very small tumblers, may be substituted for the first; and small incisions by means of a thumb lancet will answer the purpose of the other.

The cicatrices of the scarifications leave permanent marks on the skin; on which account, when blood is to be drawn from the head or neck, the glasses should be applied behind the ears, and a portion of hair removed in such a manner that the part may be covered by what remains.

A most convenient cupping apparatus is manufactured by Mr. Bigg, the eminent surgical-instrument maker of Leicester Square, consisting of cups and an exhausting syringe, so arranged that the use of the spirit-lamp is rendered unnecessary, and the operation of cupping may be performed nearly as expertly by an inexperienced nurse as by the most accomplished professional operator. It is invaluable in places remote from town.

CURAR'INE. The vegeto-alkaline base of curara, urari, woorara, woorali, or wourali, the arrow-poison of Central America.

CURCU'MIN. The yellow colouring matter of turmeric, obtained by digesting the alcoholic extract of the powder in ether, and evaporating the clear ethereal solution to dryness. A brownish-yellow mass, yielding a bright-yellow powder. It is scarcely soluble in water, but very soluble in both alcohol and ether. Boracic and hydrochloric acids redden it; alkalies turn it reddish brown.

CURD. Coagulated casein. See CHEESE.

CUR'RANTS. The currants of our garden are varieties of the *Ribes rubrum* and *Ribes nigrum.* (Linn.) The first includes RED CURRANTS and WHITE CURRANTS; the fruit of both of which are gently acidulous, cooling, and wholesome. The juice makes excellent wine. The fruit of the last (BLACK CURRANTS, QUINSY-BERRIES) is aperitive, and has been used in calculous affections; the juice is made into wine, jellies, jams, lozenges, &c. The young leaves are used as a substitute for tea; one or two buds, or half a small leaf, impart to black tea the flavour and fragrance of green. The currants of the grocers (ZANTE CURRANTS) are a small variety of dried grapes.

CUR'RY. *Syn.* CURRIE. A noted dish in Indian cookery, much esteemed throughout the East. Curries are simply stews, of which rice usually forms a characteristic ingredient, highly flavoured with fried onions and curry powder, to which sliced apples and lemon juice are sometimes added. They are made from every variety of fish, meat, poultry, game, &c., according to the fancy of the parties.

Cur'ry Powder. *Prep.* (Kitchener.) From coriander-seed, ¼ lb.; turmeric, ¼ lb.; cinnamon-seed, 2 oz.; cayenne, ½ oz.; mustard, 1 oz.; ground ginger, 1 oz.; allspice, ½ oz.; fenugreek-seed, 2 oz.; all dried thoroughly,

pounded in a mortar, rubbed through a sieve, and mixed together.

Obs. The above must be regarded as merely a substitute for Indian curry powder, which contains many ingredients not to be obtained in England. It should be kept in a bottle closely corked or stoppered. The curry powder sold at the present time consists of coriander seed, turmeric, cayenne, fenugreek-seed, and a large proportion of sago-flour.

CUS'CONINE. See ARICINE.

CUSPA''RIA. *Syn.* CUSPARIA BARK (B.P.), ANGOSTU''RA B.; COR'TEX ANGOSTU''RÆ, C. CUSPA''RIÆ, CUSPARIA (Ph. L. & E.), L. "The bark of *Galipea cusparia*" (Ph. L.), or *Galipea officinalis* (Ph. E.). A valuable drug, imported directly or indirectly from South America.—*Dose.* 10 grs. to 30 grs., as a tonic, stomachic, and febrifuge, in similar cases to those in which CASCARILLA, CALUMBA, and CINCHONA, are commonly given.

Angostura or cusparia bark has fallen into comparative disuse, in consequence of nux vomica or false angostura bark having formerly, in several instances, been mistaken for it, and administered with fatal results. The leading characteristics of these two barks have been pointed out by M. Gibourt, and are as follows:—

Characters.	False Angostura.	True Angostura.
Form	Thick, rugous, rolled upon itself. Edges cut perpendicularly.	Flat or rolled up, little wrinkled, edges beveled.
Colour	Brown, or greenish-yellow, presenting protuberances or excrescences, produced by the great development of the corky layer, which has a still more yellow colour.	Grayish-yellow.
Taste	Very bitter	Bitter.
Reaction with Nitric Acid.	Red colour when dropped upon the bark.	Yellow colour.

CUSPAR'IN. *Syn.* ANGOSTU''RIN, ANGOSTU''RA. The bitter principle of Cusparia-bark. It is neutral; crystallises in tetrahedrons; is easily fusible; soluble in rectified spirits, in acids, and in alkaline solutions. It is precipitated of a whitish colour by tincture of galls.

CUS'TARD. A composition of milk, or cream, and eggs, sweetened with sugar, and variously flavoured. Custards may be cooked either in the oven or stew-pan.

Prep. 1. (Soyer.) Milk (boiling), 1 pint; sugar, 2 oz.; thin yellow peel of half a lemon; mix, and set it aside for a short time; then take eggs, 4 in no., beat them well in a basin; add, gradually, the milk (not too hot), pass the mixture through a colander or sieve, and fill the custard cups with it; these are then to be placed over the fire in a stew-pan, containing about one inch of hot water, and left there for 12 minutes, or till sufficiently set. The above is for PLAIN CUSTARDS; but it forms a good basis to receive any of the usual flavouring ingredients, as fresh or stewed fruit, peels, essences, orange-flower-water, brandy or other spirits, &c.

2. (Rundell.) As the last, but using cream instead of milk, or equal parts of the two, with 2 additional eggs. Very rich; like the last, any suitable flavouring matter may be added to it.

3. (ALMOND CUSTARDS,—Rundell.) As either of the above, adding blanched sweet almonds, 4 oz.; bitter do., 6 in no.; beaten to a smooth paste.

4. (BAKED CUSTARDS,—Rundell.) From cream, 1 pint, with 4 eggs; flavour with mace, nutmeg, and cinnamon, and add a little white wine, rose-water, and sugar; bake in cups.

5. (COFFEE CUSTARDS,—Soyer.) Hot milk and strong-made coffee, of each, ½ pint; sugar, 2 oz.; dissolve, and add it, gradually, to 4 eggs (well beaten), and proceed as in No. 1. Chocolate custards and cocoa custards are made in the same way.

6. (COLD CUSTARD, *for invalids*,—Dewees.) 1 egg; sugar, a table-spoonful; beat well together; and add, gradually, constantly stirring, cold water, ½ pint; rose-water, 2 teaspoonfuls; and a little grated nutmeg. An agreeable and nutritious demulcent. A wineglassful every 2 or 3 hours, or *ad libitum*.

7. (LEMON CUSTARDS,—Rundell.)—*a*. As No. 1 (nearly), using a little more lemon peel. In the same way orange custards are made, but using orange peel.

b. From candied lemon peel and lump sugar, of each, 2 oz., beaten in a mortar quite fine, and added to either No. 1 or No. 2. Orange and citron custards may be made in the same manner. A little orange-flower-water, or marsala, or sherry, may be also added at pleasure. They are best baked.

8. (ORANGE CUSTARDS.) As *above*, No. 7, *a* and *b*.

9. (RICE CUSTARDS,—Rundell.) Boil ½ a cupful of the best ground rice in a pint of milk until dissolved, then mix it with a quart of cream; flavour with nutmeg, mace, and a little brandy, and put it into a cup, or dish.

CUTCH. See CATECHU.

CUTTLE-FISH. The bone of the *Sepia officinalis* of Linnæus, or common cuttle-fish (CUTTLE-FISH BONE; OS SE'PIÆ), is used by the law-stationers to erase ink-marks from paper and parchment, an application familiar to most schoolboys of the present generation. Reduced to powder (PUL'VIS SE'PIÆ), it forms a valuable dentifrice and polishing powder.

and is used for forming the moulds for small silver castings.

CUTS. These are incised wounds of greater or less extent, and must be treated accordingly. The divided parts should be drawn close together, and held so with small pieces of strapping or adhesive plaster stretched across the wound. If the part is covered with blood, it should be first wiped with a damp sponge. When the wound is large, and it is much exposed, a good method is to sew the parts up. The application of a little creasote or a spirituous solution of creasote, will generally stop local bleeding, provided it is applied to the clean extremities of the wounded vessels. A good way is to place a piece of lint, moistened with creasote, on the wound, previously wiped clean, or to pour a drop or two of that liquid on it. An excellent method is to cover the part with a film of collodion. Friar's balsam, quick-drying copal varnish, tincture of galls, copperas water, black ink, &c., are popular remedies applied in the same way. A bit of the fur plucked from a black beaver hat is an excellent remedy to stop the bleeding from a cut produced by the razor in shaving. A cobweb is said to possess the same property.

CY'ANATE. *Syn.* CY'ANAS, L. A salt in which the hydrogen of cyanic acid is replaced by a metal or other basic radical.

CYAN'IC ACID. HCNO. *Syn.* ACIDUM CYAN'ICUM, L. *Prep.* 1. Cyanuric acid, deprived of its water of crystallisation, is distilled in a retort, and the product collected in a well-cooled receiver.

2. (Liebig.) A current of sulphuretted hydrogen gas is passed through water in which cyanate of silver is diffused, the process being suspended before all the cyanate of silver is decomposed.

Prop., &c. Cyanic acid is a limpid, colourless liquid; it reddens litmus; is sour to the taste; possesses a modified sulphurous odour, similar to that which is always perceived when any of its salts are decomposed by an acid; it forms salts with the bases, called CYANATES; when in contact with water, it suffers decomposition in a few hours, and is converted into bicarbonate of ammonia; it cannot be preserved for any time, as shortly after its preparation it spontaneously passes into a white, opaque, solid mass, to which the name CYAMELIDE has been given. By distillation, this new substance is reconverted into cyanic acid.

CY'ANIDE. *Syn.* CYAN'URET; CYAN'IDUM, CYANURE'TUM, L. The compound formed by the union of cyanogen with a metal or other radical. See CYANOGEN, HYDROCYANIC ACID, and the respective bases.

Cyanide, Al'kaline. *Syn.* CRUDE CYANIDE OF POTASSIUM AND SODIUM. *Prep.* (R. Wagner.) Dry ferrocyanide of potassium, 4 parts, dry carbonate of soda, 1 part, are melted together in an iron crucible at a red heat, and continually stirred until the iron rod comes out covered with a white crust, when the heat is withdrawn, and after a few moments' repose the supernatant liquid portion is poured out on a clean iron slab. This crude mixed cyanide is quite as useful as the more expensive one of Liebig, and is equally fit for technical applications, as electrotyping, gilding, silvering, &c. See CYANIDE OF POTASSIUM.

CY'ANINE. A base discovered by Mr. G. Williams in CHINOLINE BLUE. See *below*.

Cyanine, I'odide of. *Syn.* CHIN'OLINE BLUE. The action of iodide of amyl upon chinoline gives rise to iodide of amylchinoline. Addition of excess of soda to an aqueous solution of this iodide produces a black resinous precipitate, which dissolves in alcohol with a magnificent blue colour. This precipitate is the IODIDE OF CYANINE, or CHINOLINE BLUE. Many attempts have been made to use it in dyeing; they have, however, failed on account of the instability of the colour.

CYAN'OGEN. CN or Cy. A highly important compound radical or quasi element, discovered by M. Gay Lussac in 1815.

Best obtained by carefully igniting dry cyanide of mercury in a small retort, and collecting the gas over mercury.

Prop., &c. A colourless gas, possessing a pungent and peculiar odour, resembling that of peach-kernels or prussic acid; under a pressure of about 4 atmospheres, at a temperature of 45°, it assumes the liquid form (Faraday), and this fluid again becomes gaseous on withdrawal of the pressure; water absorbs nearly 5 times its bulk of cyanogen at 60° Fahr., and alcohol about 23 times its volume; with hydrogen it forms hydrocyanic acid, and with the metals a most interesting and important class of bodies called cyanides or cyanurets; when kindled, it burns with a beautiful purple flame, carbonic acid and nitrogen being evolved. Sp. gr. 1·806. See HYDROCYANIC ACID, &c.

Forms a bromide and iodide when the cyanide of mercury is distilled with bromine or iodine, and which are colourless, volatile, highly poisonous solids; and two isomeric chlorides, one a very volatile liquid, prepared by passing chlorine over moist cyanide of mercury, and the other in white volatile needles, prepared by exposing aqueous hydrocyanic acid to chlorine in sunshine.

CYANU''RIC ACID. $H_3C_3N_3O_3$. *Syn.* PYRO-U''RIC ACID†. A peculiar acid, discovered by Scheele. It is a product of the decomposition of the soluble cyanates by dilute acids, or of urea by heat, &c.

CY'DER. See CIDER.

CY'DONINE. The peculiar gum of quince seed. It resembles bassorin in most of its properties.

CY'MIDINE. An oily base, homologous with aniline, obtained by the action of iron filings and acetic acid on nitro-cymol.

CY'MOL. A peculiar hydrocarbon found in oil of cumin, in admixture with cuminol. The two bodies are separable in a great measure by distillation, cymol being the most volatile portion of the oil.

CY'NAPINE. An alkaloid obtained from *Æthusa cynapium*, or *fool's parsley*. It possesses no practical interest.

CYST'INE. $C_3NH_7SO_2$. *Syn.* CYST'IC OXIDE. Obtained from cystic oxide calculi (in powder) by digestion in solution of ammonia. By spontaneous evaporation the ammoniacal solution deposits small, colourless crystals of cystic oxide. It forms a saline compound with hydrochloric acid, and is decomposed by the strong alkalies.

CY'TISINE. A purgative bitter principle, extracted from the *Cytisus Laburnum* (Linn.), or *common laburnum*, and some other plants.

DAGUERRE'OTYPE. See PHOTOGRAPHY.

DA"HLIA DYE (dāle'-y'ă). The shade of colour which is commonly termed 'dahlia' is a reddish lilac. It is produced by combining a blue or purple with red when a compound colour is used. Upon wool and silk it can be obtained directly by means of archil or cudbear, either alone or 'blued' by a small quantity of sulphate of indigo. Upon cotton indifferent shades of dahlia are obtained by macerating in sumac liquor, working in tin solution, and dyeing in logwood mixed with some red wood.

DA"HLINE. A species of fecula obtained from the tubers of the dahlia. It is identical with inuline. It is not employed in the arts.

DAIR'Y. The place where milk is kept, and cheese and butter made. The best situation for a dairy is on the north side of the dwelling-house, in order that it may be sheltered from the sun during the heat of the day. Ample means should be provided to ensure ventilation, and at the same time to exclude flies and other insects. The temperature should be preserved, as much as possible, in an equable state, ranging from 45° to 55° Fahr. To lessen the influence of external variations of temperature, the walls should be double, or of considerable thickness, and the windows provided with shutters or doors. In summer the heat may be lessened by sprinkling water on the floor, which will produce considerable cold by its evaporation. Dairies built of mud or 'cob' are preferred in the West of England; and this preference arises from the uniform temperature they maintain, on account of the great thickness of the walls, and their being very bad conductors of heat. In large dairy-farms, where butter and cheese are made, the dairy is generally a separate building, and divided into 3 or 4 apartments; one of which is called the 'milk-room;' a second, the 'churning-room;' a third, the 'cheese-room,' containing the cheese-press, &c.; and a fourth, the 'drying-room,' where the cheeses are placed to dry and harden. To these may be added a scullery, furnished with boiler, water, &c., for scalding and cleaning the dairy utensils.

Cleanliness is very essential in all the operations of the dairy, and in none more so than in the milking of the cows. The hands and arms of the milkmaid should be kept scrupulously clean, and should be well washed with soap and water after touching the udder of a sick cow, as without this precaution the sores may be conveyed to the healthy ones. The milk-cans should be scalded out daily, and, as well as all the other dairy utensils, should be kept clean and dry. Before placing the milk on the shelves of the dairy, it should be strained through a hair sieve or a searce covered with clean cheese-cloth, as by this precaution any stray hairs that may have fallen into the milk-pail will be taken out.

The average produce of a milch cow, supplied with good pasturage, is about 3 gallons daily from Lady-day to Michaelmas, and from that time to February about 1 gallon daily. Cows of good breed will be profitable milkers, to 14 or 15 years of age, if well fed. See BUTTER, CHEESE, CREAM, &c.

DAMAS'CUS BLADES. See STEEL.

DAMP, under any form, should be avoided. A humid atmosphere or situation is one of the commonest causes of agues, asthmas, rheumatism, and numerous other diseases.

Damp Linen is very injurious, and should especially avoided. In travelling, when it is expected that the bed has not been properly aired, a good plan is to sleep between the blankets. To ascertain this point, the bed may be warmed, and a cold, dry, glass tumbler, immediately afterwards introduced between the sheets, in an inverted position. After it has remained a few seconds, it should be examined, when, if it is found dry, and undimmed by steam, it may be fairly presumed that the bed is well aired; but if the reverse should be the case, it should be avoided. When it is impossible to prevent the use of damp linen, as articles of dress, the best way to obviate any ill effects is to keep constantly in motion, and avoid remaining near the fire, or in a warm apartment, or in a draught of cold air, until sufficient time has elapsed to allow of the escape of the moisture. The effect of evaporation is the reduction of the temperature of the body; hence the depressing action of damp linen.

Damp Walls. Ivy planted against the south wall of a house is said to exclude dampness. If a wall is already damp, ivy planted against it will, when grown up, cause it to become dry, provided the brickwork is sound, and the dampness does not arise from moisture attracted upwards from the foundation. Sometimes, when ivy is propagated from flowering branches, it will not adhere to a wall at all; the way to get over this difficulty is to cut it back to near the surface of the ground. The young woo

which will then form will take hold and cling immediately to almost anything.

DAM'SON. A species of small black plum, much used in the preparation of tarts, &c. Damsons are rather apt to disagree with delicate stomachs, and also to affect the bowels. See PLUM.

DAN'CING. The practice of dancing as an amusement or exercise must be almost as old as the human race itself. Yet, notwithstanding its antiquity and prevalence amongst all nations, both barbarous and refined, the propriety and advantages of its cultivation are of a very questionable character. In a hygienic point of view it can claim no preference, as an exercise, over the more simple ones of walking and running; whilst, from the associations it frequently induces, and the heated and confined atmosphere in which its votaries commonly assemble to indulge in it, it becomes the fertile parent of immorality and consumption. A celebrated cyclopædist has, perhaps, harshly, but truthfully, defined dancing to be "a silly amusement for the idle and thoughtless."

DANDELI'ON. *Syn.* PISS-A-BED; TARAX'ACUM (Ph. L. E. & D.), L. A common British plant of the natural order *Compositæ*. It is known among botanists by the names *Taraxacum officinale, T. dens leonis,* and *Leontodon Taraxacum* (Linn.). Its root (*Taraxaci Radix*, P.) is employed in medicine, being diuretic and tonic. It is roasted and used as coffee, and when mixed with an equal weight of foreign coffee constitutes the article once so much puffed under the name of 'dandelion coffee.' A similar mixture prepared with chocolate forms the 'dandelion chocolate' of the shops. The blanched leaves are used in salads, and the inspissated juice, extract, and decoction, are employed in medicine, and are considered as detergent, aperitive, and deobstruent. Ground roasted dandelion root cannot now be sold under the name of 'dandelion coffee' or mixed with coffee unless it has previously paid the chicory duty. See DECOCTION, EXTRACT, &c.

DAN'IELL'S BATTERY. See VOLTAIC ELECTRICITY.

DAPH'NIN. A peculiar bitter principle, discovered by Vauquelin in the *Daphne mezereum* or *mezereon*. It is procured by separating the resin from the alcoholic tincture of the bark by evaporation; afterwards, diluting the residue with water, filtering, and adding acetate of lead. A yellow substance falls down, which, when decomposed by sulphuretted hydrogen, yields daphnin, under the form of small, colourless, transparent, radiated needles. It is bitter; volatile; sparingly soluble in cold water; freely soluble in hot water, and in alcohol and ether. It possesses basic properties. See MEZEREON.

DATU'RA. *Syn.* THORN-APPLE; STRAMO'NIUM (Ph. L. E. & D.), L. A genus of plants belonging to the *nightshade order*, or '*Atropaceæ*.' The species *Datura Stramonium* is an important medicinal plant, the leaves and seeds being officinal in B. P. It is anodyne and sedative, but not hypnotic, though it will often induce sleep by relieving pain. It affects the constitution in much the same way as belladonna.—*Dose.* 1 to 4 or 5 grs., in asthma, gout, headache, neuralgic and rheumatic pains, &c. In spasmodic asthma smoking the leaf often gives instantaneous relief, but must be exhibited with care, as the whole plant is intensely poisonous. No antidote is known. Another species, namely, *Datura tatula*, is now preferred for cigars or cigarettes. Cigars are made from *Datura Stramonium* more frequently than from *Datura tatula*. They are recommended for asthma. See ASTHMA, CIGARS (Stramonium), DATURIA (*below*).

DATU'RIA. *Syn.* DATU'RINE, DATURIN'A, HYOSCY'AMINE. An organic alkali, discovered by Geiger and Hesse in *Datura Stramonium* or thorn apple. It occurs also in *Hyoscyamus niger* or henbane. It is best obtained from the seeds. Daturia dissolves in 280 parts of cold and 72 parts of boiling water; it is very soluble in alcohol, less so in ether. It tastes bitter, dilates the pupil strongly, and is very poisonous. It may be sublimed unaltered, and may be obtained in prismatic crystals by the addition of water to its alcoholic solution. With the acids it forms salts, which are mostly crystallisable.

DEAF'NESS. An imperfection or absence of the sense of hearing. When deafness is present in infancy and childhood, it is accompanied with dumbness, or imperfect articulation, in consequence of the impossibility of conveying a knowledge of the sounds necessary for the exercise of the imitative faculty of speech. Deafness frequently arises from some imperfection or obstruction of the passage leading to the membrane of the tympanum or drum of the ear. In some cases this passage is totally occluded by a membrane, or some malformation of the tube, which may frequently be removed by a surgical operation. Even instances of partial obliteration of this passage have occurred, which have been successfully treated. The researches of Mr. Yearsley have established the fact, that enlarged tonsils are a very common cause of deafness; and when such is the case, their excision will generally effect a cure. To this form of the affection Mr. Yearsley applies the term 'throat deafness.' Another cause of deafness is the presence of foreign bodies in the aural passages, or the accumulation of hardened wax. In these cases the best treatment is to inject warm water into the ear by means of a proper syringe. When deafness arises from imperfection of the tympanum or drum of the ear, the effects of the application of the artificial membrana tympani invented by Mr. Yearsley (moistened cotton wool) are generally immediate and truly wonderful. By its aid persons

previously so deaf as to be incapable of bearing their share in conversation have been enabled to hear an ordinary whisper. Insects may be destroyed by pouring a spoonful of warm olive oil, or camphorated oil, into the ear over night, retaining it there until the next morning by means of a piece of cotton wool, when it may be washed out with a little mild soap and warm water. When there is a deficiency of the natural secretion of wax, or a dryness of the aural passage, mild oleaginous stimulants may be employed. For this purpose a little olive or almond oil, to which a few drops of oil of turpentine, oil of juniper, or camphor liniment, have been added, may be used with advantage. A piece of cotton wool moistened with glycerine is an excellent application in such cases. When deafness is accompanied with continued acute pain, or a discharge of purulent matter, inflammation of the tympanum, or some other portion of the internal ear, probably exists, and medical advice should be sought as soon as possible. The deafness that frequently accompanies a violent cold is generally caused by obstructions in the Eustachian tubes, and goes off as soon as the secretions return to a healthy state. In some forms of deafness blisters behind the ears are useful. A clove of garlic wrapped in cotton or gauze, or a few drops of the juice introduced into the ear, is extremely efficacious in nervous deafness. When imperfect hearing depends upon obtundity of the auditory nerve, or an extensive obliteration or malformation of the internal ear, it scarcely admits of cure.

Deafness, Taylor's Remedy for. *Prep.* From oil of almonds, 1 lb.; garlic, bruised, 2 oz.; alkanet root, ½ oz.; digest for a week, and strain. A little is poured into the ear in deafness.

DEATH. In cases of sudden death interment should be deferred till signs of putrefaction begin to appear, especially when no gradation of disease has preceded, as in cases of apoplexy, hysterics, external injuries, drowning, suffocation, &c. No sooner has breathing apparently ceased, and the visage assumed a ghastly or a death-like hue, than the patient, after his eyes are closed, is too often hurried into a coffin, and the body, scarcely yet cold, is precipitated into the grave. So extremely fallacious are the signs of death, that the semblance has been frequently mistaken for the reality. By prompt means and judicious treatment, many persons, when in such a condition, have been happily restored to their families and friends. The effects of sound upon animal life is astonishing. The beat of a drum, for instance, has had a very beneficial effect upon persons in a state of suspended animation. At one time, a scream, extorted by grief, proved the means of resuscitating a person who was supposed to be dead, and who had exhibited the usual recent marks of the extinction of life. In cases of catalepsy or trance, having the semblance of death, the action of the lungs and heart continues, though in a nearly imperceptible degree. By placing a cold mirror or piece of highly polished metal immediately over the mouth of the patient, symptoms of moisture will appear upon the surface if the most feeble respiration takes place.

DEBIL'ITY. *Syn.* DEBIL'ITAS, L. Weakness; languor; feebleness. When this arises from a diseased action of the stomach, the occasional use of mild aperients, followed by bitters and tonics, may be had recourse to. When from a general laxity of the solids, and there are no symptoms of fever, nor a tendency of blood to the head, a course of chalybeates generally proves advantageous. See ANÆMIA, ATROPHY, &c.

DECANTA'TION. The operation of pouring or drawing off the clear portion of a liquid from the impurities or grosser matter that has subsided. It is commonly performed, either by gently inclining the vessel, or by the use of a syphon or pump. In the laboratory it is much resorted to in the purification of precipitates, or other similar operations, where repeated edulcoration or washing is required, for which purpose it is preferable to filtration, from being less troublesome and more economical. In these cases, after a sufficient time having been allowed for the subsidence of the precipitate or powder, or for the clearing of the supernatant fluid, the latter is decanted, and its place supplied by a fresh portion of water, which, after sufficient agitation, is similarly treated, and the whole operation repeated as often as necessary.

DECANT'ERS. There is often much difficulty experienced in cleaning decanters, especially after port wine has stood in them for some time. The best way is to wash them out with a little pearlash and warm water, adding a spoonful or two of fresh-slaked lime, if necessary. To facilitate the action of the fluid against the sides of the glass, a few small cinders or pieces of raw potato may be used. A spoonful of strong oil of vitriol will also rapidly remove any kind of dirt from glass bottles. Decanters which have become furred by holding hard water may be cleaned with a spoonful of hydrochloric acid ('spirits of salt') diluted with 3 or 4 times its weight of water. See STOPPERS.

DECARBONISA'TION. This operation is performed on cast iron, to convert it into soft iron. The articles to be decarbonised are packed in finely powdered hæmatite, a native oxide of iron, to which iron filings are often added, and exposed for some time to a strong red heat, by which the excess of carbon is abstracted or burnt out. The process somewhat resembles annealing or cementation.

DECAY'. See EREMACAUSIS.

DEC'IMALS. *Syn.* DECIMAL FRACTION. Fractions which have for their denominator 10, or some power of ten; as 100, 1000, &c.; the number of ciphers in the denominator

being always equal to the number of figures in the numerator. Thus, ·2, ·25, ·125, respectively represent $\frac{2}{10}$, $\frac{25}{100}$, $\frac{125}{1000}$. The denominator of decimals is never written, the dot placed before the first figure of the numerator expressing its value. Ciphers placed on the right hand of a decimal fraction do not alter its value; for ·5, ·50, ·500, are each equal to $\frac{1}{2}$; but ciphers placed on the left hand of a decimal diminish its value in a tenfold proportion; thus, ·3, ·03, ·003, respectively answer to the common fractions $\frac{3}{10}$, $\frac{3}{100}$, and $\frac{3}{1000}$. Every figure on the left hand side of the dot or decimal sign is a whole number.

ADDITION and SUBTRACTION OF DECIMALS are performed in the same manner as with common numbers, care being taken to place the numbers under each other according to their several values; as, tens under tens, hundreds under hundreds, &c.

MULTIPLICATION OF DECIMALS is performed in precisely the same manner as with whole numbers, merely pointing off as many figures in the product as there are decimals in the multiplier and multiplicand put together.

DIVISION OF DECIMALS. As the last, but pointing off as many figures in the quotient as the decimal places in the dividend exceed those of the divisor. If there are not figures enough in the quotient, the deficiency must be supplied by prefixing left-hand ciphers. Ciphers are also added to the right hand of the dividend, or to a remainder, when there are more figures in the divisor than in the dividend, by which the quotient may be carried on to any extent.

A vulgar fraction is reduced to a decimal by dividing the numerator (increased sufficiently with ciphers) by the denominator. Thus, $\frac{1}{2} = ·5$, $\frac{1}{8} = ·125$, &c.

The value of a decimal, of any denomination, is found by multiplying it by the number of parts in the next less denomination, and cutting off as many places to the right hand as there are decimals, and so on until the terms are exhausted. Thus, ·634 oz. is =

·634
8

5·072 drachms.
60

4·320 grains.

= 5 drs. 4⅓ grs. (nearly).

The constant use of decimals in the laboratory, in the surveys of the Excise, and in numerous chemical calculations, induces us to press the subject on the attention of operatives and others of neglected education. An attentive perusal of the above, and a few hours' application, will make the matter familiar to them.

DECOC'TION. *Syn.* DECOCT'UM, L. An aqueous solution of the active principles of any substance obtained by boiling; also the process of preparing such solutions.

The effect of decoction in water differs greatly from that of infusion. At the temperature of 212° Fahr., the essential oils and aromatic principles of vegetables are dissipated or decomposed; while by infusion in hot water, in covered vessels, they remain for the most part uninjured. The solvent powers of boiling water are, however, much greater than those of hot water; and many vegetable principles scarcely acted on by the one are freely soluble in the other. This is the case with many of the alkaloids, on which the medicinal virtues of several vegetables depend. On the other hand, the solutions of many substances, though more readily made by boiling, are speedily weakened or rendered inert by ebullition, in consequence of the active principles being either volatilised along with the steam, or oxidised or decomposed by exposure to the atmosphere. This is particularly the case with substances abounding in extractive or astringent matter. When the medicinal properties of vegetables are volatile, or are injured by a strong heat, infusion should be had recourse to, in preference to boiling; but when a solution of the fixed constituents is alone sought, decoction is preferable.

The substances employed for making decoctions should be well bruised, or reduced to a very coarse powder, or, if fresh and soft, they should be sliced small. In the former case, any very fine powder or adhering dust should be removed with a sieve, as its presence tends to make the product thick and disagreeable, and also more troublesome to strain. The vessel in which the ebullition is conducted should be furnished with an accurately fitting cover, the better to exclude the air; and the application of the heat should be so conducted that the fluid may be kept simmering, or only gently boiling, as violent boiling is not only quite unnecessary, but absolutely injurious to the quality of the product. In every case the liquor should be strained whilst hot, but not boiling, and the best method of doing this is to employ a fine hair sieve, or a coarse flannel bag. In general, it is found that, as decoctions cool, a sediment is formed, in consequence of the boiling water dissolving a larger portion of vegetable matter than it can retain in solution when cold. This deposit for the most part consists of the active principles of the solution, and, unless when otherwise ordered, should be mingled with the clear liquid by agitation, when the decoction enters into extemporaneous compositions, or when the dose is taken.

The length of time occupied by the ebullition is another point demanding some attention. Long boiling is in no case necessary, and should be avoided, especially in decoctions prepared from aromatic vegetables, or those abounding in extractive. The Colleges, in such cases, direct the ingredients "to be boiled for a short time," or "for 10 minutes;" or they limit the period of the ebullition by stating

the quantity that must be volatilised, as—"boil to a pint, and strain." The last method is generally employed for those substances that do not suffer by lengthened boiling.

In preparing compound decoctions, those ingredients should be boiled first which least readily give up their active principles to the menstruum, and those which most readily part with them should be added afterwards. In many cases it is proper simply to infuse the more aromatic substances in the hot decoction of the other ingredients, by which means their volatile principles will be the better preserved.

Distilled water, or perfectly clean rain water, should alone be used for decoctions, extracts, and infusions. Spring and river water, from containing lime, have much less solvent power.

The aqueous solutions of organic matter, from the nature of their constituents, rapidly ferment or putrefy, at the ordinary temperature of the atmosphere. Neither decoctions nor infusions are fit to be used in dispensing, unless made the same day. They should, consequently, be only prepared in small quantities at a time, and any unconsumed portion should be rejected, as it would be imprudent for the dispenser to risk his own reputation, and the welfare of the patient, by employing an article of dubious quality.

It has of late years become a general practice for the wholesale houses to vend preparations under the name of 'Concentrated Decoctions,' which, with the exception of the compound decoction of aloes, are stated to be of 8 times the pharmacopœial strength; so that one drachm of these liquids added to seven drachms of water, forms extemporaneous decoctions, professedly resembling those of the pharmacopœia. The decoction of aloes is made of only four times the usual strength, as the nature of its composition would not permit of further concentration. Such preparations are, however, very imperfect substitutes for the freshly made decoctions. The extreme difficulty of forming concentrated solutions of vegetable matter with bulky ingredients, too often leads to the omission of a portion of the materials, or to the practice of concentrating the liquid by long evaporation. In the first case, the strength is, of course, less than it should be; and in the second, the quality is injured, and perhaps the preparation is rendered nearly inert by the lengthened exposure to heat, and the consequent volatilisation or decomposition of its active constituents. The common practice of adding a considerable portion of spirit to these preparations, which is absolutely necessary to preserve them, is also objectionable, as, in many of the cases in which decoctions are prescribed, this article, even in small quantities, exerts a prejudicial action. Some concentrated decoctions have been recently offered for sale which do not contain alcohol, being preserved by the addition of sulphurous acid, or sulphite of lime.

Decoction of Al'oes. *Syn.* COMPOUND D. OF A., BALSAM OF LIFE; BAUME DE VIE Fr.; DECOCTUM AL'OËS (Ph. E.), D. A. CO. OS'ITUM (B. P. & Ph. D.), L. *Prep.* 1. (B. P.) Extract of liquorice, 1 oz.; extract of socotrine aloes, powdered myrrh, and saffron, of each, 1½ dr.; carbonate of potassa, 1 dr.; tincture of cardamoms, 8 ozs.; water, a sufficiency. Coarsely powder the extract of aloes and myrrh, and put them, together with the carbonate of potash and extract of liquorice, into a covered vessel, with a pint of distilled water; boil gently for five minutes, then add the saffron; let the vessel with contents cool, then add the tincture of cardamoms, and, covering the vessels closely, allow the ingredients to macerate two hours, finally strain through flannel, pouring as much distilled water over the contents of the strainer as will make the product measure 30 oz.

2. (Ph. E.) Aloes, myrrh, and saffron, of each, 1 dr.; extract of liquorice, ½ oz.; carbonate of potassa, 40 grs.; water, 16 fl. oz.; boil to 12 fl. oz.; strain, and add of compound tincture of cardamoms, 4 fl. oz,

3. (Ph. D.) As No. 1 (nearly), but using hepatic aloes.

A warm cathartic.—*Dose.* ½ to 1½ oz.; in habitual costiveness, dyspepsia, jaundice, &c.

Obs. By boiling the saffron as ordered by the Dublin and Edinburgh Colleges, nearly the whole of its fragrance is dissipated. A better plan is to macerate it in the tincture for a few days, previously to adding the latter to the decoction of the other ingredients. After the tincture has been strained off from the saffron, the latter may be washed with a little water, to remove any adhering colour and odour, and this may be added to the decoction. The addition of the tincture produces a deposit of mucilaginous and feculent matter, which has been dissolved out of the liquorice, for which reason some houses omit the latter altogether, and supply its place with an equal quantity of sugar or treacle, and a little colouring. By this method the liquid, after being once obtained clear, will continue so for any length of time.

4. (Wholesale.) Solazzi juice, 1½ lb.; kali (carbonate of potassa), 4 oz.; hepatic aloes, 5½ oz.; myrrh (small), 5 oz.; water, 4½ galls., boil to 3 galls., strain through flannel, cool, and add, of compound tincture of cardamoms, 10 pints; previously digested for 10 days on saffron, 2½ oz.; mix well, and add, essential oil of nutmeg, 15 drops; oils of cassia and caraway, of each, 10 drops; and oils of cloves and pimento, of each, 5 drops; in a week decant the clear portion from the sediment, and preserve it in a cool place.

5. (Concentrated; D. A. CONCENTRA'TUM, L.)—*a.* Lump sugar, 8 oz.; colouring, ¼ pint; carbonate of potash, 2 oz.; aloes, 3½ oz.; myrrh and saffron, of each, 2½ oz.; compound tincture of cardamoms, ½ a gal.; water, 3 pints; boil the first five in the water, until reduced to nearly one half; cool, and add the

tincture, previously digested for a week, on the saffron; and proceed as above. 14 oz. of extract of liquorice may be used instead of the sugar and colouring.

b. Aloes, myrrh, liquorice, and potassa (all in powder), and saffron, as last; compound tincture of cardamoms, 5¾ pints; digest a fortnight, and filter. In this way a very odorous and beautiful preparation is produced, which has been much admired. The above are said to possess four times the strength of the College preparation.

Decoction, Anticol'ic. *Syn.* ANTICOLIC AP'OZEM, DEGLAND'S COLIC MIXTURE; APOZ'EMA ANTICOL'ICUM, L. *Prep.* Senna leaves, 2 oz.; boiling water, 1 pint; simmer gently to 16 fl. oz.; press out the liquor, add sulphate of soda, 1 oz., syrup of buckthorn, 2 oz., and strain through flannel. *Used* by glassfuls in lead colic, or after poisoning by lead.

Decoction, Antidar'trous. Decoction of Bitter Sweet (see *below*).

Decoction of Ar'nica. *Syn.* DECOCTUM ARNICÆ, L. *Prep.* 1. (Swediaur.) Flowers of *Arnica montana*, 1 oz.; water, 3 pints; boil to a quart; filter, and add of syrup of ginger, 3 oz.—*Dose.* 1 to 2 fl. oz., every two or three hours; in aphonia, paralysis of the voluntary muscles, rheumatism, &c.; and as a substitute for bark, in putrid fever, agues, &c.

2. (Ph. Cast. Aust., 1841.) Arnica root, 2 drs.; water, 9 oz.; boil to 6 oz., and strain. —*Dose.* 1 oz.; as the last.

Decoction, Astrin'gent. *Syn.* DECOCTUM ASTRIN'GENS, L. *Prep.* (Swediaur.) Oak-bark, pomegranate peel, and tormentil root, of each, 2 drs.; water and milk, of each, 1 lb.; boil 12 minutes, add of cinnamon, 2 drs.; boil 2 or 3 minutes longer, and strain.—*Dose.* A wine-glassful.

Decoction of Bark. *Syn.* DECOCTION OF CINCHO'NA; DECOCTUM CINCHO'NÆ, L. *Prep.* 1. Ph. L.:—*a.* (D. OF YELLOW B.; D. CINCHONÆ, B. P.) Yellow cinchona or calisaya bark (bruised), 1½ oz.; distilled water, 1 pint; boil for 10 minutes in a lightly covered vessel; when cold, strain and pour on the marc sufficient water to make up 1 pint.

b. (D. OF PALE B.; D. C. PALLIDÆ, Ph. L.) From pale cinchona or loxa bark, as above (*a.*).

c. (D. OF RED B.; D. C. RUBRÆ, Ph. L.) From red bark, as above (*a.*).

2. (Ph. E.) Brown, gray, yellow, or red cinchona (bruised), 1 oz.; water, 24 fl. oz.; boil for 10 minutes; when cold, filter the liquor, and evaporate it to 16 fl. oz.

3. (Ph. D.) From pale or loxa bark, similar to the 'Decoctum cinchonæ pallidæ' of Ph. L. (1. *b.*, *above*).

Dose, &c. 1 to 2 fl. oz., 3 or 4 times daily, as a tonic, stomachic, and febrifuge, when the stomach will not bear the administration of bark in powder; in fevers, dyspepsia, convalescence, &c. The plan recommended by the Edinburgh College, of filtering the decoction when cold, is absurd. According to Soubeiran, 146 grs. of the deposit thus removed contained 86 grs. soluble in alcohol, and rich in the cinchona alkaloids. This liquid should, therefore, be well shaken before pouring it out for use, instead of being filtered. The addition of a few drops of either sulphuric or hydrochloric acid to the water greatly increases its solvent power, and also, consequently, the medicinal value of this preparation. (See *below*.)

Decoction of Bark (Acid'ulated). *Syn.* DECOCTUM CINCHONÆ ACIDULA'TUM, L. *Prep.* 1. To the water for any one of the above, add dilute sulphuric acid, 1½ fl. dr.; boil 10 minutes, and strain whilst hot.

2. (Sir J. Wylie.) Cinchona bark, 1 oz.; water, 16 fl. oz.; diluted sulphuric acid, 1 dr.; as last.

Decoction of Bark (Facti''tious). *Syn.* DECOCTUM CINCHONÆ FACTITIUM, L. *Prep.* (Ph. Bor.) Willow bark and horse-chestnut bark, of each, ½ oz.; calamus root and cloves, of each, ¼ oz.; water, 16 fl. oz.; boil to one half. *Used* as a substitute for decoction of cinchona bark, but is vastly inferior.

Decoction of Bark and Ser'pentary. *Syn.* DECOCTUM CINCHONÆ CUM SERPENTA'RIÂ, L. *Prep.* (Sir J. Pringle.) Peruvian bark, 3 drs.; water, 1 pint; boil to one half, and infuse in the hot decoction, serpentaria root, 3 drs. As a diaphoretic stimulant, and tonic, in fevers, and as a gargle in sore throat.

Decoction of Bar'ley. *Syn.* BARLEY-WATER; DECOCTUM HOR'DEI (B. P.), L. *Prep.* 1. (B. P.) Pearl barley, 1 oz. (washed clean); boil for twenty minutes in 15 oz. of water, and strain.

2. (Ph. D.) Similar to above. (See *Obs. below*.)

Decoction of Barley (Compound). *Syn.* PECTORAL DECOCTION, FE'VER DRINK; DECOCTUM PECTORA'LE, PTISAN'A COMMU'NIS, DEC. HOR'DEI COMPOS'ITUM (Ph. L.), MISTU'RA HOR'DEI (Ph. E.), L. *Prep.* 1. (Ph. L.) Decoction of barley (simple), 1 quart; figs (sliced) and raisins (stoned), of each, 2½ oz.; fresh liquorice (sliced), 5 drs.; water, 1 pint; boil to a quart, and strain.

2. (Ph. E.) Pearl barley, 2½ oz.; water, 4½ pints; boil to 3 pints; add figs and raisins, of each, 2½ oz.; liquorice root, 5 drs.; water, 1 pint; and boil to 2 pints, as before.

Obs. The above are used as demulcents in fevers, phthisis, strangury, &c., taken *ad libitum*. They are slightly laxative, and when this would be an objection to their use, a few drops of laudanum may be added. Mixed with an equal quantity of decoction of bark, barley-water forms an excellent gargle in cynanche maligna (ulcerated sore throat), and, with a like quantity of milk and a little sugar, a good substitute for the breast in dry nursing infants. It is, also, often acidulated with lemon juice or sulphuric acid, and sweetened (Decoctum hordei acidulatum). Gum arabic, 4 drs., and nitre, 1 dr., to each pint, is a common addition in gonorrhœa. Cream of tartar,

1 dr., is occasionally added to render it more aperient.

Decoction, Bit'ter. *Syn.* DECOCTUM AMA'RUM, L. *Prep.* 1. Dried tops of lesser centaury and wormwood, and leaves of germander, of each, 3 drs.; water, 1½ pint; boil to a pint.

2. Gentian root, ½ oz.; water 1½ pint; boil 10 minutes, take out the root, slice it, and add it again to the decoction with dried orange peel, ½ oz.; boil to 1 pint, and strain.

Decoction of Bitter Sweet. *Syn.* ANTIDAR'TROUS AP'OZEM; APOZ'EMA DULCAMA''RÆ, L. *Prep.* (Trousseau and Reveille.) Dulcamara, 1 dr.; water, 16 oz.; boil to 9 oz., and strain. To be taken in three doses during the day. Every other day the quantity is to be increased until 12 drs. or even 2 oz. are taken daily, "so that the patient may begin to feel dryness of the throat, and some disorder of vision and digestion;" and "continue at this quantity for several weeks in succession." In obstinate skin diseases. See DECOCTION OF DULCAMARA.

Decoction of Blue Cardinal Flowers. *Syn.* DECOCTUM LOBEL'IÆ, D. L. SYPHILIT'ICÆ, L. *Prep.* 1. (P. Cod.) Root of *Lobelia syphilitica*, 1 handful; water, 12 lbs.; boil to 7 lbs., and strain.

2. (Swediaur.) Dried root, 5 oz.; water, 12 lbs.; as last. Alterative, purgative, and diuretic.

Obs. This decoction was strongly recommended by Swediaur in certain complaints. He gave half a pint, at first, twice daily, and afterwards 4 times a day, unless it acted too strongly on the bowels, when the frequency of the dose was diminished, or it was discontinued for 3 or 4 days, and then had recourse to again, until the cure was effected.

Decoction of Bran. *Syn.* DECOCTUM FURFURIS, L. *Prep.* 1. From bran, ½ lb.; water, 1½ pint; boil to a pint. In diabetes; and sweetened with sugar, as a demulcent and laxative in cough and sore throat.

2. Bran, 1 quart; water, 1½ gal.; boil 5 minutes, and add, cold water, q. s. to bring it to the proper temperature. As an emollient foot-bath.

Decoction of Broom. *Syn.* DECOCTUM SPAR'TII CACUMIN'IUM; D. SCOPA''RII (Ph. D.), L. *Prep.* (Ph. D.) Broom-tops (dried), ½ oz.; water, ½ pint; boil 10 minutes, and strain. (See *below*.)

Decoction of Broom (Compound). *Syn.* DECOCTUM SPAR'TII CACUMINIUM C., D. SCOPA''RII (Ph. E.), D. S. COMPOS'ITUM (Ph. L.), L. *Prep.* 1. (Ph. L.) Tops of broom (recent and dried), juniper berries (bruised), dandelion root (bruised), of each, ½ oz.; distilled water, 1½ pint; boil to a pint, and strain.

2. (Ph. E.) Tops of broom and juniper, of each, ½ oz.; cream of tartar, 2½ drs.; water, 1½ pint; boil to a pint, as last. The above are diuretic and laxative.—*Dose.* ½ to 1 wineglassful, 3 or 4 times a day; in dropsy, especially of the belly (ASCITES).

Decoction of Bur'dock. *Syn.* DECOCTUM ARC'TII, D. BARDA'NÆ, L. *Prep.* 1. Bardana root, 6 oz.; water, 5 pints; boil to 3 pints, and strain.

2. (Wood.) Dried root, 2 oz.; water, 3 pints; boil to 2 pints, and strain. As an alterative; a pint, or more, daily, in all those cases in which sarsaparilla is recommended.

Decoction of Cabbage-tree Bark. DECOCTUM GEOFFROYÆ (Ph. E. 1817), D. G. INERMIS (Ph. D. 1826). *Prep.* (Ph. D.) Bark of the cabbage tree (bruised), 1 oz.; water, 1 quart; boil to a pint, and strain. Cathartic, narcotic, and anthelmintic.—*Dose.* 2 to 4 table-spoonfuls, for an adult; 1 to 2 teaspoonfuls, for a child, followed by demulcents and castor oil; in worms, &c.

Decoction of Calumba (Compound). *Syn.* DECOCTUM CALUM'BÆ COMPOS'ITUM, L. *Prep.* (Ph. U. S. 1831.) Calumba and quassia, of each, 2 drs.; orange peel, 1 dr.; rhubarb, 20 grs.; carbonate of potassa, 30 grs.; water, 20 fl. oz.; boil to 16 fl. oz., strain, and, when cold, add of compound tincture of lavender, ½ fl. oz. Bitter, tonic, and stomachic.—*Dose.* 1 to 2 table-spoonfuls, 3 or 4 times daily.

Decoction of Cey'lon Moss. *Syn.* DECOCTUM FU''CI AMYLA'CEI, D. PLOCA''RIÆ CANDI'DÆ, L. *Prep.* From Ceylon moss, 2 drs.; water, milk, or whey, 1 pint; boil to 16 fl. oz., and strain. It may be sweetened and flavoured. In irritation of the mucous membranes and in phthisis.

Decoction of Cham'omile. *Syn.* DECOCTUM ANTHE'MIDIS, D. CHAMÆMELI, L. From chamomiles, 1 oz.; boiling water, 1 pint; digest for 10 minutes, simmer gently for 2 or 3 minutes longer, and strain with pressure. (See *below*.)

Decoction of Chamomile (Compound). *Syn.* DECOCTUM CHAMÆMELI COMPOSITUM, L. *Prep.* (Ph. D. 1826.) Chamomile flowers (dried), ½ oz.; fennel seed, 2 drs.; water, 16 oz.; boil a short time, and strain. Both the above are bitter, stomachic, and tonic; the last is vermifuge. They are chiefly used as fomentations and clysters.

Decoction of Chiret'ta. *Syn.* DECOCTUM CHIRAYTÆ, L. *Prep.* From chiretta or chyrata, 5 drs.; water, 1 pint; boil 8 or 10 minutes and strain.—*Dose.* ½ to 1 wine-glassful, 2 or 3 times daily, as a stomachic tonic; in flatulency and acidity, especially in the dyspepsia of gouty persons.

Decoction of Cincho'na. See DECOCTION OF BARK.

Decoction of Col'ocynth. *Syn.* DECOCTUM COLOCYNTH'IDIS, L. *Prep.* (Ph. Bat.) Colocynth pulp, 1 dr.; water, 8 oz.; boil 10 minutes, and when quite cold, add of syrup of orange peel, 1 oz.; sulphuric ether, 1 dr.—*Dose.* 2 to 6 drs., 2 or 3 times a day; in dropsy, &c.

Decoction of Colts'foot. *Syn.* DECOCTUM TUSSILAG'INIS, L. *Prep.* (Pereira.) Fresh leaves of coltsfoot, 2 oz. (or, flowers, 1 oz.);

water, 2 pints; boil to a pint and strain. A popular remedy in chronic coughs and chest diseases. It is emollient and demulcent.—*Dose*, ½ a teacupful, *ad libitum*. (See *below*.)

Decoction of Coltsfoot (Compound). *Syn.* DECOCTUM TUSSILAGINIS COMPOSITUM, L. *Prep.* (Taddei.) Coltsfoot flowers, 6 oz.; figs, raisins, and jujubes, of each, 2 oz.; water, 12 pints; boil down to 4 pints; add liquorice root, 2 oz.; again boil, and strain. As the last.

Com'mon Decoction. See DECOCTION OF MALLOWS.

Decoction of Cor'sican Moss. *Syn.* DECOCTUM HELMINTH'OCORTI, L. *Prep.* From the moss, 5 drs.; water, 1½ pint; boil to a pint.—*Dose.* A wine-glassful, three times a day; as a vermifuge. In 1822, Mr. Farr brought it forward as a remedy for cancer.

Decoction of Cot'ton Root. *Syn.* DECOCTUM GOSSYP'II, L. *Prep.* (Dr. Bouchelle.) Inner part of the root of the cotton plant, 4 oz.; water, 1 quart; boil to a pint.—*Dose.* A wine-glassful, occasionally, as an emmenagogue; or, every 30 or 40 minutes, to produce uterine contractions, for which purpose it is said to be as effectual as ergot of rye.

Decoction of Dandeli'on. *Syn.* DECOCTUM TARAX'ACI (B. P.), L. *Prep.* 1. (B. P.) Fresh dandelion root (bruised), 1 oz.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. E.) Herb and root (fresh), 7 oz.; water, 1 quart; boil to a pint. Aperient, stomachic, and tonic.—*Dose.* 1 to 2 fl. oz., or more, 2 or 3 times daily.

Diaphoret'ic Decoction. *Syn.* DECOCTUM DIAPHORETICUM, L. Decoction of bark, 1 pint; liquor of acetate of ammonia, 4 oz.; aromatic confection, 1 oz.—*Dose.* 2 or 3 table-spoonfuls every 3 hours.

Decoction of Dog-grass. *Syn.* DECOCTUM GRAMIN'IS, L.; PTISANE CHIENDENT, Fr. *Prep.* From dog-grass root (*Triticum repens*), 1 oz.; liquorice root, ½ oz.; water, 1 quart; boil 20 minutes, and strain. Aperient and pectoral; by cupfuls, *ad libitum*. (See *below*.)

Decoction of Dog-grass (Iodureted). *Syn.* DECOCTUM GRAMINIS IODURE'TUM, L. *Prep.* (Magendie.) Decoction of dog-grass, 32 fl. oz.; syrup of peppermint, 2 oz.; iodide of potassium, ½ dr.; mix. By cupfuls, *ad libitum*.

Decoction of Dog-wood. *Syn.* DECOCTUM COR'NUS FLORIDÆ, L. *Prep.* (Ph. U. S.) Dog-wood bark (bruised), 1 oz.; water, 1 pint; boil 10 minutes, and strain whilst hot. Tonic and astringent; recommended as a substitute for bark.—*Dose.* A wine-glassful.

Decoction of Dulcama"ra. *Syn.* DECOCTION OF BITTER SWEET, D. OF WOODY NIGHTSHADE; DECOCTUM DULCAMA"RÆ (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Woody nightshade or bitter sweet (the new shoots), 10 drs.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. E.) Dulcamara (chopped small), 1 oz.; water, 24 fl. oz.; boil to a pint, and strain.

3. (Ph. D.) Twigs of woody nightshade, 1 oz.; water, 1 pint; boil 10 minutes in a covered vessel, and strain. It should measure about 16 fl. oz. Alterative, diaphoretic, and diuretic.—*Dose.* A wine-glassful, or more, 2 or 3 times a day; in chronic coughs and chronic skin diseases, and in most of those cases wherein sarsaparilla proves useful. See DECOCTION OF BITTER SWEET, also *below*.

Decoction of Dulcama"ra (Compound). *Syn.* DECOCTUM DULCAMA"RÆ COMPOS'ITUM, L. *Prep.* 1. (Augustin.) Dulcamara (bitter sweet), 4 drs.; burdock root, liquorice root, sassafras chips, and guaiacum wood, of each, 2 drs.; water, 2 lbs.; boil to 16 fl. oz., and strain.—*Dose.* 1 to 2 wine-glassfuls, 2 or 3 times a day.

2. (Foy.) As the last, but using dulcamara, 2 oz.—*Dose.* ½ to 1 wine-glassful; in similar cases to those in which the simple decoction is given; especially in chronic rheumatism and venereal affections.

Decoction of El'der Bark. *Syn.* DECOCTUM SAMBU"CI, D. S. CORTICIS, L. *Prep.* 1. (Sydenham.) Inner bark of elder, 1 oz.; water and milk, of each, 1 pint; boil to one half, and strain.

2. (Collier.) Bark, 1 oz.; water, 16 fl. oz.; boil to ½ pint, and strain.

3. (Pereira.) Bark, 1 oz.; water, 1 quart; boil to one half.—*Dose.* One wine-glassful 2 or 3 times a day; as an aperient and resolvent in various chronic disorders, in dropsy, and in certain cutaneous affections; or, 2 wine-glassfuls, as before, as a hydragogue cathartic in dropsies.

Decoction of Elecam'pane. *Syn.* DECOCTUM HELEN"II, D. INU'LÆ, L. *Prep.* (Ph. U. S.) Elecampane root, ½ oz.; water, 1 pint; boil a few minutes, and strain. Tonic and expectorant, and, in some cases, diuretic and diaphoretic.—*Dose.* A wine-glassful every hour or two. (See *below*.)

Decoction of Elecampane (Compound). *Syn.* DECOCTUM HELENII COMPOSITUM, D. INULÆ C., L. *Prep.* (Rotier.) Elecampane, 1 oz.; hyssop and ground ivy, of each, 2 drs.; water, 1 pint; boil 15 minutes, strain, and add of honey, 2 oz.—*Dose.* 1 to 3 table-spoonfuls; as the last.

Decoction of Elm Bark. *Syn.* DECOCTUM UL'MI (B. P.), L. *Prep.* Elm bark (cut in small pieces), 1 oz.; distilled water, 16 oz.; boil to 8 oz., and strain.—*Dose.* 2 to 4 oz., three or four times a day, as a cheap substitute for sarsaparilla in scaly skin diseases. (See *below*.)

Decoction of Elm Bark (Compound). *Syn.* DECOCTUM ULMI COMPOSITUM, L. *Prep.* (Jeffrey). Simple decoction of elm bark, 8 pints; liquorice root, sassafras, and guaiacum chips, of each, 1 oz.; mezereon root, 3 drs.; boil for one hour, and strain. More active than the last.

Decoction of Er'got. *Syn.* DECOCTUM ERGOT'Æ, D. SECA'LIS CORNU'TI, L. *Prep.* (Pereira.) Ergot of rye (bruised), 1 dr.; water,

6 fl. oz.; boil 10 minutes, and strain.—*Dose.* One third, at intervals of half an hour, until the whole is taken; as a parturifacient.

Decoction of Fern Root. *Syn.* DECOCTUM FILI'CIS; D. RADICIS F., L. *Prep.* (Dr. Wood.) Dried fern-root, 1 oz.; water, 1 pint; boil to 16 fl. oz., and strain. By wine-glassfuls, fasting, until it excites slight nausea; as a vermifuge, more particularly for tapeworm.

Decoction of Figs. *Syn.* DECOCTUM FICI, L. *Prep.* (Cadet.) Figs (chopped), 1 oz.; water, 1 pint; boil, and strain. Demulcent and pectoral; taken *ad libitum.* (See *below.*)

Decoction of Figs (Compound). *Syn.* DECOCTUM FICI COMPOSITUM, L. *Prep.* (Foy.) Figs and raisins (chopped), of each, 2 oz.; liquorice root, ½ oz.; boiling water, 1 quart; boil 15 minutes, and strain. As the last.

Decoction for Ene'mas. *Syn.* DECOCTUM PRO ENEMA'TE, L. Barley-water, or thin gruel, is commonly used under this name. See DECOCTION OF MALLOWS, &c.

Decoction for Fomenta'tions. *Syn.* DECOCTUM PRO FOMENTO, L. *Prep.* (Ph. L. 1788.) Dried leaves of southernwood, tops of sea wormwood, and chamomile flowers, of each, 1 oz.; laurel or bay leaves (dried), ½ oz.; water, 1 pint, boil a few minutes, and strain.

Decoction of Galls. *Syn.* DECOCTUM GAL'LÆ, (Ph. L.) *Prep.* From galls (bruised), 2½ oz.; water, 1 quart; boiled to one half, and strained. As an astringent, fomentation, enema, or injection, in prolapsus ani, piles, and leucorrhœa.

Decoction of Guaiac'um. *Syn.* DECOCTUM GUAIAC'I (Ph. E.), D. G. COMPOSITUM (Ph. D. 1826), L. *Prep.* 1. (Ph. E.) Guaiacum shavings, 3 oz.; raisins (chopped), 2 oz.; water, 8 pints; simmer down to 5 pints, adding towards the end, sassafras (rasped or sliced), and liquorice root (bruised), of each, 1 oz.

2. (Ph. D.) Guaiacum wood, 3 oz.; sassafras, 10 drs.; liquorice root, 2½ oz.; water, 10 pints; as the last; to strain 5 pints.

Obs. The above form the once celebrated 'Decoction of the Woods.'—*Dose.* A teacupful, 3 or 4 times daily, or oftener, in chronic rheumatism, cutaneous diseases, after a course of mercury, &c. Although its virtues are of a very dubious kind, there is no doubt that it frequently does good, especially when persevered in with a sudorific regimen.

Decoction of Hairy Horehound. *Syn.* DECOCTUM BALLOTÆ LANATÆ, L. *Prep.* (Rehmann.) Siberian or woolly horehound (Ballota), 1½ oz.; water, 1 quart; boil to one half.—*Dose.* A tumblerful, or more, twice a day; in rheumatic, gonty, and dropsical affections, especially the latter. See DECOCTION OF HOREHOUND.

Decoction of Harts'horn. See MIXTURES.

Decoction of Hel'lebore. 1. (DECOCTION OF BLACK HELLEBORE; DECOCTUM HELLEBORI NIGRI, L.) *Prep.* 1. (A. T. Thomson.) Black hellebore root, 2 drs.; water, 1 pint; boil 15 minutes.—*Dose.* 1 fl. oz., every 4 hours; in dropsy, worms, chronic skin diseases, &c., occurring in non-irritable habits.

2. (DECOCTION OF WHITE HELLEBORE; DECOCTUM VERATRI, Ph. L. & D.) *Prep.* (Ph. L. 1836.) White hellebore (bruised), 10 drs.; water, 1 quart; boil to a pint, and when cold, add of rectified spirit, 3 fl. oz. *Used* as a lotion in itch, lepra, psoriasis, scald-head, &c.; and to destroy pediculi. In most cases it should be diluted with water, and should never be applied to the unsound skin.

Decoction of Horehound. *Syn.* COMPOUND DECOCTION OF HOREHOUND; DECOCTUM MARUBII COMPOSITUM, L. *Prep.* (Dr. R. E. Griffith.) Dried horehound (*Marrubium vulgare*), 1 oz.; liquorice root and flax seed (bruised), of each, ½ oz.; boiling water, 1½ pint; macerate for 3 or 4 hours (boil a minute), and strain. An excellent demulcent and pectoral.—*Dose.* 1 to 2 fl. oz., as required, in coughs, &c.

Decoction of Horse-chest'nut Bark. *Syn.* DECOCTUM HIPPOCASTANEI, L. *Prep.* (Dr. Wood.) Horse-chestnut bark (coarsely powdered), 10 drs.; water, 1 pint; boil 10 minutes, and strain. *Used* for decoction of cinchona bark. A little liquorice root is frequently added. (See *below.*)

Decoction of Horse-chestnut Bark (Compound). *Syn.* DECOCTUM HIPPOCASTANEI COMPOSITUM, L. *Prep.* 1. (Phœbus.) Horse-chestnut bark, 1½ oz.; water, 18 fl. oz.; boil to one half, strain, and when quite cold, add of sulphuric ether, 1 to 2 drs.; syrup of orange peel, 1 oz. To be used during the intermission of an ague, in wine-glassfuls at a time.

2. (Spielman.) Horse-chestnut bark and willow bark, of each, ½ oz.; calamus aromaticus and root of water avens, of each, 2 drs.; water, 16 fl. oz.; boil to one half. As the last.

Decoction of Iceland Moss. *Syn.* DECOCTION OF LIVERWORT; DECOCTUM CETRARIÆ (Ph. L.); D. LICHENIS ISLANDICI (Ph. D.); D. LICHENIS (Ph. L. 1824). *Prep.* 1. (Ph. L.) Liverwort (Iceland moss), 5 drs.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. D.) Iceland moss, 1 oz.; water, 1½ pint; boil for 10 minutes in a covered vessel, and strain. Nutritious, demulcent, pectoral, and tonic.—*Dose.* 1 to 4 fl. oz., every 3 or 4 hours; in chronic affections of the chest and stomach, especially pulmonary consumption, old coughs, dyspepsia, chronic diarrhœa, and dysentery. It may be flavoured and sweetened; milk is frequently added to it. The bitter matter may be removed by steeping the moss for some time in pretty warm water, or in cold water to which a very little carbonate of potash has been added. Without this is done, it is intensely bitter and nauseous.

Decoction of Indian Ba'el. *Syn.* DECOCTION OF ÆGLE MARMELOS; DECOCTUM BAEL, L. From the dried unripe fruit of *Ægle marmelos* (Indian bael), 2 oz.; water, 1 pint; boil to one

third, and strain.—*Dose.* 2 fl. oz. two or three times a day; in dysentery, diarrhœa, and English cholera.

Decoction of Indian Pink. *Syn.* DECOCTUM SPIGELIÆ, L. *Prep.* Indian pink root, 5 drs.; water, 1 pint; boil 5 minutes; add senna, 4 drs.; digest 15 minutes, strain, and add of manna, 1 oz.—*Dose.* A small teacupful, 3 times a day, for an adult; ½ oz. to 1 oz., or less, for children; as an althelmintic purge.

Decoction of Indian Sarsaparil'la. *Syn.* DECOCTUM HEMEDES'MI, L. *Prep.* (Pereira.) Root of Indian sarsaparilla (*Hemedesmus Indicus*), 2 oz.; water 1½ pint; boil to a pint. Diuretic, alterative, and tonic.—*Dose.* By wine-glassfuls, as decoction of sarsaparilla.

Decoction of I"rish Moss. *Syn.* DECOCTUM CHON'DRI. *Prep.* (Pereira.) Carrageen or Irish moss, 1 oz.; macerate in lukewarm water for 10 minutes, take it out and drain it, and then boil it in water (or milk), 3 pints, for 15 minutes, and strain through linen.

Obs. If twice the above weight of moss is employed, a mucilage (*mucilago chondri*) is produced, which may be flavoured with lemon juice, spices, &c., and forms a most nutritious article of spoon diet. It is taken in the same cases as decoction of Iceland moss; and is frequently employed in cookery, as a substitute for animal jelly, in the preparation of blancmanges, soups, &c.

Decoction of I"singlass. See LISBON DIET DRINK.

Decoction of Ju"niper Berries (Compound). *Syn.* DECOCTUM JUNIPERI COMPOSITUM, L. *Prep.* (St. B. Hosp.) Juniper berries 2 oz.; cream of tartar, 3 drs.; water, 4 pints; boil to a quart, strain, and add compound spirit of juniper, 2 fl. oz. Diuretic.—*Dose.* 2 or 3 wine-glassfuls, 3 times a day, warm.

Decoction of Lin'seed (Compound). *Syn.* DECOCTUM LI'NI COMPOS'ITUM (Ph. D.), L. *Prep.* (Ph. D.) Linseed, 1 oz.; liquorice root (bruised), ½ oz.; water, 1½ pint; boil for 10 minutes in a covered vessel, and strain whilst hot. Emollient and demulcent.—*Dose.* A wine-glassful *ad libitum;* in gonorrhœa, dysentery, pulmonary affections, &c. It may be flavoured with lemon peel, and sweetened. See INFUSIONS.

Decoction of Liq'uorice. *Syn.* DECOCTUM GLYCYRRHIZÆ, L. *Prep.* (Ph. D. 1826.) Liquorice root (sliced), 1½ oz.; water, 16 fl. oz.; boil 10 minutes and strain. A mild demulcent; it is taken either alone, by wine-glassfuls, or is used as a vehicle for more active remedies.

Decoction, Lisbon. See LISBON DIET DRINK.

Decoction of Liv'erwort. See DECOCTION OF ICELAND MOSS.

Decoction of Log'wood. *Syn.* DECOCTUM HÆMATOXYLI (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Logwood chips, 10 drs.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. E.) Logwood, 1 oz.; water, 1 pint; boil to 10 fl. oz., adding towards the last, cinnamon (in powder), 1 dr.

3. (Ph. D.) Logwood, 1 oz.; water, ½ pint. Astringent and tonic.—*Dose.* 1 table-spoonful to a wine-glassful; in diarrhœa, as required.

Decoction of Mad'der. *Syn.* DECOCTUM RUBIÆ, D. R. TINCTORIÆ, L. *Prep.* 1. (Dewees.) Powdered madder, 1 oz.; boiling water, 1 pint; simmer for 15 minutes, and add of cloves (bruised), 1 dr.; when cold, strain.—*Dose.* A wine-glassful, 2 or 3 times daily; in amenorrhœa, chlorosis, &c.; or every 3 hours, a short time previous to the expected menstrual discharge.

2. (W. Cooley.) To the last add ammonio-citrate of iron, 3 drs.

3. (St. Marie.) Powdered madder, ½ oz.; hops, 1 dr.; English walnut leaves, 3 drs.; water, 1 quart; boil to 1½ pint, strain, and when cold, add of tincture of tartrate of iron, 1 dr.—*Dose.* 2 fl. oz., night and morning; in scrofula, &c.

Decoction of Mal'lows. *Syn.* COMMON DECOCTION; DECOCTUM COM'MUNE, D. PRO ENEMA'TE (Ph. L. 1787), D. MALVÆ COMPOSITUM (Ph. L. 1836), L. *Prep.* (Ph. L. 1836.) Common mallows (dried), 1 oz.; chamomile flowers (dried), ½ oz.; water, 1 pint; boil 15 minutes, and strain. *Used* chiefly for fomentations and enemas.

Decoction of Malt. *Syn.* DECOCTUM BI'NÆ, D. BYNES, D. MALTI, L. *Prep.* (Swediaur.) Ground malt, 3 oz.; water, 1 quart; boil to a pint, and strain. An oz. of syrup of lemons, or of saffron, may be added to the cold decoction; or, a little liquorice root, with the malt. Demulcent and laxative. A cupful *ad libitum.* Infusion of malt (sweet wort) is a more convenient and elegant preparation.

Decoction of Marshmal'low. *Syn.* DECOCTUM ALTHÆ'Æ (Ph. D. 1826 and Ph. E. 1813), L. *Prep.* (Ph. D. 1826.) Dried root and herb of marshmallow, 4 oz.; raisins (stoned), 2 oz.; water, 7 pints (wine measure); boil down to 5 pints, strain, allow it to deposit the sediment and decant the clear liquid. Demulcent.—*Dose.* A cupful *ad libitum*, in coughs, colds, calculous affections, and other diseases of the urinary organs. See MIXTURES.

Decoction of Mat'ico. *Syn.* DECOCTUM MATICO'NIS, L. *Prep.* (Dr. Jeffreys.) Matico leaves, 1 oz.; water, 1 pint; boil 12 minutes, and strain. Astringent.—*Dose.* 1 fl. oz., 2 or 3 times a day; in hæmorrhagic and other discharges.

Decoction, Mercu"rial. *Syn.* DECOCTUM HYDRARGYRI, D. MERCURIALE, L. *Prep.* 1. Quicksilver, 4 oz.; water, 1 pint; boil in a glass or earthen vessel for an hour, adding water to replace that lost by evaporation.—*Dose.* A teacupful.

2. Mercurial pill, 1 oz.; water, 1 quart; boil to a pint.—*Dose.* A wine-glassful. Both were formerly taken for worms and the itch.

3. Corrosive sublimate, 1 gr.; (dissolved in)

spirit of wine, 30 drops; extract of sarsaparilla, 3 drs.; decoction of sarsaparilla, 8 fl. oz.; mix.—*Dose.* One large table-spoonful, 3 times a day; in syphilis and obstinate skin diseases.

Decoction of Mezere'on. *Syn.* DECOCTUM MEZEREI (Ph. E. and Ph. D. 1826), L. *Prep.* (Ph. E.) Root-bark of mezereon, 2 drs.; liquorice root, 4 drs.; water, 1 quart; simmer to 1½ pint, and strain. Stimulant and sudorific.—*Dose.* A wine-glassful, or more, three or four times a day; in chronic rheumatism, scrofula, secondary syphilis, lepra, and some other cutaneous affections. Much boiling injures the virtues of mezereon. (See *below.*)

Decoction of Mezere'on (Compound). *Syn.* DECOCTUM MEZEREI COMPOSITUM, L. *Prep.* (Van Mons.) Mezereon, 2 drs.; bitter sweet, 4 drs.; burdock, 2 oz.; water, 2 quarts; boil to 3 pints, add of liquorice root, 2 drs., and strain. As the last, and in obstinate diseases of the skin.

Decoction, Narcotic. *Syn.* DECOCTUM ANODYNUM, D. NARCOTICUM, L. *Prep.* (Hosp. Form.) Common nightshade (dried), 1 oz.; poppy heads, 3 in no.; water, 1 pint; boil 10 minutes, and strain. As an anodyne fomentation, used warm.

Decoction of Ni'tre. *Syn.* DECOCTUM NITROSUM, D. NITRATUM, D. POTASSÆ NITRATIS, L. *Prep.* 1. Nitre, ½ oz.; white sugar, 2 oz.; cochineal, 20 grs.; water, 1½ pint; boil a few minutes, and strain.

2. (Hosp. Form.) Barley-water, 1 pint; nitre, 5 drs.; dissolve. Diuretic, diaphoretic, and refrigerant. A wine-glassful, frequently; in gonorrhœa, sore throat, acute rheumatism, scurvy, &c.

Decoction of Oak Bark. *Syn.* DECOCTUM QUERCÛS (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L. & E.) Oak bark (bruised), 10 drs.; water, 1 quart; boil down to a pint, and strain.

2. (Ph. D.) Oak bark, 1½ oz.; water, 1½ pint; boil 10 minutes, and strain. Astringent. *Used* as a gargle in ulcerated sore throat, relaxation of the uvula, &c., and as a wash, and as an injection in piles, leucorrhœa, hæmorrhages, prolapsus ani, &c.

Decoction of Oats. *Syn.* WATER GRUEL; DECOCTUM AVENÆ, L. *Prep.* 1. (Cullen.) Oatmeal, 1 oz.; water, 3 quarts; boil to a quart, strain, and when cold, decant the clear liquid from the sediment.

2. (A. T. Thomson.) Washed groats, 4 oz.; water, 4 pints; boil to a quart. Nutritious and demulcent. Taken *ad libitum*, to promote the action of purgatives, and as an enema, either alone, or as a vehicle for more active substances. It is too thin for food. See GRUEL.

Decoction of Parei'ra. *Syn.* DECOCTUM PAREIRÆ (Ph. L.), L. *Prep.* 1. (Ph. L.) *Pareira brava* root (sliced), 10 drs.; water, 1½ pint; boil to a pint, and strain.

2. (Sir B. Brodie.) Pareira, 4 drs.; water, 3 pints; boil to a pint, as last. The above are given in gonorrhœa, leucorrhœa, and chronic inflammation of the bladder.—*Dose.* Of the first, ½ to 1 wine-glassful, 3 or 4 times a day; of the second, about twice that quantity, or more. It is commonly combined with some tincture of hyoscyamus; and when the triple phosphates are present in the urine, dilute hydrochloric or nitric acid may be added. See PAREIRA.

Decoction, Pec'toral. See DECOCTION OF BARLEY.

Decoction of Pel'litory. DECOCTUM PYRETHRI, L. *Prep.* (Guy's Hosp.) Pellitory root, 1 oz.; water, 1½ pint; boil to a pint, and strain. *Used* as a gastric stimulant, and as a gargle in the relaxation of the uvula.

Decoction of Pome'granate. *Syn.* DECOCTUM GRANA'TI (Ph. L.), L. *Prep.* (Ph. L.) Pomegranate rind (fruit-bark), 2 oz.; distilled water, 1½ pint; boil to a pint, and strain. Astringent. *Used* as a gargle and injection, in sore throat, leucorrhœa, &c.; and internally, in diarrhœa, dysentery, &c.—*Dose.* 1 fl. oz., or more.

Decoction of Pomegranate Root. *Syn.* DECOCTUM GRANATI RADICIS (Ph. L.), L. *Prep.* 1. (Ph. L.) Root-bark of pomegranate (sliced), 2 oz.; water, 1 quart; boil to a pint, and strain.

2. (Collier.) Bark of the root, 2 oz.; water, 1 pint; boil to one half. This is the common form used in India.

Dose, &c. A wine-glassful, half-hourly, until the whole is taken, a light diet and a dose of castor oil having been taken the day previously. In tapeworm, Dr. Collier recommends the whole of the last preparation to be given at 2 doses, at the interval of 2 hours. It purges, and in 6 hours frequently expels the worm; if this does not take place, it should be persevered in. "Look for the head of the tænia (tapeworm); for if that is not expelled, you have done nothing." (Collier.) Oil of turpentine and kousso are now more frequently given in tænia in this country.

Decoction of Pop'pies. *Syn.* DECOCTION OF POPPY-HEADS, FOMENTATION OF P.-H.; DECOCTUM PAPAVERIS (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Poppy-heads (bruised), 4 oz.; water, 2 quarts; boil for 15 minutes, and strain.

2. (Ph. E. & D.) As the last, but using only 3 pints of water. *Used* as an emollient fomentation, in painful swellings, excoriations, &c. The addition of a ½ pint of vinegar is said to promote its efficacy.

Decoction of Quas'sia. *Syn.* DECOCTUM QUASSIÆ, L. *Prep.* From quassia chips (small), 1 dr.; water, 1¼ pint; boil to a pint, and add syrup of orange peel, 2 oz.—*Dose.* A wine-glassful, occasionally, as a stomachic tonic. See INFUSIONS.

Decoction of Quince. *Syn.* DECOCTION OF QUINCE SEED, MUCILAGE OF Q. S.; DECOCTUM CYDONII (Ph. L.), L. *Prep.* From quince seeds,

2 dr.; water, 1 pint; boil for 10 minutes, and strain. *Used* as an emollient and sheathing application to abraded or wounded surfaces, as cracked lips, nipples, &c.; and to the skin in erysipelas, to painful hæmorrhoidal tumours, and the like. Prepared with a little less water, it is used by the hairdresser as 'bandoline' or 'fixateur.'

Decoction of Rice. *Syn.* RICE WATER, RICE DRINK; DECOCTUM ORY'ZÆ, L. *Prep.* Rice, 2 oz.; water, 1 quart; boil to one half, and strain. Demulcent. A good drink in fevers, coughs, &c., either alone or sweetened and flavoured with a little lemon peel.

Decoction of Sarsaparil'la. *Syn.* DECOCTUM SAR'ZÆ (Ph. L. & E.), D. SARSAPARILLÆ (Ph. D.), L. *Prep.* 1. (Ph. L.) Sarsaparilla (sliced), 5 oz.; water, 2 quarts; boil to a quart, and strain.

2. (Ph. E.) Sarsaparilla, 5 oz.; boiling distilled water, 4 pints; macerate for 2 hours, in a vessel lightly covered, and placed in a warm situation; then take out the root, bruise it, return it again to the liquor, boil down to a quart, and strain.

3. (Ph. D.) Sarsaparilla, 2 oz.; boiling water, 1½ pint; digest an hour, boil 10 minutes, cool, and strain.

Obs. The medicinal virtues of sarsaparilla root reside wholly in the bark, or cortical portion; it is therefore quite unnecessary to bruise it, as directed in the Ph. E. By those houses which do largely in decoction of sarsaparilla, the root is seldom split or cut; the bundles in which it is made up being simply untied and spread open, to allow of the free exposure of every part to the solvent action of the water. By this plan the whole of the soluble portion of the bark is extracted, whilst the feculent matter that pervades the wood is only partially dissolved out. According to Soubeiran, a mere infusion is preferable. The *dose* is a teacupful to half a pint, 3 or 4 times a day.

An extemporaneous docoction of sarsaparilla is made by dissolving ¾ oz. of the simple extract in 1 pint of hot water. See SARSAPARILLA, and *below*.

Decoction of Sarsaparilla (Concentrated). *Syn.* DECOCTUM SARZÆ CONCENTRATUM, L. *Prep.* 1. (Wholesale.) Sarsaparilla (Jamaica), 10½ lbs., is placed in a large and well-cleaned copper boiler, and enough boiling water added to cover it; it is then left to macerate, without boiling, for 3 or 4 hours, after which it is boiled for about an hour, and the clear liquor drawn off into another clean copper pan; the root (after it has well drained) is then washed or 'sparged'[1] with boiling water, until the latter runs off scarcely coloured; the washings are added to the decoction, and the whole evaporated as quickly as possible to 6½ pints; it is then set to cool, and rectified spirit of wine, 1½ pint, further added; after agitation, the whole is set aside in a well-corked bottle, in a cool place, for a week. In a few days it is usually found as clear and brilliant as brandy, with very little sediment, and will keep for any length of time uninjured. Some manufacturers, instead of washing the root, give it a second and third water, boiling it each time and evaporating the mixed liquors.

2. (Extemporaneous.) Extract of sarsaparilla, 6½ oz.; water, 12 fl. oz.; dissolve, add rectified spirit, 2½ fl. oz., and water, q. s. to make the whole exactly measure a pint.

Obs. 1 drachm of this decoction, mixed with 7 drachms of water, forms a similar preparation to the Decoctum Sarzæ of the Ph. L., and is now very frequently substituted for it in dispensing. See SARSAPARILLA, EXTRACTS, and *below*.

Decoction of Sarsaparilla (Compound). *Syn.* DECOCTUM SARZÆ COMPOSITUM (Ph. L. & E.), D. SARSAPARILLÆ C. (Ph. D.), L. *Prep.* 1. (Ph. L.) Decoction of sarsaparilla (boiling), 4 pints; sassafras chips, guaiacum wood (rasped), and fresh liquorice root (bruised), of each 10 drs.; mezereon (root-bark), 3 drs.; boil for 15 minutes, and strain.

2. (Ph. E.) As the last, but using 4 drs. of mezereon.

3. (Ph. D.) Sarsaparilla (sliced), 2 oz.; sassafras, guaiacum turnings, and liquorice root (bruised), of each, 2 dr.; mezereon root-bark, 1 dr.; boiling water, 1½ pint; digest for an hour, then boil for 10 minutes, cool, and strain.

4. (Extemporaneous.) Compound extract of sarsaparilla, 7½ drs.; boiling water, 1 pint; dissolve,

Obs. This decoction is an imitation of the once justly celebrated 'Lisbon Diet Drink.' It is alterative and diaphoretic.—*Dose.* A teacupful, or more, 3 or 4 times a day, either along with, or after, a mercurial course; and in syphilis, scurvy, scrofula, chronic rheumatism, lepra, psoriasis, and several other skin diseases, and especially in cachexia, or general bad habit of body. During its use the skin should be kept warm. See SARSAPARILLA and *below*.

Decoction of Sarsaparilla (Concentrated Compound). *Syn.* DECOCTUM SARZÆ COMPOSITUM CONCENTRATUM, D. SARSAPARILLÆ C. C., L. There is a very considerable trade done in this article, in consequence of compound decoction of sarsaparilla being taken in large doses, both alone and in combination with other remedies, and the pharmacopœial preparation spoiling if kept longer than about 12 hours, in warm weather. Like the concentrated simple decoction, it is said to be of 8 times the usual strength, so that when mixed with 7 times its weight of water, it forms a similar preparation to the Decoctum Sarzæ Compositum,—Ph. L.; for which it is very generally substituted in dispensing.

Prep. 1. (Wholesale.) Sarsaparilla (red Jamaica), 96 lbs.; mezereon root (not root-bark), 9 lbs.; liquorice root (bruised), 16 lbs. The me-

[1] For an explanation of the operation of 'sparging' see *page* 262.

zereon and liquorice are first laid (loosely) on the bottom of a clean copper pan, and the bundles of sarsaparilla (untied and loosened) packed over them, in horizontal layers, alternately at right angles with each other. Three or four boards, with as many iron ½-cwt. weights, are next placed on the top of the whole. Water is now run in, to about ten inches higher than the ingredients, and heat is applied until ebullition commences. The materials are now allowed to macerate, without boiling, for 3 or 4 hours, after which the liquor is gently boiled for about an hour, care being taken to add fresh water from time to time, so as to keep the whole well covered. The decoction is next run off, and set evaporating as quickly as possible. The ingredients are then washed with successive portions of boiling water, by allowing it to descend from a species of shower-bath, after the manner of 'sparging,' described under BREWING.[1] This is repeated until the water runs off nearly colourless, the smallest quantity being employed that will effect the object in view. The whole of the liquid is now evaporated without delay, until reduced to 8¼ galls., when, after cooling, 2 drs. of essential oil of sassafras, dissolved in 2 galls. of rectified spirit of wine, are added, and afterwards, 1 pint of essence of guaiacum. The liquid is then placed in a suitably sized barrel, set upon its head, and fitted with a small cock (not placed too near the bottom), and allowed to repose for a week, by which time it becomes clear and brilliant, and fit for sale. This is the form adopted by the large metropolitan drug-houses most celebrated for this preparation. The product that may be drawn off fit for sale is something over 10 galls. The residuum, forming the 'bottoms,' consists chiefly of fecula. The latter is well stirred up with 3 or 4 galls. of cold water, and allowed to settle. The clear decanted 'washings' are used as water or liquor in making the next batch of decoction.

2. (Extemporaneous.) Compound extract of sarsaparilla, 7½ oz.; boiling water, 12 fl. oz.; dissolve, then add of rectified spirit of wine, 2½ fl. oz.; mix well, and further add of water, q. s. to make the whole measure a pint.

Obs. To conduct this process successfully, several large copper pans are required; one of which (to boil the ingredients in) must be capable of containing from 140 to 150 gallons at the least, and the others must be sufficiently large to receive the liquors as they are drawn off. Those for the evaporation should be very shallow, in order that it may proceed rapidly; and the whole should be heated by steam. An excellent plan is, to employ large wooden vats, and to apply the heat by means of pipes laid along the bottom, and supplied with high-pressure steam. This method is less expensive than the use of double steam pans, as above. When essence of guaiacum is not used, 24 lbs. of guaiacum shavings, from which the dust has been sifted, are boiled with the other ingredients, instead. Those desirous of using the proportions of the ingredients ordered by the Colleges, may do so by taking eight times the given quantities, and proceeding as above. The following are special preparations:—

FELTZ'S DECOCTION OF SARSAPARILLA. *Syn.* AP'OZEM OF FELTZ; DECOCTUM SARZÆ CUM ICHTHYOCOL'LÂ, L.; PTISANE DE FELTZ, Fr. *Prep.* From sarsaparilla (sliced), 3 oz.; isinglass and crude antimony (in powder), of each, ½ oz.; water, 5 pints; boil to one half, and strain. *Used* in skin diseases.

JAUPERAND'S DECOCTION OF SARSAPARILLA. *Syn.* DECOCTUM SARZÆ CUM RADICE CHINÂ, L.; PTISANE DE JAUPERAND, Fr. *Prep.* (Bories.) Sarsaparilla and China root, of each, 2 oz.; senna and sassafras chips, of each, 1 oz.; rhubarb and Peruvian bark, of each, ½ oz.; carbonate of potassa, 1 dr.; water, 2 galls.; simmer, gently, for several hours, and strain 12 pints; when cold, decant the clear.—*Dose.* 2 fl. oz., two or three times daily; in scrofula, &c.

VINACHE'S DECOCTION OF SARSAPARILLA. *Syn.* DECOCTUM SARZÆ CUM SENNÂ, L.; PTISANE DE VINACHE, Fr. *Prep.* (Foy.) Sarsaparilla, China wood, and guaiacum wood, of each, 1½ oz.; crude antimony (tied in a rag), 2 oz.; water, 6 pints; macerate for 12 hours (7 in hot weather), boil to one half, add sassafras chips and senna, of each, ½ oz., infuse 1 hour longer, and strain; when cold, decant the clear. Recommended in scrofula, secondary syphilis, and various cutaneous affections.

ZITTMANN'S DECOCTION OF SARSAPARILLA. *Syn.* DECOCTUM ZITTMANNI, L.; PTISANE DE ZITTMANN, Fr. *Prep.* 1. (STRONGER DECOCTION; D. Z. FORTE—Ph. Bor. 1847.) Sarsaparilla, 12 oz.; water, 72 lbs. (say, 5¾ galls.); digest 24 hours, then add (suspended in a bag), white sugar and alum, of each, 6 drs.; calomel, 4 drs.; cinnabar, 1 dr.; boil to 24 lbs., adding towards the end of the process, senna, 3 oz.; liquorice root, 1½ oz.; aniseed and fennel seed, of each, ½ oz.; finally strain, with pressure and after some time decant the clear portion. The formula in the 'Ph. Suec.' 1845 is similar; that in the 'Hamburg Codex' directs only 24 lbs. of water to be used, and the whole to be reduced to 16 lbs.

2. (WEAKER DECOCTION; D. Z. TENUE,—Ph. Bor. 1847.) Add to the residuum (waste) of the last preparation, sarsaparilla, 6 oz.; water, 72 lbs. (say, 5¾ galls.); boil to 24 lbs.; adding towards the end of the process, lemon peel, cinnamon bark, liquorice root, and cardamoms (all bruised), of each, 3 drs.; press, strain, &c., as before. In the 'Ph. Suec.' 1845 double the above weights of lemon peel and liquorice root are ordered; and in the 'Hamburg Codex' (1845) 24 lbs. of water only are ordered, and the whole is to be boiled down to 16 lbs.

Obs. Both the above are used in Germany and on the Continent generally, in the same

[1] See *page* 262.

cases as those in which compound decoction of sarsaparilla is administered in England. They may be drunk almost *ad libitum*. A trace of mercury may be detected in the stronger decoction, when properly prepared. See SARSAPARILLA.

Decoction of Sen'ega Root. *Syn.* DECOCTION OF AMERICAN SNAKE ROOT, D. OF RATTLESNAKE ROOT; DECOCTUM POLYGALÆ, D. SENEGÆ (Ph. L.), L. *Prep.* (Ph. L.) Senega or seneka root, 10 drs.; water, 1 quart; boil to a pint, and strain.—*Dose.* ½ to 2 wine-glassfuls, three or four times daily; in humoral asthma, chronic cough, dropsy, &c. It is stimulant, expectorant, and diuretic, and, in large doses, emetic and cathartic. It is frequently conjoined with ammonia. It is the antidote employed by the Senega Indians against the bite of the rattlesnake. (Dr. Tennant.)

Decoction of Simaru'ba Bark. *Syn.* DECOCTUM SIMARU'BÆ, L. *Prep.* (Dr. Wright.) Simaruba bark, 2 drs.; water, 24 fl. oz.; boil to one half, and strain. Tonic.—*Dose.* 1 to 2 fl. oz.; in chronic dysentery and diarrhœa.

Decoction of Squills (Compound). *Syn.* DECOCTUM SCILLÆ COMPOSITUM, L. *Prep.* (Ph. U.S. 1841.) Squills, 3 drs.; juniper berries, 4 oz.; snake root, 3 oz.; water, 4 lbs.; boil to one half, strain, and add of sweet spirits of nitre, 4 fl. oz. In chronic coughs and other chest affections, unaccompanied with active inflammatory symptoms.—*Dose.* 1 to 3 fl. oz., twice or thrice daily.

Decoction of Starch. *Syn.* DECOCTUM AM'YLI (Ph. L.), MUCILA'GO AM'YLI (Ph. E. & D.), L. *Prep.* (Ph. L. & E.) Starch, ½ oz.; add, gradually, water, 1 pint, and boil for a short time. The Dublin preparation is nearly twice as strong. *Used* as an enema in dysentery, diarrhœa, and excoriations of the rectum.

Decoction, Sudorif'ic. *Syn.* DECOCTUM SUDORIF'ICUM, L. The old name of the compound decoctions of sarsaparilla and guaiacum.

Decoction of Su'et. *Syn.* ARTIFICIAL GOAT'S MILK; DECOCTUM SE'VI, L. *Prep.* Suet, 1 oz.; tie it loosely in a piece of muslin and simmer it in cow's milk, 1¼ pint; adding towards the last, white sugar, ½ oz. In scrofulous emaciation and phthisis; taken *ad libitum*.

Decoction of Tam'arinds. *Syn.* DECOCTUM TAMARIND'ORUM, L. *Prep.* Tamarinds, 1½ oz.; water, 1 pint; boil for 5 minutes, and strain. A pleasant drink in fevers, asthma, chronic coughs, &c.

Decoction of Tamarinds and Sen'na. *Syn.* DEC. TAMARINDORUM CUM SENNÂ (Ph. E. 1744), L. *Prep.* Tamarinds, 6 drs.; cream of tartar, 2 drs.; water, 1½ pint; boil in a glazed earthen vessel until reduced to 16 oz.; then infuse therein for 12 hours, senna, 4 drs.; strain, and add of syrup of violets, 1 oz. A gentle aperient.—*Dose.* A wine-glassful, or more.

Decoction of Tar. *Syn.* TAR WATER; DECOCTUM PI'CIS LIQ'UIDÆ, L. *Prep.* Tar, 1 oz.; water, 1½ pint; boil to 1 pint.—*Dose.* A pint, or more, daily; in chronic catarrh; and as a wash in chronic skin diseases, especially those of the head, in children.

Decoction, Ton'ic. *Syn.* STRENGTHENING DECOCTION; DECOCTUM ROBORANS, L. *Prep.* 1. Peruvian bark (bruised), ½ oz.; Virginian snake root, 2 drs.; water, 1 pint; boil to one half, strain whilst hot, and add, spirit of cinnamon, 1½ fl. oz.; diluted sulphuric acid, 1½ dr.—*Dose.* 2 oz., two or three times a day.

2. Decoction of bark, 5 oz.; tincture of bark, 6 drs.; aromatic confection, ½ dr.; sal-volatile, 1 dr.—*Dose.* 1 or 2 table-spoonfuls night and morning; especially in diarrhœa.

Decoction of Tor'mentil. *Syn.* DECOCTUM TORMENTIL'LÆ (Ph. L.), L. *Prep.* (Ph. L.) Tormentil root (bruised), 2 oz.; water, 1½ pint; boil to a pint, and strain. Astringent. —*Dose.* 1 to 2 fl. oz., in chronic diarrhœa, &c.

Decoction of Tur'meric. *Syn.* DECOCTUM CURCU'MÆ, L. *Prep.* From turmeric root (in powder), 1½ oz.; water, 1 pint; boil for 5 minutes, and strain. A mild aromatic stimulant and stomachic.—*Dose.* A wine-glassful, *ad libitum*. It is principally used as a test for alkalies, which turn it brown. Unsized paper dipped into it and dried forms the turmeric test-paper of the chemist.

Decoction of Verbe'na. *Syn.* DECOCTUM VERBE'NÆ, L. From verbena (vervain), 2 oz.; water, 1½ pint; boil to 1 pint, and strain.

Obs. The *Verbena officinalis* was formerly highly recommended by Etmuller, Hartman, De Haën, Morley, and others, in scrofula, cephalalgia, &c., but afterwards fell into neglect. More recently, a decoction of the plant has been highly extolled by Boshanov, and others, as an anti-febrile.

Decoction, Vul'nerary. *Syn.* DECOCTUM VULNERA''RUM, L. *Prep.* From ground ivy and broad-leaved plantain, of each, ½ oz.; water, 3 pints; boil to 1 quart, strain, and add sugar, 1 oz. A popular pectoral and tonic, especially in old coughs; also to heal wounds.—*Dose.* ½ a teacupful or more, twice a day.

Decoction of Wal'nut Bark. *Syn.* DECOCTUM JUGLAND'IS, L. *Prep.* (Ph. Gen.) Green bark of walnuts, 1 oz.; water, 1 pint; boil for 15 minutes, and strain. As an anti-syphilitic. Before the general introduction of sarsaparilla, it was much esteemed in most cases in which that drug is now taken.—*Dose, &c.* The same as those of comp. dec. of sarsaparilla. Pearson says, that "when the putamen (green rind) of the walnut has been omitted, either intentionally or by accident (from Decoctum Lusitanicum), the same good effects have not followed its use as when it contained this ingredient.

Decoction of Walnut Leaves. *Syn.* DECOCTUM JUGLAND'IS FOLIO''RUM, L. *Prep.* (Negrier.) Walnut leaves, 1 handful; water, 1

quart; boil 15 minutes, and strain. Detersive, diaphoretic, and alterative.—*Dose, &c.* As the last, especially in chronic rheumatism, secondary syphilis, &c.

Decoction of Wa'terdock. *Syn.* DECOCTUM RUMI'CIS, D. E. AQUAT'ICI, L. *Prep.* (A. T. Thomson.) Root of common waterdock (*Rumex obtusifolius*), 1 oz.; water, 1 pint; boil for 10 minutes, and strain.

Obs. This decoction is astringent, and was once much celebrated as a remedy for scurvy and some other cutaneous affections. "It is the only remedy which proves efficacious in that disease, when the ulcers are healed, and the patient is attacked with asthma." (Linnæus, on the scurvy of the Laplanders.)

White Decoction (Sydenham's). *Syn.* HARTSHORN DRINK; MIS'TURA COR'NU USTI. *Prep.* Prepared burnt hartshorn, 2 oz.; gum arabic, 1 oz.; water, 3 pints; boil to 1 quart, and strain. Mucilaginous; demulcent. Taken *ad libitum*.

Decoction of Whor'tleberry. *Syn.* DECOCTION OF BEAR-BERRY, D. OF UVA-URSI; DECOCTUM UVÆ URSI (Ph. L. & D.), L. *Prep.* 1. (Ph. L.) Whortleberry leaves, 1 oz.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. D.) Uva-ursi (the leaves), ½ oz.; water, ½ pint; boil 10 minutes, and strain.

Dose, &c. 1 to 3 fl. oz., two or three times daily; in phthisis and purulent affections of the urinary organs, unaccompanied with active inflammation; especially in chronic affections of the bladder.

Decoction of Wil'low Bark. *Syn.* DECOCTUM SALICIS, D. S. CORTICIS, L. *Prep.* 1. (Wilkinson.) Willow bark (*Salix latifolia*), bruised, 1½ oz.; macerate in water, 2 lbs., for 6 hours, then boil for 15 minutes, and strain. Tonic, astringent, and febrifuge.—*Dose.* A wine-glassful.

2. (Nieman.) Willow bark (*Salix alba*), 1½ oz.; water, ¾ pint; boil to one half.—*Dose.* 1 to 2 fl. oz. Both are used as substitutes for decoction of cinchona bark.

Decoction of Win'ter-green. *Syn.* DECOCTION OF PYROLA, D. OF UMBELLATED WINTER-GREEN, D. OF PIPSISSEWA; DECOCTUM CHIMAPHILÆ (Ph. L.), D. PYROLÆ (Ph. D.), L. *Prep.* 1. (Ph. L.) Chimaphila (dried herb), 1 oz.; water, 1½ pint; boil to a pint, and strain.

2. (Ph. D.) Winter-green (dried leaves), ½ oz.; water, ½ pint; boil 10 minutes in a covered vessel, and strain. Tonic, stomachic, alterative, and diuretic.—*Dose.* 1 to 2 fl. oz.; in dropsies, scrofula, debility, loss of appetite, &c.; and in those affections of the urinary organs in which uva-ursi is commonly given.

Decoction of Worm'seed. *Syn.* DECOCTUM SANTONICI, L. *Prep.* 1. Wormseed, bruised, 2 oz.; water, 1 pint; boil down to 16 fl. oz., and strain.

2. (Dr. R. E. Griffith.) Fresh leaves of wormseed (*Chenopodium anthelminticum*,—Linn.), 1 oz.; water, 1 pint; orange peel, 2 drs.; boil (10 minutes), and strain. The above are bitter, stomachic, and vermifuge —*Dose.* A wine-glassful twice a day; in worms. It is also used as an injection against ascarides.

Decoction of Yar'row. *Syn.* DECOCTUM MILLEFOLII, L. *Prep.* From milfoil or yarrow tops, 1½ oz.; water, 1½ pint; boil to a pint, and strain. Astringent, tonic, and vulnerary. —*Dose.* A wine-glassful, thrice daily; in dropsies, &c. It is also used as a fomentation to bruises, &c.

DECOLORA'TION. The blanching or removal of the natural colour of any substance. Syrups, and many animal, vegetable, and saline solutions, are decoloured or whitened by agitation with animal charcoal, and subsequent subsidence or filtration. Many fluids rapidly lose their natural colour by exposure to light, especially to the direct rays of the sun. In this way castor, nut, poppy, and several other oils, are whitened. Fish oils are partially deodorised and decoloured by filtration through animal charcoal. Cottons and linens are still commonly bleached by the joint action of light, air, and moisture. The peculiar way in which light produces this effect has never been satisfactorily explained. The decoloration of textile fabrics and solid bodies generally is called bleaching. See BLANCHING, BLEACHING, OILS, TALLOW, SYRUPS, SUGAR, &c.

DECOMPOSI'TION (-zĭsh'-un). In *chemistry*, the resolution of compounds into their elements, or the alteration of their chemical constitution in such a manner that new products are formed.

DEFECA'TION. The separation of a liquid from its lees, dregs, or impurities, by subsidence and decantation. It is commonly employed for the purification of saline solutions, and glutinous or unctuous liquids, on the large scale, in preference to filtration; than which it is both more expeditious and inexpensive. See CLARIFICATION, DECANTATION, FILTRATION, &c.

DEFLAGRA'TION. The sudden combustion of any substance, for the purpose of producing some change in its composition, by the joint action of heat and oxygen. The process is commonly performed by projecting into a red-hot crucible, in small portions at a time, a mixture of about equal parts of nitre, and the body to be oxidised.

DELIQUES'CENCE. Spontaneous liquefaction by absorption of the moisture of the atmosphere. Deliquescent salts are those which by exposure gradually assume the liquid state. They should all be kept in well-closed bottles or jars.

DELIR'IUM TRE'MENS. [L.] The madness of drunkards; a disease of the brain resulting from the excessive and protracted use of intoxicating liquors, particularly of ardent spirits. The early *symptoms* are extreme irritability and fretfulness, with unusual

mobility of the body. Sleeplessness and unpleasant dreams soon follow. At length frightful dreams and visions harass the patient. He sees remarkable sights, hears extraordinary sounds, and labours under all the strange delusions of insane persons, which, however vague and unfounded, operate on him with all the force of realities till he becomes furiously mad. The fit almost always comes on after hard drinking; and the hands are usually, but not always, tremulous. A similar affection is occasionally produced by the abuse of opium, excessive mental anxiety, night watching, or depletion. According to Dr. Armstrong, even respiring the fumes of ardent spirits will, under some circumstances, produce this disease. Persons who have undergone surgical operations under the influence of chloroform are more liable to attacks of this kind than other persons.

The *treatment* of delirium tremens consists mainly in the judicious use of opium, laudanum, or morphia, in rather large doses, frequently repeated. 30 to 60 drops of laudanum may be given every hour or two during the fit, its effects being carefully watched. The object is to produce quiet sleep, from which the patient usually wakes free from the worst symptoms of the disease. Diaphoretics and mild aperients may also be given, and a light, nutritious diet adopted throughout. Depletion, especially bleeding, should be particularly avoided. Alcoholic stimulants and wine, in certain cases, have proved useful. Under this treatment, the patient, unless of a very bad habit of body, or much debilitated by previous excesses, usually recovers. He is, however, very liable to relapses and subsequent attacks, which are best prevented by judicious moral management.

DELPHIN'IC ACID. *Syn.* PHOCE'NIC ACID. A fatty acid, obtained by saponifying the oil of the *delphinus* or *porpoise*. According to recent experiments, it is identical with valeric acid.

DELPHIN'INE. *Syn.* DEL'PHINE, DEL'PHIA, DELPHIN'IA. An alkaloid discovered by Lassaigne and Feneulle in *Delphinium staphysagria* or *Stavesacre*.

Prep. 1. The husked seeds (in powder) are boiled in a little water, and pressed in a cloth; a little pure magnesia is then added to the filtered decoction, the whole is boiled for a few minutes, and refiltered; the residuum, after being well washed, is digested in boiling alcohol, which dissolves out the alkaloid, and gives it up again by gentle evaporation and cooling.

2. The bruised, but unshelled, seeds are digested in dilute sulphuric acid, the filtered liquor precipitated with carbonate of potassa, and the precipitate digested in alcohol as before.

3. (Parrish.) An alcoholic extract of the seeds is treated with dilute sulphuric acid, precipitated with an alkali, again dissolved in dilute sulphuric acid; the colouring matter precipitated by a few drops of nitric acid, the alkaloid by potassa. The alkaloid is then dissolved in absolute alcohol, and the solution thus formed is evaporated; one pound yields about one drachm.

Prop., &c. A light-yellowish or white, odourless powder; extremely acrid and bitter; scarcely soluble in water; dissolves in ether, and readily in alcohol; and has an alkaline reaction. Its alcoholic solution produces a burning and tingling sensation when rubbed on the skin, and a similar sensation is produced in various parts of the body when it is taken in doses of a few grains. It has been exhibited in neuralgia and rheumatism by Dr. Turnbull.—*Dose.* $\frac{1}{12}$ gr. every three hours, made into a pill with 1 gr., each, of the extracts of henbane and liquorice. It is also used externally under the form of ointment and lotion.

DEMUL'CENTS. In *medicine*, substances which are calculated to soften and lubricate the parts to which they are applied. Though having the same signification as the word EMOLLIENTS, it is desirable to restrict the latter term to such as are intended for external application, and to include under the above head only such as are intended for internal exhibition. The principal demulcents are gum arabic, gum tragacanth, liquorice, honey, arrow-root, pearl barley, isinglass, gelatine, milk, almonds, spermaceti, almond and olive oils, and most other mucilaginous, amylaceous, saccharine, and oily substances. For use, these are made into MUCILAGES, DECOCTIONS, EMULSIONS, or MILKS, with water, and form suitable beverages in dysentery, diarrhœa, catarrh, diseases of the urinary organs, and all other diseases where diluents are useful. See EMOLLIENTS.

DENS'ITY. Comparative masses of equal weights, or the quantity of matter contained in a given space. It is commonly used synonymously with SPECIFIC GRAVITY, which, however, refers to comparative weights of equal bulks. Thus, quicksilver is said to have a density greater than that of copper, and alcohol one less than that of oil of vitriol.

DENTI'FRICES. *Syn.* DENTIFRICIA, L. Substances applied to the teeth, to cleanse and beautify them. The most useful form of dentifrices is that of powder (TOOTH POWDER); but liquids (TOOTH WASHES), and electuaries (TOOTH ELECTUARIES, TOOTH PASTES), are also employed. The solid ingredients used in dentifrices should not be so hard or gritty as to injure the enamel of the teeth; nor so soft or adhesive as to adhere to the gums, after rinsing the mouth out with water. Pumice-stone (in fine powder) is one of those substances that acts entirely by mechanical attrition, and is hence an objectionable ingredient in tooth powder intended for daily use. It is, however, very generally present in the various advertised dentifrices, which are remarkable

for their rapid action in whitening the teeth. Bath brick is another substance of a similar nature to pumice, and, like that article, should be only occasionally employed. Cuttle-fish bone, coral, and prepared chalk, are also commonly used for the same purpose, but the last is rather too soft and absorbent to form the sole ingredient of a tooth powder. Charcoal, which is so very generally employed as a dentifrice, acts partly mechanically, and partly by its chemical property of destroying foul smells and arresting putrefaction. For this purpose it should be newly burnt, and kept in well-closed vessels, until used, as by exposure to the air it rapidly loses its antiseptic powers. Powdered rhatany, cinchona bark, and catechu, are used as astringents, and are very useful in foulness or sponginess of the gums. Myrrh and mastic are employed on account of their odour, and their presumed preservative action, and power of fixing loose teeth. Insoluble powders have been objected to on account of their being apt to accumulate between the folds of the gums and in the cracks of the teeth, and thus impart a disagreeable appearance to the mouth. To remedy this defect, a reddish or flesh-coloured tinge is commonly given to them with a little rose pink, red coral, or similar colouring substance, when any small portion that remains unwashed off is rendered less conspicuous. Some persons employ soluble substances as tooth powders, which are free from the above objection. Thus, sulphate of potash and cream of tartar are used for this purpose, because of the grittiness of their powders and their slight solubility in water. Phosphate of soda and common salt are also frequently employed as dentifrices, and possess the advantage of being readily removed from the mouth by means of a little water. Among these substances that chemically decolour and remove unpleasant odours, the only ones employed as dentifrices are charcoal and the chlorides of lime and soda. The first has been already noticed; the others may be used by brushing the teeth with water, to which a very little of their solutions has been added. A very weak solution of chloride of lime is commonly employed by smokers to remove the odour and colour imparted by tobacco to the teeth. Electuaries, made of honey and astringent substances, are frequently employed in diseases of the gums. The juice of the common strawberry has been recommended as an elegant natural dentifrice, as it readily dissolves the tartareous incrustations on the teeth, and imparts an agreeable odour to the breath. See PASTE and POWDER (Tooth), also WASHES (Mouth).

DENT'INE. The tissue of which the teeth are composed.

DENTI'TION. See TEETHING.

DEOB'STRUENT. In medicine, a substance which removes obstructions, and opens the natural passages of the fluids of the body, as the pores, lacteals, and glands. Iodine, mercury, sarsaparilla, and aperients, are deobstruents.

DEO'DORISER. Any substance having the power of destroying fetid effluvia. Chlorine, chloride of lime, chloride of zinc, nitrate of lead, sulphate of iron, and freshly burnt charcoal, are the most effective and convenient deodorisers. Peat charcoal has been highly recommended for deodorising manure, &c., on the large scale. When it is mixed with these substances, their fetor is immediately destroyed, and a compost produced, which may be substituted for guano for agricultural purposes. See DISINFECTANT.

DEOX'IDATION. See REDUCTION.

DEPIL'ATORY. A cosmetic employed to remove superfluous hairs from the human skin. Depilatories act either mechanically (MECHANICAL DEPILATORIES), or chemically (CHEMICAL DEPILATORIES). To the first class belong adhesive plasters, that, on their removal from the skin, bring away the hair with them. The second class includes all those substances which destroy the hair by their chemical action.

Lime or orpiment, and generally both of them, have formed the leading ingredients in depilatories, both in ancient and modern times. The first acts by its well-known causticity, and also, when an alkali is present, by reducing that also, either wholly or in part, to the caustic state. The action of the orpiment is of a less certain character, and its use is even dangerous when applied to a highly sensitive or an abraded surface. The addition of starch is to render the paste more adhesive and manageable.

In using the following preparations, those which are in the state of powder are mixed up with a little warm water to the consistence of a paste, and applied to the part. Sometimes soap lye is used for this purpose, and some persons spread the pulpy mass on a piece of paper, and apply it like a plaster. In 12 or 15 minutes, and sooner, if much smarting ensues, the whole should be washed off with warm water, and a little cold cream, lip-salve, or spermaceti cerate, applied to the part. The application of the liquid preparations is generally accompanied with gentle friction, care being taken to prevent them extending to the adjacent parts. All the following effect the object satisfactorily, with proper management; but some are much more effective than others. A small wooden or bone knife is the best for mixing them with. They must all be kept in well-stoppered bottles, and no liquid must be added to them until shortly before their application; and then no more should be mixed than is required for immediate use.

Depilatory, Arsen'ical. Orpiment (sulphide of arsenic) forms the principal ingredient in many fashionable depilatories, but its use is not free from danger. The following are well-known preparations:—

1. (Colley's D.) From nitre and sulphur, of each, 1 part; orpiment, 3 parts; quicklime, 8 parts; soap lees, 32 parts; boil to the consistence of cream. Very caustic.

2. (Delcroix's D.; 'Poudre subtile.') Orpiment, 1 oz.; quicklime, 10 oz.; starch, 14 oz.

3. (Oriental D.; Oriental rusma.)—*a.* Quicklime, 3 oz.; orpiment, ½ dr.; strong alkaline lye, 1 lb.; boil together in a clean iron vessel until a feather dipped into the liquor loses its flue.

b. From pearlash, 2 oz.; orpiment, 3 drs.; liquor of potassa, ½ pint; boil together as before. One of the most caustic and consequently the most certain of depilatory preparations; but, with the rest of its class, open to the objections of containing orpiment. (See No. 7.)

4. (Paste D.; 'Pâte épilatoire.') To No. 1 add of orris root, 3 parts.

5. (Plenck's D.; 'Pasta epilatoria.') Orpiment, 1 part; quicklime and starch, of each, 12 parts.

6. Soap D.; 'Savon épilatoire.') Turkish depilatory and soft soap, equal parts. Must not be mixed until about to be applied. (See No. 7.)

7. (Turkish D.; Turkish rusma.) Orpiment, 1 part; quicklime, 9 parts. For use, it is mixed up with soap lees, and a little powdered starch.

Depilatory, Boudet's. *Prep.* Sulphide of sodium (crystallised), 3 parts; quicklime (in fine powder), 10 parts; starch, 10 parts; mix. To be mixed with water, and applied to the skin, and scraped off in 2 or 3 minutes with a wooden knife. Very effective and safe.

Depilatory, Cazenave's. *Syn.* Mahon's D.; Pommade épilatoire de Cazenave, Fr. *Prep.* Quicklime, 1 part; carbonate of soda, 2 parts; lard, 8 parts; mix. Applied as an ointment.

Depilatory, Chi'nese. *Prep.* 1. Quicklime, 8 oz.; pearlash (dry) and liver of sulphur, of each, 1 oz.; all reduced to a fine powder; mixed, and kept in a close bottle.

2. (Roseate D.) As No. 1., but coloured with a little rose pink or light red.

These preparations are applied in the same manner as Boudet's Depilatory.

Depilatory, Colley's. See Arsenical Depilatory (*above*).

Depilatory, Hydrosul'phate of Lime. *Prep.* (Beasley.) Mix quicklime and water to a thick cream, and pass into the mixture 25 or 30 times its volume of sulphuretted hydrogen gas. When the gas ceases to be absorbed, stop the process. The pulpy mass is spread on paper, and applied for 12 or 15 minutes. It is very effective, but has a most disgusting smell. Spolasco's depilatory is a very similar preparation (see *below*).

Depilatory, Mechan'ical. *Syn.* Depilatory plaster. *Prep.* From pitch and resin, equal parts, melted together and spread on leather. Applied as a plaster.

Depilatory, Rayer's. *Prep.* Quicklime, 2 oz.; salt of tartar, 4 oz.; charcoal, ¼ oz. Less active than Chinese Depilatory.

Depilatory, Redwood's. *Prep.* A strong solution of sulphide of barium, made into a paste with powdered starch, and applied immediately. Mr. Redwood says this is "the best and safest depilatory."

Depilatory, Ro'seate. See Chinese Depilatory (*above*).

Depilatory, Spolasco's. *Prep.* Freshly prepared sulphide of calcium and quicklime, equal parts. Almost equal to Redwood's (*above*).

DEPOSI'TION (of Metals). See Electrotype.

DER'BYSHIRE NECK. See Goiture.

DESIC'CANTS. *Syn.* Desiccan'tia, L. In *pharmacology*, substances that check secretion and dry sores of abraded surfaces, without acting as styptics, or constringing the fibres of the parts to which they are applied. See Astringents.

DESICCA'TION. *Syn.* Exsicca'tion. The evaporation or drying off of the aqueous portion of solid bodies. Plants, and chemical preparations are deprived of their humidity by exposure to the sun, a current of dry air, an atmosphere rendered artificially dry by sulphuric acid, or by the direct application of heat by means of a water bath, a sand bath, or a common fire. Planks and timber are now seasoned, on the large scale, in this way, by which a condition may be produced, in 2 or 3 days, which on the old system is barely attainable in as many years. "Endeavours were made to enforce the importance and value of the desiccation of woods to the builder, cabinet maker, architect, and civil engineer, so long back as 1843, but without success. Since that period, certain persons have availed themselves, commercially, of our ideas and experiments on the subject, without any acknowledgment, either verbal or pecuniary." Cooley.

DESTEM'PER. *Syn.* Distemper. Colours ground up with size, gum, or white of egg, and water, as in scene painting. The art of executing work in distemper, is called 'distemper painting.'

DETER'GENT. An agent having the power of removing offensive matter from the skin. The name is now generally restricted to applications that tend to cleanse foul wounds and ulcers.

Detergent, Collier's. *Prep.* From liquor of potassa, 2 fl. drs.; rose water, 5½ fl. oz.; spirit of rosemary, ½ fl. oz.; mix. One of the best applications known to free the head from scurf, when the hair is strong and healthy. The head should be afterwards sponged with clean, soft water.

DETONA'TION. See Fulminating Compounds.

DEUTOX'IDE. See Oxides.

DEW-POINT. The temperature at which dew begins to form, as observed by a ther-

mometer. It varies with the humidity of the atmosphere.

DEX'TRIN. $C_6H_{10}O_5$. *Syn.* STARCH GUM, DEXTRINA, DEXTRINUM, BRITISH GUM. A soluble substance resembling gum, formed by the action of dilute acids at the boiling temperature, and by infusion of malt, at about 160° Fahr., on starch. It is also formed when potato starch and some of the other farinas are exposed to a heat of about 400°. See DIASTASE and GUM (British).

DEX'TRO-RACE'MIC ACID. See RACEMIC ACID.

DIABE'TES. See URINE.

DIACH'YLON. See PLASTERS.

DIALY''SER. In *practical chemistry*, an instrument for separating 'crystalloids' from 'colloids,' introduced by the late Prof. Graham. In its most convenient form it consists of a hoop of gutta percha, over which a circular piece of parchment-paper is stretched. The paper is applied to the hoop while wet, and is kept stretched by a second hoop, by an elastic band, or by a few turns of string. The instrument, when complete, resembles an ordinary tambourine. It is distinguished as the 'HOOP DIALYSER.' The fluid to be 'dialysed' is poured into the hoop upon the surface of the parchment-paper, to a small depth only, such as half an inch, and the dialyser is then floated upon water in a large glass basin. Another form of dialyser, termed the 'BULB DIALYSER,' consists of a small glass bell-jar, the mouth of which is covered by a piece of parchment-paper. This is suspended or otherwise supported in a large vessel of water in such a manner that the parchment-paper septum just dips below the surface. See DIALYSIS (*below*), PARCHMENT-PAPER.

DIAL'YSIS. In *practical chemistry*, the method of separating substances by 'diffusion' through a septum of gelatinous matter. When a solution having a sp. gr. greater is introduced into a cylindrical glass vessel, and then water very cautiously poured upon it, in such a manner that the two layers of liquid remain unmoved, the substance dissolved in the lower liquid will gradually pass into the supernatant water, though the vessel may have been left undisturbed, and the temperature remain unchanged. The gradual passage of a dissolved substance from its original solution into pure water taking place, notwithstanding the higher sp. gr. of the substance which opposes this passage, is called the 'diffusion of liquids.' From the investigation of the phenomena of this diffusion, the late Prof. Graham derived the remarkable results upon which the method under notice is based. Different substances, when in solution of the same concentration, and under other similar circumstances, diffuse with very unequal velocity. "The range in the degree of diffusive mobility," says Prof. Graham, "exhibited by different substances, appears to be as wide as the scale of vapour-tensions. Thus, hydrate of potassa may be said to possess double the velocity of diffusion of sulphate of potassa, and sulphate of potassa again double the velocity of sugar, alcohol, and sulphate of magnesia. But the substances named belong, as regards diffusion, to the more volatile class. The comparatively fixed class, as regards diffusion, is represented by a different order of chemical substances (marked out by the absence of the power to crystallise), which are slow in the extreme. Among the latter are hydrated silicic acid, hydrated alumina, and other metallic peroxides of the aluminous class, when they exist in the soluble form; with starch, dextrine, and the gums, caramel, tannin, albumen, gelatin, vegetable and animal extractive matters. Low diffusibility is not the only property which the bodies last enumerated possess in common. They are distinguished by the gelatinous character of their hydrates. Although often largely soluble in water, they are held in solution by a most feeble force. They appear singularly inert in the capacity of acids and bases, and in all the ordinary chemical relations. But, on the other hand, their peculiar physical aggregation, with the chemical indifference referred to, appears to be required in substances that can intervene in the organic processes of life. The plastic elements of the body are found in this class. As gelatin appears to be its type, it is proposed to designate substances of this class as 'COLLOIDS,' and to speak of their peculiar form as the 'colloidal condition of matter.' Opposed to the colloidal is the 'crystalline condition.' Substances affecting the latter form will be classed as 'CRYSTALLOIDS.' The distinction is, no doubt, one of intimate molecular constitution."[1] A certain property of colloidal substances comes into play most opportunely in assisting diffusive separations. The jelly of starch, that of animal mucus, of pectin, of vegetable gelose, and other solid colloidal hydrates, all of which, strictly speaking, are insoluble in cold water, are themselves permeable when in mass, as water is, by the more highly diffusive class of substances. But such jellies greatly resist the passage of the less diffusible substances, and cut off entirely other colloid substances like themselves that may be in solution. A mere film of the jelly has the separating effect. Now, parchment-paper, when wetted, acts just like a layer of animal mucus or other hydrated colloid, by permitting the passage of crystalloids, but not of colloids, consequently this substance may be used for dialytic septa (see DIALYSER, *above*). The following experiments recorded by Graham will give some idea of the results which may be obtained by dialysis:—

1. Half a litre of urine was placed in a hoop dialyser, which was then floated on a considerable quantity of pure water. Dialysed for 24 hours, the urine gave its crystalloidal constituents to the external water. The latter, evaporated by a water bath, yielded a white

[1] "*Philosophical Transactions*" for 1861.

saline mass. From this mass urea was extracted by alcohol in so pure a condition as to appear in crystalline tufts upon the evaporation of the alcohol.

2. By pouring silicate of soda into diluted hydrochloric acid (the acid being maintained in large excess), a solution of silica is obtained. But in addition to hydrochloric acid, such a solution contains chloride of sodium, a salt which causes the silica to gelatinise when the solution is heated, and otherwise modifies its properties. Now, such a solution, placed for 24 hours in a dialyser of parchment-paper, was found to lose 5% of its silicic acid (silica) and 86% of its hydrochloric acid. After 4 days on the dialyser, the liquid ceased to be disturbed by nitrate of silver. All the chlorides were gone, with no further loss of silica. What remained was a pure solution of silicic acid, which could be boiled in a flask, and considerably concentrated, without change.

3. Half a litre of dark-coloured porter, with ·05 gramme of arsenious acid added ($\frac{1}{10,000}$th part of arsenious acid), was placed on a hoop dialyser, 8 inches in diameter, and the whole floated in an earthenware basin containing 2 or 3 litres of water. After 24 hours the latter fluid had acquired a slight tinge of yellow. It yielded, when concentrated and precipitated by sulphuretted hydrogen, upwards of one half of the original arsenious acid in a fit state for examination.

DI'AMOND. The diamond is pure carbon, and differs from the carbon of charcoal and lampblack simply in being limpid, colourless, and highly refractive of light, properties which are generally referred to its crystalline form. The weight, and, consequently, the value of diamonds, is estimated in carats, one of which is equal to 4 grains; and the price of one diamond, compared to that of another of equal colour, transparency, purity, form, &c., is as the squares of the respective weights. The average price of ROUGH DIAMONDS, that are worth working, is about £2 for the first carat; that of a CUT DIAMOND is equal to that of a rough diamond of double weight, exclusive of the price of workmanship. "To estimate the value of a wrought diamond, ascertain its weight in carats, double that weight, and multiply the square of this product by £2." (Ure.) Thus, a cut diamond of—

1 carat	is worth	£8
2 carats	„	£32
3 „	„	£72
4 „	„	£128

&c., &c. See CARBON, GEMS.

Di'amond Dust. Genuine diamond dust is the powder produced by the abrasion of diamonds against each other in the process of cutting and polishing them. It possesses the valuable property of polishing the gems, and giving "the finest edge to every kind of cutlery." The discovery of the latter fact, a few years since, led certain dishonest persons to extensively advertise spurious preparations, consisting chiefly of emery powder or powdered quartz, under the name of diamond dust. The factitious articles acquired a very short and bad notoriety. Instead of sharpening cutting instruments, they infallibly destroyed their edge, and were particularly unfortunate in converting razors into saws.

DIAPEN'TE. *Syn.* PULVIS DIAPENTE. *Prep.* 1. (Ph. E. 1744.) Bay-berries, birth-wort, gentian, ivory dust, and myrrh, equal parts. An excellent warm tonic, especially useful in the debility and rickets of children. The substance sold under this name in the shops is an inferior mixture, used principally as a tonic in veterinary practice. The following are the forms commonly adopted in its preparation:—

2. Turmeric, 4 lbs.; laurel berries and mustard, of each, 3 lbs.; gentian, 2 lbs. (all in fine powder); mix.

3. Bay-berries, gentian, mustard, and turmeric, equal parts.

4. Gentian, 6 lbs.; bay-berries, 1 lb. This is the formula generally used by the farriers. Sometimes mustard, 1 lb., is added.

DIAPHORET'ICS. *Syn.* SUDORIF'ICS; DIAPHORETICA, SUDORIFICA, L. Medicines which promote or increase the perspiration. Those that produce this effect in a very marked degree are more particularly called 'sudorifics.' The principal diaphoretics are:—warm diluents, as barley-water, gruel, tea, &c.; salts of the alkalies, as the citrates of potassa and soda, acetate of potassa, acetate and carbonate of ammonia, sal-ammoniac, nitre, &c.; preparations of antimony, as antimonial powder, tartar emetic, &c.; also alcohol, camphor, Dover's powder, ipecacuanha, opium, wine, &c.

The *use* of diaphoretics is indicated in nearly all diseases accompanied by fever and a dry skin, and particularly in febrile and pectoral affections.

DI'APHRAGM (frăm). A partition through or across; a dividing substance. In *anatomy*, the term is applied to the midriff, a muscle separating the chest or thorax from the abdomen or lower belly. In *astronomy* and *optics*, the term is applied to a circular ring placed in a telescope or other instrument to cut off the marginal portions of a beam of light. In *electricity*, the name is commonly used to denote the porous partition, cell, or vessel that separates the fluid containing the positive plate from the fluid which surrounds the negative plate, in a constant voltaic battery. Thin partitions of sycamore, or other porous wood, are occasionally used, but cells made of thin biscuit ware are the most convenient and durable diaphragms. Plaster of Paris, animal membrane, coarse and tightly wove canvas, &c., are used also for the purpose. Plaster cells are also formed by surrounding an oiled cylinder of wood with a hoop of paper, and pouring plaster of Paris, mixed up with water, into the space between the two. See ELECTROTYPE.

DIARRHŒ'A. A purging or looseness of the bowels. The causes of diarrhœa are various, but among the most common are the presence of irritating matter, worms, or acidity in the stomach or bowels; and exposure to cold (especially cold to the feet) or sudden changes of climate or temperature.

Treatm. In general, it will be proper to administer a mild aperient, for which purpose rhubarb or castor oil is usually preferred. The dose of the first may be from 20 to 30 grains in sugar, or made into a bolus; that of the second, from ¼ oz. to ½ oz., with a little mint or peppermint water. After the due operation of this medicine, opium, astringents, and absorbents, may be taken with advantage, but not in excessive doses, as is commonly the practice. The first and second are indicated when great irritability exists, and the third, in cases of diarrhœa arising from the presence of acidity. Chalk mixture, to which a few drops of laudanum have been added, or the compound powder of chalk and opium, are excellent medicines, and will generally quiet the bowels. A small piece of catechu or hard extract of logwood, sucked in the same way as a lozenge, is a pleasant method of taking either of these powerful astringents, and will generally cure cases of simple diarrhœa arising from excessive peristaltic motion, or want of tonicity of the muscular coats of the intestines.

In *bilious diarrhœa*, characterised by the bright yellowish-brown colour of the dejections, a dose of blue pill or calomel, assisted by mild diluents and demulcents, and warmth, generally proves efficacious. Small doses of opium are also useful in some cases.

In *catarrhal diarrhœa, chylous diarrhœa*, and the like varieties, characterised by the dejections being nearly colourless, and consisting chiefly of water and mucus; or white and milky, showing the entire absence of bile; or, being entirely liquid, limpid, and serous (in some cases resembling the washings of flesh), opinions are divided as to the treatment. The majority of the best authorities regard purging as injurious in these varieties, and rely chiefly on warm baths and warm fomentations, with the internal administration of mild salines and diaphoretics, followed by astringents, tonics, and occasional doses of opiates. *Choleraic diarrhœa* demands a nearly similar treatment.

The diet in every variety of diarrhœa should be light and non-irritating. Glutinous broths, beef-tea and arrow-root, are among the best articles which can be taken. To these may be added a little dry toast. Arrow-root (genuine), either with or without a spoonful of port wine or brandy (preferably the former), will of itself cure all ordinary cases of diarrhœa, if accompanied with repose and a recumbent posture.

Among external remedies, warm and stimulating fomentations, liniments, &c., to the epigastrium and abdomen, will be found useful adjuncts to other treatment. A spoonful or two of laudanum, used as a friction, will generally allay pain, and in many cases settle the bowels when all other remedies have been tried in vain.

DI'ASTASE. A peculiar azotised substance, contained in malt, which effects the conversion of starch, first into dextrin, and then into grape sugar.

Prep. A cold infusion of malt is heated to 158° Fahr. (to coagulate in albumen); it is then allowed to cool, and alcohol is added to the filtered liquor, when diastase is precipitated, under the form of a tasteless white powder, which is freely soluble in water.

Prop., &c. Diastase seems to resemble vegetable albumen, but very little is known respecting it, as it has never been got in a state of purity. One part of diastase is capable of converting 2000 parts of starch into grape sugar. Malted barley is said to contain $\frac{1}{500}$th part of this substance; yet this small portion is quite sufficient to convert the starch of the malt into sugar during the operation of mashing, in the manufacture of beer. See BREWING, DEXTRIN, &c.

DICTA'MIA. A nutritious, dietetic article. *Prep.* (Beasley.) Sugar, 7 oz.; potato arrow-root, 4 oz.; flour of brent barley (*Triticum monococcum*), 3 oz.; Trinidad and Granada chocolate, of each, 1 oz.; vanilla, 15 grs.; triturate together.

DIDYM'IUM. Di. A rare metal, found associated with cerium and lanthanium in the Swedish mineral cerite. See CERIUM.

DI'ET. Food or victuals. In *medicine*, food regulated by certain rules, or prescribed for the cure or prevention of disease. The dietetic part of medicine is no inconsiderable branch, and deserves a much greater share of regard than it commonly meets with. A great variety of diseases might be removed by the observance of a proper diet and regimen, without the assistance of medicine, were it not for the impatience of the sufferers. On all occasions it may come in as a proper assistant to the cure, which sometimes cannot be performed without a due observance of the non-naturals.

Writers on dietetics (DIETETICA, L.) have taken much trouble to divide and classify the numerous articles of food suitable to the various conditions of the body in health and disease; but little practical advantage has resulted from their labours. Low diet, middle diet, full diet, milk diet, farinaceous diet, fruit diet, and vegetable diet, are terms which, under most circumstances, are sufficiently simple to be almost self-explanatory.

DIGES'TION. In *chemistry* and *pharmacy*, the operation of exposing bodies to a gentle and continuous heat. The best digesters are thin glass flasks and beakers, and the most convenient source of heat is the sand bath. Digestion is often performed to soften and otherwise modify bodies that are to be distilled.

In *physiology*, the term is applied to the conversion of food into chyme, or the process of dissolving aliment in the stomach, and preparing it for circulation and nourishment. In *surgery*, digestion signifies a method of treating ulcers, wounds, &c. See DIGESTIVES (*below*).

DIGES'TIVES. In *surgery*, substances which, when applied to wounds or tumours, induce or promote suppuration. All stimulating applications are of this class. Heat is a most powerful digestive agent. The action of digestives is opposed to that of DISCUTIENTS, which repel or resolve tumours and indurations.

DIGITA'LIN. *Syn.* DIGITA'LIA. A vegetable principle discovered by M. Royer in *Digitalis purpurea*, or purple foxglove.

Prep. 1. (Majendie.) Foxglove leaves (powdered), 1 lb., are digested in ether, first in the cold, and then heated under pressure; when the whole has again become cold, the liquor is filtered (rapidly), and the ether is distilled off in a water bath; the residuum is dissolved in water, the filtered solution treated with hydrated oxide of lead, the whole gently evaporated to dryness, and the dry residuum again digested in hot ether; from this solution the alkali is obtained, by evaporation and repeated resolutions, in a crystalline form.

2. (Homolle and Henry.) Foxglove leaves (carefully dried and powdered), 2½ lbs., are digested in rectified spirit, and the tincture expressed in a tincture press; the spirit is then distilled off, and the residual extract treated with distilled water, ½ pint, acidulated with about 2 fl. drs. of acetic acid, a gentle heat being employed; some animal charcoal is then added, and the whole filtered; the filtrate is then diluted with water, and partly neutralised with ammonia; a fresh-made, strong decoction of galls is next added; a copious precipitation of tannate of digitalin ensues; the precipitate is washed with water, and mixed with a little alcohol, after which it is triturated with litharge (in fine powder) and exposed to a gentle heat; the whole is now digested in alcohol, the tincture treated with animal charcoal, and evaporated; the dry residuum is, lastly, treated with cold sulphuric ether, which takes up some foreign matter, and leaves the digitalin. 2 lbs. 8 oz. of the dried leaves yield 140 to 150 grs. of the digitalin.

Prop., &c. White, inodorous, porous masses, or small scales; it crystallises with difficulty, is intensely bitter, and excites violent sneezing when smelled to; dissolves freely in alcohol; scarcely soluble in cold ether; and takes 2000 parts of water for its solution; it is neither basic nor alkaline; concentrated colourless hydrochloric acid dissolves it, forming a characteristic solution which passes from yellow to a fine green. (Homolle.) It is one of the most powerful of known poisons, being fully 100 times stronger than the powdered leaves of the dried plant. It is used in the same cases.—*Dose.* $\frac{1}{60}$ to $\frac{1}{30}$ gr.; either made into pills or dissolved in alcohol and formed into a mixture. Owing to the difficulty and uncertainty connected with dispensing such small quantities, it is now seldom employed in this country.

DILL. *Syn.* ANETHUM (Ph. L. & E.), L. The fruit (seed) of *Anethum graveblens*, or garden dill, *Anethi fructus*, B. P. Dill is an aromatic stimulant and carminative. The Cossacks employ it as a condiment; and in this country it is frequently employed to heighten the relish of soups and pickles, especially cucumbers. DILL WATER is a favorite remedy of nurses to promote the secretion of milk, and to relieve the flatulence and griping of infants.—*Dose.* Of the powder, 10 grs. to ½ dr., or more. Oil of dill (OLEUM ANETHI) and dill water (AQUA ANETHI) are officinal in the pharmacopœias.

DIL'UENTS. *Syn.* DILUENTIA, L. *Aqueous liquors;* so named because they increase the fluid portion of the blood. Tea, barley-water, water-gruel, and similar articles, are the most common diluents, after pure water. The copious use of diluents is recommended in all acute inflammatory diseases, not of a congestive character, and to promote the action of diuretics and sudorifics.

DINNER PILLS. See PILLS.

DIOS'MA. *Syn* BOOKOO, BUKU; FOLIA BAROSMÆ, F. DIOSMÆ, L.; BUCHU (Ph. L.), BUCKU (Ph. E.), DIOSMA (Ph. L. 1836). "The leaves of *Barosma serratifolia*, *B. crenulata*, and *B. crenata*." (Ph. L.) These species were all included by De Candolle in the genus *Diosma*. Buchu is principally employed in chronic affections of the urino-genital organs, especially that of the mucous membrane of the bladder, attended with copious discharge of mucus.—*Dose.* 20 grs. to ½ dr. of the powder, taken in wine; or made into an infusion or decoction.

The officinal buchu leaves are "glabrous, glandular; either linear-lanceolate with small serrations, or ovato-oblong, obtuse, crenated, ovate or obovate, serrated." (Ph. L.) Their odour somewhat resembles that of rue, and their taste is warm and mint-like.

DIOS'MINE. A bitter extractive matter obtained by Brande from buchu leaves. It is very soluble in water, but not in alcohol and ether.

DISCU'TIENTS. In *surgery*, substances or agents which disperse or resolve tumours, &c. See DIGESTIVES.

DISINFECT'ANT. An agent which absorbs, neutralises, or destroys, putrescent effluvia and miasmata, and thus removes the causes of infection. The principal disinfectants are chlorine, the so-called chlorides of lime and soda, chloride of zinc, ozone, carbolic acid, the alkaline manganates and permanganates, peat charcoal, the fumes of nitric, nitrous, and sulphurous acids, heat, and ventilation. The last two are the most efficient and easily

applied. The clothing, bedding, &c., of patients labouring under contagious diseases may be effectually disinfected by exposure to a temperature a little higher than that of boiling water, for about an hour. Neither the texture nor colour of textile fabrics is injured by a heat of even 250° Fahr. (Dr. Henry.) It is a practice at some of the workhouses to bake the clothes of the paupers who have the itch, or who are infested with vermin. Quicklime rapidly absorbs carbonic acid, sulphuretted hydrogen, and several other noxious gases, and is therefore commonly used as a wash for the walls of buildings. Acetic acid, camphor, fragrant pastiles, cascarilla, brown paper, and other similar substances, are frequently burnt or volatilised by heat, for the purpose of disguising unpleasant odours. The sulphates of iron and lime have the property of rapidly destroying noxious effluvia. A quantity of either of these sulphates thrown into a cesspool, for instance, will in a few hours render the matter therein quite scentless. Of gaseous disinfectants, "sulphurous acid gas (obtained by burning sulphur) is preferable, on theoretical grounds, to chlorine. No agent checks so effectually the first development of animal and vegetable life. All animal odours and emanations are immediately and most effectually destroyed by it." (Graham.) See ANTISEPTIC, DEODORISER, FUMIGATION, INFECTION, OZONE, also the DISINFECTING COMPOUNDS given *below*.

Disinfecting Compounds. 1. (SIR WM. BURNETT'S DISINFECTING LIQUID.) A concentrated solution of chloride of zinc. See ZINC.

2. (COLLINS' DISINFECTING POWDER.) A mixture of dry chloride of lime, 2 parts, and burnt alum, 1 part. *Used* either dry or moistened with water. See LIME.

3. (CONDY'S DISINFECTING FLUIDS.) Solutions of the alkaline manganates and permanganates. See MANGANESE.

4. (ELLERMAN'S DEODORISING FLUID.) This is said to consist chiefly of the perchlorides and chlorides of iron and manganese.

"In a report addressed to the Metropolitan Board of Works in 1859, Drs. Hofmann and Frankland stated that the perchloride of iron was the cheapest and most efficient deodoriser that could be applied to sewage." (Beasley.)

5. (LABARRAQUE'S DISINFECTING SOLUTION; LIQUOR SODÆ CHLORINATÆ, Ph. L. & D.) A solution of chlorinated soda, or, as it is commonly called, 'chloride of soda.' M. Labarraque made known this valuable disinfectant in 1822, and obtained the prize of the French 'Society for Encouraging National Industry' for its introduction.

6. (LEDOYEN'S DISINFECTING FLUID.) A solution of nitrate of lead, 1 part, in about 8 parts of water; or, of litharge, 13½ oz., in nitric acid (sp. gr. 1·38), 12 oz., previously diluted with water, 6 pints. Sp. gr. 1·40.

7. (SIRET'S DISINFECTING COMPOUNDS.) —*a*. A mixture of sulphate of lime, 53 lbs., sulphate of iron, 40 lbs., sulphate of zinc, 7 lbs., and peat charcoal, 2 lbs., made into balls.

b. Sulphate of iron, 20 parts; sulphate of zinc, 10 parts; tan or waste oak-bark (in powder), 4 parts; tar and oil, of each, 1 part; as before. *Used* for deodorising cesspools, &c.

DISLOCA'TION. *Syn.* LUXATION; DISLOCATIO, L. The forcible displacement of a bone from its socket, either by violence or disease. The latter happens when the textures forming the joint have been destroyed by some independent organic affection. "A considerable share of anatomical knowledge is required to detect the nature of these accidents; and it is much to be lamented that students neglect to inform themselves sufficiently on the subject." (Sir A. Cooper.) In common cases, the bones may be frequently replaced by forcibly extending the limb. This should be done as early as possible, and before inflammation sets in. The latter should be combated by aperients, local bleeding, refrigerant lotions, &c. Dislocations frequently exist without the fact being suspected, the swelling and inflammation being referred to other causes.

DISPLACE'MENT. See PERCOLATION.

DISTEM'PER. A disease among dogs, usually characterised by a running from the nose and eyes, and a short dry cough; followed by wasting of the flesh, and loss of strength and spirits. At length the brain suffers, and fits, paralysis of the extremities, or convulsions come on. Laxatives and emetics are the best remedies. If there is much diarrhœa, astringents may be afterwards given. The violence of the fits may be mitigated by the administration of antispasmodics, and by the warm bath. The distemper is a contagious disease, and is generally fatal to weakly and very young dogs. Fits in the advanced stages of the disease are seldom followed by recovery. Impatience of light, red eyes, obstinate diarrhœa, spasmodic twitchings, a yellow colour of the skin, and a pustular eruption, are also bad symptoms.

Distemper Powders (Blane's). The basis of these is said to be '*aurum musivum*,' or bisulphide of tin. That of another advertised nostrum is a mixture of mercury and chalk, with a little rhubarb and ipecacuanha.

DISTILLA'TION. The evaporation and subsequent condensation of the vapour of fluids, by means of a still and refrigerator, or other similar apparatus. DRY DISTILLATION is a term applied to the distillation of substances *per se*, or without the addition of water or other volatile fluid. DESTRUCTIVE DISTILLATION is the distillation of substances at temperatures sufficiently high to decompose them, by which their elements are separated, or evolved in new combinations. FRACTIONAL

DISTILLATION is the separation of substances having different boiling-points, by distilling the mixture with a gradually increasing heat, and collecting the products which come over at different temperatures in separate receivers. See HYDROCARBON, STILL, &c.

Distillation. The art of the distiller; the manufacture of spirituous liquors as practised on the large scale.

The process of distillation, as carried on in the distilleries of Great Britain, may be divided into four general operations, viz.:—1. The mashing, or formation of a saccharine infusion from certain vegetable matters, as malt, barley, oats, rye, &c. 2. The cooling of this wort or liquor. 3. The fermentation, or process by which the sugar of the cooled wort is converted into alcohol. 4. The separation of the spirit so formed by means of a still and refrigerator. By the first operation, the materials for the formation of the alcohol are obtained; by the second, they are brought to a temperature most favorable to the transformation that takes place in the third, after which it only remains to free the product of the last operation from the foreign matter with which it is associated; this is done in the fourth, which, correctly speaking, constitutes the only part of the process which can be called distillation.

The general principles of the first three of the preceding operations are noticed in the articles BREWING, FERMENTATION, &c. It will there be seen, that the amylaceous or starchy matter of the grain is first 'saccharified,' and afterwards converted into alcohol, and that certain precautions are necessary to render the process successful and economical. In many of the distilleries of Great Britain molasses and analogous saccharine substances are employed, in which case the vegetable principle (sugar) essential to the formation of alcohol, is already present, and merely requires simple solution in water of a proper temperature, to be ready to be subjected to immediate fermentation. In general, however, the sources of spirit in England are the various kinds of grain; barley, rye, maize, and rice are those commonly employed. These are ground and mixed with bruised malt, in various proportions, and are mashed in a similar manner to malted grain. The fermentation is carried on until the density of the liquor ceases to lessen or 'attenuate,' which is determined by an instrument called a saccharometer. When this point is arrived at, the 'wash' is submitted to distillation, to prevent the access of the acetous fermentation, which would lessen its alcoholic value.

During the process of distilling off the spirit of the fermented 'wash' or 'wort,' a hydrometer is employed to ascertain the 'strength' of the liquor that passes over. As soon as this has fallen to a certain point, the operation is stopped, and the 'spent wash' removed. The spirits obtained by the first distillation are generally called 'low wines,' and have a specific gravity of about ·975. By rectification or 'doubling,' a crude milky spirit, abounding in oil, at first comes over, followed by clear spirit, which is received in a separate vessel. The process is continued until the alcoholic content of the distilled liquor has considerably diminished, when the remaining weak spirit that distils over, called 'faints,' is caught separately, and mixed with the low wines, preparatory to another distillation. The strongest spirit passes over first, and the condensed liquor gradually becomes weaker, until it ceases to contain alcohol. By receiving in separate vessels any given portion of the product, spirit of any required strength, within certain limits, may be obtained. The same object is more conveniently effected by surrounding the top of the capital of the still with a water bath, of a temperature corresponding to that of alcoholic vapour of the strength it is desired to obtain. Thus, if we keep the temperature of the water at about 198° Fahr., we shall obtain proof spirit; if at 192°, a spirit 20 o. p.; and so on for other strengths.

It is found from experience, and is readily accounted for by theory, that the lower the temperature at which the distillation is conducted, the stronger will be the product, and the less quantity of oil or other volatile matter will come over along with it. To promote this, it has been proposed to carry on the process *in vacuo*, but on the large scale this has never been adopted. The distillation of the wash is usually performed in a separate set of stills to those employed for the rectification of the low wines. For very strong and tasteless spirit, a third and even a fourth rectification is employed, conjointly with other methods, to abstract the water, and to remove any foreign matter that vitiates its odour or flavour. A portion of soap is generally put into the still with the wash, to prevent excessive frothing.

We have said that the processes of mashing, &c., in the distillery, are similar to those adopted in brewing beer. We may add, that as richness in alcohol, and not flavour, is the object aimed at in the distiller's wash, not only is a large quantity of unmalted grain employed, but the process of boiling the wort with hops is omitted altogether. The wort is commonly 'set' at 70° Fahr., and the fermentation and attenuation of the liquor pushed as far as possible by large and repeated doses of the best 'top-yeast' of the porter brewers.

It often happens that raw spirit prepared from damaged grain is contaminated with a highly acrid and volatile fatty substance, which is powerfully intoxicating, and irritating to the eyes and nostrils, and possesses an odour very similar to that of an alcoholic solution of cyanogen. This may be got rid of by dilution with water and skilful rectification, when most of it passes over with the first and last 'runnings,' the intermediate portion being less loaded with

it. Another plan is to filter the spirit successively through 6 or 7 separate vessels containing pine or willow charcoal, before rectifying it. In some distilleries the contaminated spirit is well agitated with a considerable quantity of olive oil, and after repose decanted, diluted with water, and rectified as before. The ordinary corn oil or fusel oil of raw spirit is generally, for the most part, intercepted by a self-regulating bath arranged between the still-head and the refrigeratory.

The quantity of spirit obtained from various substances, and even from pure sugar, depends upon the skill with which the several operations are conducted. By theory, pure sugar should yield 51% of alcohol; but in practice 11·925 galls. of proof spirit is the largest quantity which has yet been obtained from 112 lbs. of sugar. By the revenue authorities this weight of sugar is estimated to afford 11½ galls. of proof spirit. The average product is, perhaps, about 1 gal. of spirit of this strength for every 10 lbs. of sugar. According to Harmstädt, 100 lbs. of starch yield 35 lbs. of alcohol, or 7·8 galls. of proof spirit; and 100 lbs. of the following grains produce the accompanying quantities by weight of spirit of sp. gr. ·9427, or containing 45% of pure alcohol:—wheat, 40 to 45%; rye, 36 to 42%; barley, 40%; oats, 36%; buckwheat, 40%; maize, 40%; the mean benig 3·47 galls. of proof spirit. It is found that a bushel of good malt yields 2 galls. of proof spirit, and that the largest quantity of proof spirit obtained from raw grain, mashed with ⅛ or ⅛ of malt, does not exceed 22 galls. per quarter.

The distiller is allowed to produce worts from any substance, and at any specific gravity, provided such gravity can be correctly ascertained by the saccharometer approved of by the Board of Inland Revenue. He is not, however, allowed to mash and distil at the same time. See ALCOHOL, BRANDY, FERMENTATION, FUSEL OIL, GIN, STILL, &c.

DISTORTIONS. See SPINE, STRABISMUS, SURGERY (Popular), &c.

DIURE'SIS. See URINE.

DIURE'TICS. *Syn.* DIURETICA, L. Medicines which promote the secretion of urine. The principal diuretics are—aqueous fluids, which act by increasing the watery portion of the blood, and—substances which promote the action of the kidneys. Most of the first produce copious diuresis, if the skin is kept cool. Among the last are acetate, bitartrate, and nitrate of potassa; oils of juniper, turpentine, cajeput, and copaiba; dilute spirit, and sweet spirits of nitre; decoction of common broom, &c.

DIVIDIVI. An astringent substance imported from Jamaica. It contains above 5% of tannin; whilst gall-nuts contain less than 3·5%, and the best oak-bark only 1·35%. Hence its value in tanning.

DOBEREINER'S LAMP. A portable apparatus for obtaining instantaneous light by the action of a jet of hydrogen on a small piece of spongy platinum.

DOCIMACY or DOCIMAS'TIC ART. See ASSAYING.

DOORS. Much annoyance is sometimes experienced from the creaking of doors. This may be prevented by rubbing a little soap, or a mixture of tallow and black-lead on the hinges; or by applying to them with a feather a little sweet oil, once or twice a year. The trifling trouble and expense (a penny or two a twelvemonth) will be amply repaid by their noiselessness and greater durability. To prevent the noise of doors slamming, a small piece of vulcanised India rubber, cork, or leather, may be placed so as to receive the shock.

DOSE. In medicine the quantity taken or prescribed at one time. The doses of medicinals vary with the sex, age, temperament, constitutional strength, habituation, and idiosyncrasies of individuals. Different circumstances, especially of climate, exercise an important influence on the activity of medicines. Thus, the inhabitants of England and the northern countries of Europe bear much larger doses in their own climates, than when they remove to warmer latitudes. Warmth, indeed, appears to promote the action of most medicinals, whilst cold acts in a contrary way. Nor does the same rule apply to all medicines. Calomel, for instance, is generally borne better by children than by adults; while opium affects them more powerfully, and requires the dose to be diminished considerably below that indicated by mere calculation or analogy with other medicines.

Prescribers ought not to forget that the action of medicines is not simply proportioned to the amount, but that each remedy has a dose below which it either produces no effect or one contrary to that which we desire it to produce. Dr. Paris remarks, "that powerful doses are disposed to produce local rather than general effects;" and Dr. Barlow gives it as his opinion that "practitioners often err, especially in the treatment of chronic maladies, from requiring an obvious effect from each dose administered." Adult women are said to require only three fourths the full dose for men. The following rules and tables have been framed, chiefly with reference to age; but, as Dr. R. E. Griffith correctly observes, "no scheme can be devised, founded on age alone, to which there are not many exceptions."

I. *Formula of* Dr. YOUNG.

For children under 12 *years, the doses of most medicines must be diminished in the proportion of the age to the age increased by* 12. Thus, at 2 years, the dose will be 1-7th of that for an adult,

$$\text{for } \frac{2}{2+12} = \text{1-7th.}$$

II. *Posological Table of* GAUBIUS.

For an adult, suppose the dose to be 1, or 1 drachm.

Under 1 year will require		$\frac{1}{15}$ or 5 grains.
„ 2 years	„	$\frac{1}{8}$ or 8 grains.
„ 3 „	„	$\frac{1}{6}$ or 10 grains.
„ 4 „	„	$\frac{1}{4}$ or 15 grains.
„ 7 „	„	$\frac{1}{3}$ or 1 scruple.
„ 14 „	„	$\frac{1}{2}$ or $\frac{1}{2}$ drachm.
„ 20 „	„	$\frac{2}{3}$ or 2 scruples.
„ 21 to 60, the full dose, or 1 or 1 drachm.		

Above this age an inverse gradation must be observed.

III. *Posological Table of* PHOEBUS.

Age—*Years*	80	65	50	25-40	20	16	12	8	5	2
Doses	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{1}{2}$	$\frac{3}{6}$	$\frac{1}{4}$
„ *Months*	12	6	2	1						
Doses	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{24}$						

DOUCHE. [Fr.] *Syn.* DOUCHE BATH. A species of bath much employed by hydropathists, both for the relief of local affections, and to give a healthy stimulus to the whole system. The douche consists of a single jet of cold water, varying in size from the thickness of a quill to that of a man's arm; it is projected with great force, either from above, below, or on one side, upon a particular part of the body. See BATH (Shower).

DOVER'S POWDERS. See POWDER.

DRACO'NINE. *Syn.* DRA'CINE, RED RESIN OF DRAGON'S BLOOD. A peculiar vegetable principle discovered by M. Melandre in dragon's blood.

Prep. Dragon's blood is dissolved in alcohol, the solution filtered, concentrated, and precipitated with cold water; the red, spongy precipitate is well washed, neutralised with dilute sulphuric acid, again liberated, and well washed with water.

Prop., &c. Draconine has a fine red colour; is tasteless, inodorous, and flexible; it fuses at 131° Fahr. The smallest quantity of carbonate of lime in filtering paper may be detected by sulphate of draconine, the yellow colour instantly turning red.

DRAGON'S BLOOD. *Syn.* SANGUIS DRACONIS, L. A rich red-coloured resin, obtained from various species of the genus *Calamus*. Its colour, in the lump, is a dark brownish-red; in powder, bright red. It is friable, breaks with a shining fracture, and has a sp. gr. not higher than 1·196 or 1·197. When pure, it readily dissolves in alcohol, ether, and oils, yielding rich red, transparent solutions. Adulterated and factitious dragon's blood is only partly soluble, and lacks the rich colour of the genuine article. Dragon's blood is chiefly used to tinge varnishes and lacquers.

Dragon's Blood, Factitious. *Prep.* 1. Shellac, 4 lbs.; melt, remove from the fire, and add, Canada balsam, 6 oz., and gum benzoin, 2 oz.; mix well, stir in red sander's wood, 1½ lb., and Venetian red, ¾ lb. (both in fine powder); and form the mass into sticks.

2. As the last, omitting the red Venetian.

DRAUGHT. *Syn.* HAUSTUS, L. A single dose of liquid medicine, usually dispensed in one-and-a-half-ounce or two-ounce phials. Draughts are almost exclusively extemporaneous compounds, and differ from 'mixtures' only in containing one dose; whereas mixtures contain several. The latter have now very generally superseded draughts among all but the higher classes, when the dose is to be frequently repeated. Draughts possess the advantages of extreme convenience, and, from only one phial being opened at a time, of preserving the preparation better than when it is exposed to the air by the frequent removal of the cork. They are usually taken from a wine-glass, which they about ⅔rds fill.

In the preparation of draughts the same precautions are observed as are pointed out under MIXTURE; regard being had to the increased volume of the dose. The ingredients of a six-ounce mixture, for example, containing (say) 12 doses, may be equally distributed among a dozen draught-phials, after which each may be filled up with distilled water, or any other simple vehicle. In most cases, a little syrup may be advantageously added. In many instances no addition will be required, the doses of each form of preparation being the same.

The following are useful formulæ, which will serve as examples for others of the class. The number might be easily multiplied, and, indeed, might be extended so as to include ¾ths of the whole materia medica; but such a plan would lead to useless repetitions, and occupy much space. See MIXTURE, PRESCRIBING, &c.

Draught, Abernethy's. See ABERNETHY MEDICINES and MIXTURE.

Draught, Ace'tate of Ammo"nia. *Syn.* HAUSTUS AMMONIÆ ACETATIS, L. *Prep.* 1. (St. B. Hosp.) Solution of acetate of ammonia, 4 fl. drs.; water to make 1½ fl. oz.

2. (Dr. Paris.) Camphor mixture, 1½ fl. oz.; liquor of acetate of ammonia, 4 fl. drs.; antimonial wine, 20 drops; mix. As a refrigerant and diaphoretic in febrile affections; taken late in the evening.

Draught, Ac'etate of Potas'sa. *Syn.* HAUSTUS POTASSÆ ACETATIS, L. *Prep.* (Mid. Hosp.) Acetate of potassa, 30 grs.; bicarbonate of potassa, 20 grs.; peppermint water, 1 fl. oz. Diuretic, antacid, and laxative.

Draught, Ammoni'acal. *Syn.* HAUSTUS AMMONIACALIS, H. AMMONIÆ, L. *Prep.* (Brande.) Liquor of ammonia, 20 to 30 drops; compound tincture of cardamoms and tincture of gentian, of each, ½ fl. dr.; camphor mixture, 1½ fl. oz. An aromatic absorbent and stomachic; in heartburn, acidity, low spirits, &c.

Draught, An'odyne. *Syn.* HAUSTUS ANODYNUS, L. *Prep.* 1. Tincture of opium, 15

drops; pimento water and syrup of poppies, of each, 2 drs.; water, 1 fl. oz.

2. (Copland.) Nitre, 6 grs.; laudanum, 12 drops; compound spirit of ether, 1 fl. dr.; syrup of poppies, 2 fl. drs.; camphor mixture, 9 fl. drs.

3. (Ellis.) Tincture of opium, 15 to 25 drops; syrup of poppies, 2 fl. drs.; spirit of cinnamon, 1 fl. dr.; distilled water, 1½ fl. oz.

4. As the above, but substituting a like quantity of solution of either acetate or hydrochlorate of morphia in lieu of the laudanum. All the above are given as soothing draughts to allay pain and produce sleep, especially the last thing at night. No. 4 is to be preferred if there are febrile symptoms present.

Draught, Antac'id. *Syn.* HAUSTUS ANTACIDUS, L. *Prep.* 1. Bicarbonate of soda, 20 grs.; tincture of calumba, 3 fl. drs.; tincture of hops, 1 fl. dr.; syrup of orange peel, 2 fl. drs.; water, 6 fl. drs. To improve the appetite in heartburn and dyspepsia; taken 1 hour before a meal.

2. Liquor of ammonia, 16 drops; syrup of saffron, 2 fl. drs.; infusion of gentian, 3 fl. drs.; water, 7 fl. drs. As the last, taken occasionally, especially in debility, low spirits, &c.

3. (Collier.) Compound tincture of cardamoms, 1 fl. dr.; solution of bicarbonate of magnesia (fluid magnesia), 9 fl. drs.; simple syrup, 2 fl. drs. Twice a day; in dyspepsia, heartburn, &c., especially in gouty patients.

4. (A. T. Thomson,) Magnesia, 1 dr.; peppermint water, 1½ fl. oz.; tincture of orange peel, 1 fl. dr. In dyspepsia, &c., with acidity or diarrhœa.

5. As No. 1, but using bicarbonate of potassa for bicarbonate of soda. In acidity, diarrhœa, &c., accompanied by great irritability of the coats of the stomach.

6. Prepared chalk, 30 grs.; spirit of nutmeg and tincture of opium, of each, 12 to 20 drops; syrup of saffron, 3 drs.; cinnamon water, 1 fl. oz. In acidity, with extreme looseness of the bowels.

Draught, Anti-arthrit'ic. *Syn.* HAUSTUS ANTI-ARTHRITICUS, L. *Prep.* 1. Tincture of colchicum seeds (Ph. L.), 1 to 1½ fl. dr.; syrup of orange peel 2½ fl. drs.; water, 1 fl. oz. In gout; taken over-night, followed by another in the morning.

2. (Brande.) Wine of colchicum, ½ fl. dr.; carbonate of magnesia, 15 grs.; cinnamon water, ½ fl. oz.; water, 1 fl. oz. As the last.

3. (Sir C. Scudamore.) Magnesia, 18 grs.; Epsom salts, 1½ dr.; vinegar of colchicum, 1½ fl. dr.; simple syrup, 1 fl. dr.; cinnamon water, 9 fl. drs. As the last.

4. (Sir H. Halford's GOUT PREVENTIVE.) From compound infusion of gentian, 1½ fl. oz.; tincture of rhubarb, 1 fl. dr.; bicarbonate of potassa, 15 grs.

Draught, Anti-asthmat'ic. *Syn.* HAUSTUS ANTI-ASTHMATICUS, L. *Prep.* Vinegar of squills, ½ fl. dr.; ipecacuanha wine, 15 drops; cinnamon water, 1½ fl. oz. Expectorant. One to be taken three times daily during the attack.

Draught, Anti-emet'ic. *Syn.* HAUSTUS ANTI-EMETICUS, L. *Prep.* 1. Juice of 1 lemon; liquor opii sedativus, 10 drops (or laudanum, 15 drops); ether, 20 drops; simple syrup, 2 drs.; water, q. s.

2. (HAUSTUS ANTI-EMETICUS RIVERII,—P.C.) Bicarbonate of potassa, 30 grs.; lemon juice, 4 drs.; syrup of lemon, 1 oz.; water, 3 oz.; mix quickly, and tie down the cork. To check nausea and vomiting. The last is best given effervescing.

Draught, Anti-hyster'ic. *Syn.* HAUSTUS ANTI-HYSTERICUS, L. *Prep.* Cyanide of potassium, 1 gr.; lettuce water (distilled), 2 fl. oz.; syrup of orange flowers, 1½ oz.; water, 5½ fl. oz.; for 6 draughts. One to be taken when the fit is expected, and a seecond in half an hour. Should the fit come on, the dose may be repeated at intervals of about 15 minutes until 3 or 4 have been altogether administered. The symptoms, however intense, are generally either at once arrested, or greatly alleviated by this treatment.

Draught, Antilith'ic. *Syn.* HAUSTUS ANTILITHICUS, L. *Prep.* 1. (Venables.) Borax, 8 grs.; bicarbonate of soda, 10 grs.; aërated water, 8 fl. oz. For a draught; in red gravel.

2. (Dr. Paris.) Carbonate of soda, 12 grs.; tincture of calumba, 1 fl. dr.; infusion of quassia, 1 fl. oz.; water, 3 fl. drs. In dyspepsia and gravel, attended with the lithic acid diathesis.

Draught, Anti-neural'gic. *Syn.* HAUSTUS ANTI-NEURALGICUS, H. NARCOTINÆ, L. *Prep.* (Jeston.) Narcotine, 2 grs.; diluted sulphuric acid, 20 drops; infusion of roses, 1½ fl. oz. One every 2 hours in the intermissions of neuralgia.

Draught, Antisep'tic. *Syn.* HAUSTUS ANTISEPTICUS, L. *Prep.* (Dr. Collier.) Decoction of yellow bark, 1 fl. oz.; tincture of opium, 5 drops; spirit of pimento and water, of each, 2 fl. drs. In putrid fevers, gangrene, &c.

Draught, Antispasmod'ic. *Syn.* HAUSTUS ANTISPASMODICUS, L. *Prep.* 1. (Dr. Collier.) Tincture of castor, 1 fl. dr.; sulphuric ether, 10 drops; peppermint water, 11 fl. drs.; mix. In hysteria, and that species of irregular muscular action dependent on debility.

2. (Dr. Gregory.) Fetid spirit of ammonia, ½ to 1 fl. dr.; camphor mixture, 10 fl. drs.; syrup of saffron, 1 fl. dr. In cases complicated with low spirits, debility, &c.

3. (A. T. Thomson.) Musk mixture, 14 fl. drs.; liquor of ammonia, 16 drops; tincture of castor, 1 fl. dr.; syrup of poppies, ½ fl. dr.; mix. Three or four times daily, in hysteria and convulsive affections, after the bowels have been well cleared by some aperient.

4. (A. T. Thomson.) Oil of aniseed, 10 drops; magnesia, 20 grs.; tincture of senna,

2 fl. drs.; peppermint water, 10 fl. drs.; mix. In flatulence and spasms of the stomach.

Draught, Ape"rient. *Syn.* HAUSTUS APERIENS, L. *Prep.* 1. (Paris.) Infusion of senna, 1 fl. oz.; tincture of senna, tincture of jalap, and syrup of senna, of each, 1 fl. dr.; tartrate of potassa, 1 dr.; mix.

2. (Ryan.) Epsom salts, 4 drs.; tincture of senna, 1½ fl. dr.; syrup of ginger, 1 fl. dr.; spirit of sal-volatile, 20 drops; infusion of senna, 1½ fl. oz.

3. (Thomson.) Tartrate of potassa, 3 drs.; tincture of senna and syrup of saffron, of each, 1 dr.; infusion of senna, 1½ oz. The above are good aperients, and in their composition and action resemble the ordinary "black draught."

4. (EFFERVESCING A. D.)—*a.* (Dr. Barker.) Bisulphate of potassa, 73 grs.; carbonate of soda, 72 grs.; water, q. s.; dissolve the two in separate glasses, mix the solutions, and drink whilst effervescing, in the same way as soda water.

b. (W. Cooley.) Bicarbonate of soda, 1 dr.; potassio-tartrate of soda, 2 drs.; dissolve in about 1-3rd of a glassful of cold water; and pour it on another like quantity of water, holding in solution tartaric acid, 40 grs., and syrup of orange peel, 1½ fl. dr.; and drink it instantly.

c. (Paris.) Potassio-tartrate of soda, 2 drs.; bicarbonate of soda, 40 grs.; dissolve, and add lemon juice, 1 or 2 table-spoonfuls.

d. (Young.) Cream of tartar, 3 drs.; carbonate of soda, 2½ drs.; throw them into a soda-water bottle three parts filled with cold water, cork immediately, and wire down the cork. The last three are examples of FACTITIOUS EFFERVESCING SEIDLITZ WATER, and are good saline aperients. The method of taking them may be varied by mixing the dry ingredients (in fine powder) on a piece of paper, and throwing the mixture suddenly into a tumbler 2-3rds filled with water, and drinking the liquid whilst effervescing. See CATHARTIC D. (*below*).

Draught, Ap'petite. See DINNER DRAUGHT.

Draught, Aromat'ic. *Syn.* AROMATIC ANTACID DRAUGHT; HAUSTUS AROMATICUS, L. *Prep.* 1. Aromatic confection, 1 dr.; spirit of sal-volatile, ½ dr.; syrup of saffron, 2 drs.; pimento water, 9 fl. drs. Excellent in dyspepsia, with acidity, and in diarrhœa, preceded by an aperient.

2. (H. AROM. CUM RHEO.—St. B. Hosp.) Aromatic confection, 1 dr.; infusion of rhubarb and cinnamon water, of each, 6 fl. drs. In diarrhœa and dyspepsia, especially when there is acidity and deficiency of bile.

Draught, Astrin"gent. *Syn.* HAUSTUS ASTRINGENS, L. *Prep.* 1. Tannin, 3 grs.; rectified spirit, 1 fl. dr.; simple syrup, 2 fl. drs.; water, 6 fl. drs.

2. (Dr. Paris.) Chalk mixture, 1½ fl. oz.; tincture of catechu, 1 fl. dr.; laudanum, 15 drops.

3. (Thomson.) Extract of logwood, 12 grs.; tincture of catechu, 1 fl. dr.; cinnamon water, 15 fl. drs. The above are excellent remedies in diarrhœa (preceded by a purgative), and in dysentery, &c. One may be taken after each motion.

Draught, Black. See MIXTURE.

Draught, Cam'phor. *Syn.* HAUSTUS CAMPHORÆ, L. *Prep.* (Guy's Hosp.) Camphor, 6 grs.; rectified spirit, q. s. to powder; white sugar, 1 dr.; mucilage, 3 drs.; water, 1½ fl. oz. Anodyne and diaphoretic, &c.

Draught, Cas'tor Oil. *Syn.* HAUSTUS OLEI RICINI, L. *Prep.* (Guy's Hosp.) Castor oil, 4 drs.; yelk of egg, q. s. (2 in no.); simple syrup, 1 fl. dr.; cassia or cinnamon water, 1 fl. oz. Aperient.

Draught, Cathar'tic. *Syn.* HAUSTUS CATHARTICUS, L. The following are given as additions to those under APERIENT D., and other heads:—*Prep.* 1. (Dr. Thomson.) Tartrate of potassa, 5 drs.; tincture of senna, 1 fl. dr.; infusion of senna, 14½ fl. drs.; syrup of saffron, ½ fl. dr.; mix. In acute diseases, taken early in the morning.

2. (Thomson.) Epsom salts and manna, of each, 2 drs.; infusion of roses, 14 fl. drs.; dilute sulphuric acid, 10 drops. In inflammatory affections, and to check vomiting in low fevers.

3. (Thomson.) Carbonate of magnesia, 1 dr.; powdered rhubarb, 20 grs.; peppermint water, 12 fl. drs. In dyspepsia, attended with costiveness and acidity, taken an hour before dinner.

4. (Thomson.) Castor oil, 5 fl. drs.; powdered gum, 20 grs.; rose water, 1 fl. oz.; compound tincture of lavender, 8 drops; syrup of poppies, 1 fl. dr. In colic and calculus. The above differ from aperient draughts simply in their greater strength.

Draught, Chalk. *Syn.* HAUSTUS CRETÆ, L. *Prep.* 1. From powdered gum, chalk, and simple syrup, of each, 1 dr.; aromatic water (as that of caraway, cinnamon, nutmeg, pimento, or peppermint), 1½ fl. oz.

2. (CHALYBEATED C. D.; HAUSTUS CRETA ET FERRI, L.—Paris.) Chalk mixture, 7 fl. drs.; compound mixture of iron, 3 fl. drs.; sesquicarbonate of ammonia, 5 or 6 grs. In diarrhœa, particularly in that arising from debility and anæmia.

3. (C. D. WITH RHUBARB; HAUSTUS CRETÆ CUM RHEO, L.)—*a.* Simple chalk mixture (see *above*), 1½ fl. oz.; powdered rhubarb, 12 grs.

b. (Lond. Hosp.) Commercial powder of chalk with opium, 12 grs.; rhubarb, 15 grs.; syrup of saffron and compound tincture of cardamoms, of each, 1 dr.; caraway water, 10 fl. drs. In heartburn, dyspepsia, and certain forms of diarrhœa.

Draught, Chlo"rine. *Syn.* HAUSTUS CHLORINII, L. *Prep.* (Copland.) Chlorine water, ½ fl. dr.; water, 1½ fl. oz.; mix, and add of syrup of poppies, ½ fl. dr. One every 6 hours;

in the worst form of typhus fever, and other putrid diseases, &c.

Draught, Cit'rate of Ammo''nia. *Syn.* HAUSTUS AMMONIÆ CITRATIS, H. A. SESQUICARBONATIS EFFERVESCENS, L. *Prep.* (Guy's Hosp.) Sesquicarbonate of ammonia, 20 grs.; water, 1 fl. oz.; dissolve, and add of lemon juice, ½ fl. oz. An agreeable, cooling, saline draught in febrile cases.

Draught, Cit'rate of Potas'sa. *Syn.* HAUSTUS POTASSÆ CITRATIS, L. *Prep.* From carbonate of potassa, 24 grs. (or bicarbonate, 29 grs.); water, 1 fl. oz.; dissolve, and add of lemon juice, 5 fl. drs. As the last. 20 grs. of citric acid may be used instead of the lemon juice.

Draught, Col'chicum. See ANTI-ARTHRITIC DRAUGHT.

Draught, Copai'ba. *Syn.* HAUSTUS COPAIBÆ L. *Prep.* (St. B. Hosp.) Balsam of copaiba, ½ fl. dr.; mucilage (thick), 4 fl. drs.; pimento water, 3 fl. drs.; water, 5 fl. drs. In gonorrhœa, &c.

Draught, Cough. See MIXTURE.

Draught, Diaphoret'ic. *Syn.* HAUSTUS DIAPHORETICUS, L. *Prep.* 1. (Collier.) Infusion of serpentary, 1½ fl. oz.; tincture of serpentary, 1 fl. dr. Tonic and diaphoretic.

2. (Thomson.) Sesquicarbonate of potassa, 20 grs.; fresh lemon juice, 4 fl. drs.; tartrate of antimony, ⅛ gr.; water, 11 fl. drs.; syrup of poppies, 1 fl. dr. Antifebrile and diaphoretic.

3. (Thomson.) Liquor of acetate of ammonia, 6 fl. drs.; camphor mixture, 10 fl. drs.; nitrate of potassa, 10 grs.; syrup of tolu, ½ fl. oz. Anodyne and diaphoretic. All the above are used in inflammatory affections.

Draught, Din'ner. *Syn.* APPETITE DRAUGHT; HAUSTUS DICTUS ANTE CIBUM. *Prep.* 1. Tinctures of cascarilla, hops, and rhubarb, of each, 1 fl. dr.; spirit of sal-volatile, ½ fl. dr.; tincture of capsicum, 20 drops; syrup of orange peel, 2 drs.; water, 1½ fl. oz.

2. Compound tincture of gentian, ½ fl. oz.; sal-volatile, ½ a teaspoonful; cinnamon water, 1 fl. oz.; compound tincture of cardamoms, 1 teaspoonful. Either of the above to be taken an hour before a meal.

Draught, Diuret'ic. *Syn.* HAUSTUS DIURETICUS, L. *Prep.* 1. (Collier.) Tincture of jalap, 2 fl. drs.; vinegar of squills, 1 fl. dr.; peppermint water, 10 fl. drs.; mix.

2. (Copland.) Acetate of potassa, ½ dr.; infusion of quassia and cinnamon water, of each, 6 fl. drs.; vinegar of squills and sweet spirits of nitre, of each, ½ fl. dr.

3. (Thomson.) Nitre, 8 grs.; tincture of digitalis, 16 drops; infusion of roses, 13 fl. drs.; syrup of roses, 1 fl. dr.

4. (Turner.) Nitre and powdered gum, of each, 15 grs.; almond mixture, 1½ fl. oz. The above are used as diuretics in dropsy; the last, also in scurvy, and in the incontinence of urine of children.

Draught, Donovan's. *Syn.* DRAUGHT OF HYDRIODATE OF ARSENIC AND MERCURY; HAUSTUS HYDRIODATIS ARSENICI ET HYDRARGYRI, L. *Prep.* (Donovan.) Liquor of hydriodate of arsenic and mercury (Donovan's), 2 fl. drs.; distilled water, 3½ fl. oz.; syrup of ginger, ½ fl. oz.; mix for 4 draughts. One, night and morning; in lepra, lupus, psoriasis, and some other obstinate cutaneous affections. It must not be allowed to touch anything metallic.

Draught, Efferves'cing. *Prep.* (Lond. Hosp.) Sesquicarbonate of soda, 30 grs.; water or peppermint water, 1½ fl. oz.; syrup of orange peel, 2 fl. drs.; tincture of calumba, ½ fl. dr.; tartaric or citric acid, 25 grs.; add the acid last, and drink whilst effervescing. Stomachic, tonic, and anti-emetic; in acidity, dyspepsia, &c. (See *antè*.)

Draught, Emet'ic. *Syn.* HAUSTUS EMETICUS, L. *Prep.* 1. Sulphate of zinc, 15 grs. to 30 grs.; water, 9 fl. drs.; dissolve. In cases of poisoning, and at the commencement of an attack of ague.

2. (Copland.) Ipecacuanha, 30 grs.; sesquicarbonate of ammonia, 20 grs.; tincture of capsicum, 30 drops; oil of chamomile, 10 drops; mint water, 2 fl. oz. As a stimulant emetic in cases of poisoning by laudanum or other narcotics.

3. (Guy's Hosp.) Antimonial wine, 2 fl. drs.; ipecacuanha wine, 6 fl. drs.; water, 4 fl. drs. For unloading the stomach in ordinary cases.

4. (Mid. Hosp.) Tartar emetic, 1 gr.; ipecacuanha, 20 grs.; syrup, 2 fl. drs.; water, 10 fl. drs. As the last.

5. (Dr. Pickford.) Sulphate of zinc, 20 grs.; sulphate of magnesia, 4 drs.; water, 1½ oz. When it is also desired to act rapidly on the bowels.

6. (Rodier.) Sulphate of copper, 10 grs.; water, 2 fl. oz. In poisoning by laudanum.

7. (Sprague.) Ipecacuanha, 30 grs.; sesquicarbonate of ammonia, 20 grs.; tincture of capsicum, 1 fl. dr.; peppermint water, 3 fl. oz. In poisoning by narcotics.

8. (A. T. Thomson.) Ipecacuanha, 20 grs.; ipecacuanha wine, 2 fl. drs.; water, 10 fl. drs. For unloading the stomach in ordinary cases.

9. (Trousseau.) Ipecacuanha, 8 grs.; syrup of ipecacuanha, 1 fl. oz.; water, q. s. for 4 draughts. One every 10 minutes, until vomiting occurs.

Draught, E'ther. *Syn.* HAUSTUS ÆTHEREUS, L. *Prep.* (Neligan.) Sulphuric ether, 1 fl. dr.; spermaceti, 3 grs.; rub together (expertly), and add of peppermint water, 10 fl. drs. An excellent stimulant and antispasmodic, febrile symptoms being absent.

Draught, Expec'torant. *Syn.* HAUSTUS EXPECTORANS, L. *Prep.* 1. (Collier.) Mixtures of ammoniacum and almonds, of each, 6 fl. drs.; tincture of squills, 12 drops. In hoarseness, chronic coughs, &c.

Draught, Hen'bane. *Syn.* HAUSTUS HYOS-

CYAMI, L. *Prep.* 1. Tincture of henbane, 30 to 60 drops; syrup of saffron, 1 fl. dr.; water, 10 fl. drs. Anodyne and soporific. *Used* to allay nervous excitement, and induce sleep, when laudanum is inadmissible.

2. (HENBANE AND SQUILLS D.; HAUSTUS HYOSCYAMI CUM SCILLÂ, L.—Dr. Bree.) Extract of henbane, 3 grs.; tincture of squills, 10 drops; dilute nitric acid, 6 drops; water, 1½ fl. oz. Anodyne and expectorant; in asthmas, chronic coughs, &c.

Draught, Hydrocyan'ic. *Syn.* HAUSTUS HYDROCYANICUS, L. *Prep.* 1. (Donovan.) Cyanide of potassium, 1 gr.; syrup of lemons, ½ fl. oz.; distilled water, 7½ fl. oz. For 8 draughts. One for a dose.

2. (Dr. S. Dickson.) Medicinal hydrocyanic acid (Ph. L.), 15 drops; liquor of ammonia, 20 drops; syrup of orange flowers (or simple syrup), 3 fl. drs.; water, 8½ fl. oz.; mix, and divide into 6 draughts. One, two, or three times a day; in gastrodynia, and all those nameless nervous and hysterical affections arising from excessive irritability, mental anxiety, &c. In a case that came under our notice, in which life was an absolute burden to the patient, relief was afforded by the first draught, and 4 or 5 effected a comparative cure, although almost every other remedy had been tried in vain.

Draught, Laennec's. *Syn.* LAENNEC'S CONTRA-STIMULANT DRAUGHT; HAUSTUS CONTRA-STIMULANS, L. *Prep.* From tartar emetic, 2 grs.; syrup of poppies, 2 fl. drs.; orange-flower water, 1½ fl. oz. Every two hours in pneumonia, &c.

Draught, Lax'ative. *Syn.* HAUSTUS LAXANS, L. *Prep.* 1. See APERIENT DRAUGHTS.

2. (Dr. Copland.) Infusion of senna and compound infusion of gentian, of each, 6 fl. drs.; sulphate of potassa, 20 to 30 grs.; extract of taraxacum, 30 to 40 grs.; compound tincture of cardamoms, 1½ fl. dr. Aperient, stomachic, and alterative.

Draught, Mor'phia. *Syn.* HAUSTUS MORPHIÆ, L. *Prep.* (Brera.) Morphia, ¼ gr.; syrup of poppies, 1 fl. dr.; water, 11 fl. oz. Two or three drops of acetic acid may be advantageously added. At bed-time, as a soporific.

Draught, Narcot'ic. *Syn.* HAUSTUS NARCOTICUS, H. OPIATUS, L. *Prep.* 1. (St. B. Hosp.) Laudanum, 12 to 20 drops; syrup of red poppies, 1 fl. dr.; pimento water, 3 fl. drs.; water, 1 fl. oz. To induce sleep in slight cases, when fever is absent.

2. (A. T. Thomson.) Camphor mixture, 1½ fl. oz.; laudanum, 35 drops; sulphuric ether and syrup of saffron, of each, 1 fl. dr. In intermittent headache.

3. (Thomson.) Carbonate of ammonia, 15 grs.; fresh lemon juice, ½ fl. oz.; water, 1 fl. oz.; spirit of nutmeg, 1 fl. dr.; syrup of orange peel, ½ fl. dr.; tincture of hemlock, 10 drops. In diseases of increased irritability.

4. (Thomson.) Carbonate of potassa, 20 grs.; fresh lemon juice, ½ fl. oz.; peppermint water, 1 fl. oz.; laudanum, 25 drops; syrup of tolu, ½ fl. dr. To procure sleep in the majority of diseases. (See *above*.)

Draught, Nux Vom'ica. *Syn.* HAUSTUS NUCIS VOMICÆ, L. *Prep.* (Dr. Joy.) Nux vomica (in fine powder), 3 grs.; powdered gum, 2 drs.; compound tincture of cardamoms, 1 fl. dr.; cinnamon water, 10 fl. drs. Diuretic, narcotic, stimulant, and tonic; in paralysis, impotence, debility, &c., unaccompanied by inflammation of the nervous centres. See STRYCHNIA.

Draught, Refri"gerant. *Syn.* HAUSTUS REFRIGERANS, L. *Prep.* 1. Carbonate of potassa, 20 grs.; syrup of orange peel, 1 fl. dr.; spirit of nutmeg, ½ fl. dr.; water, 1½ fl. oz.

2. (Thomson.) Nitre, 12 grs.; almond mixture, 1½ fl. oz.; syrup of tolu, 1 fl. oz.

3. (Collier.) Carbonate of potassa, 20 grs.; antimonial wine, 20 drops; syrup of orange peel, 1 fl. dr.; tincture of orange peel, ½ fl. dr.; water, 1½ fl. oz.; mix, and add a large tablespoonful of lemon juice. In inflammatory diseases, &c.

Draught, Saline'. See EFFERVESCING DRAUGHT, &c.

Draught, Stomach'ic. See DINNER DRAUGHT, &c.

Draught, Ton'ic. *Syn.* STRENGTHENING DRAUGHT; HAUSTUS TONICUS, L. *Prep.* 1. (Collier.) Disulphate of quinine, 2 grs.; tincture of orange peel, 1 fl. dr.; diluted sulphuric acid, 5 drops; laudanum, 10 drops; infusion of cascarilla, 1½ fl. oz. In pyrosis, &c., 1 hour before dinner.

2. (A. T. Thomson.) Infusion of yellow bark, 1½ fl. oz.; compound tincture of cinchona, 1 fl. dr.; powdered cinchona, 40 grs.; syrup of orange peel, ½ fl. dr. In intermittents and acute rheumatisms.

3. (Thomson.) Infusion of cascarilla, 1½ fl. oz.; tincture of cascarilla and ginger, of each, 1 fl. dr. In dyspepsia, arising from intemperance.

4. (Walton.) Infusion of cascarilla, 9 fl. drs.; tinctures of rhubarb and ginger, of each, 1 fl. dr.; syrup of saffron, ½ fl. dr.; ammonio-citrate of iron, 6 grs.; tincture of capsicum, 5 drops. In anæmia, and debility accompanied by paleness and relaxation.

Draught, Ver'mifuge. *Syn.* HAUSTUS VERMIFUGUS, H. ANTHELMINTHICUS, L. *Prep.* (M. Levacher.) Castor oil, 4 drs.; essence of turpentine, 2 drs.; mint water, 2 fl. oz.; syrup, 1 fl. oz.; powdered gum, 2 drs.; for an emulsion. In tapeworm.

DRAW'INGS. Chalk and pencil drawings may be fixed, so as not to suffer from slight abrasion, by washing them with skimmed milk, or with water holding in solution a little isinglass or gum. When the first is used, great care must be taken to deprive it of the whole of the cream, as the latter substance would cause the drawing to look streaky. An easy way of applying these fluids is to pour them

into a shallow vessel, and to lay the drawing flat upon the surface of the liquid; after which it should be gently removed and placed on white blotting-paper, in an inclined position, to drain and dry.

DRENCHES. *Syn.* DRINKS. In *veterinary practice,* these terms are applied to liquid medicines or mixtures which are administered to horses and neat cattle, and chiefly to the latter. A drench for a HORSE should not be less than half a pint, nor more than a quart; about a pint is, perhaps, the best quantity; that for a COW or OX should measure about a quart, and not more than about 5 half-pints. See VETERINARY MEDICINE.

DRES'SING. In the *industrial arts,* a preparation of gum, starch, size, &c., employed in stiffening or 'finishing off' textile fabrics and paper. In *surgery,* the term is appropriated to any application to a wound or sore, made by means of lint, linen, or leather. SIMPLE DRESSING is simple cerate or spermaceti cerate. Among *cooks,* the stuffing of fowls, pork, veal, &c., is commonly called 'dressing.'

DRINKS (Summer). See GINGER BEER, LEMONADE, SHERBET, &c.

DROP. See MEASURES.

DROPS (Confectionery). These are confections of which the principal basis is sugar. They differ from lozenges chiefly in the ingredients being combined by the aid of heat. Occasionally, they are medicated.

Prep. Double refined sugar is reduced to powder, and passed through a hair sieve (not too fine), and afterwards through a gauze sieve, to take out the fine dust, which would destroy the beauty of the drop. It is then put into a clean pan, and moistened with any favorite aromatic, as rose or orange-flower water, added slowly, stirring it with a paddle all the time, from which the sugar will fall as soon as it is moist enough, without sticking. The colouring (if any) is next added, in the liquid state, or in very fine powder. A small, polished copper, or tinned-copper pan, furnished with a lip, is now one half or three parts filled with the paste, and placed over the fire, or over the hole of a stove, or preferably on a sand bath, and the mixture stirred with a little bone or glass spatula until it becomes liquid. As soon as it almost boils, it is taken from the fire, and if it is too moist, a little more powdered sugar is added, and the whole stirred, until it is of such a consistence as to run without too much extension. A tin plate, very clean and smooth, and very slightly oiled, being now ready, the pan is taken in the left hand, and a bit of bright iron, copper, or silver wire, about 4 inches long, in the right. The melted sugar is next allowed to fall regularly on the tin plate, the wire being used to remove the drop from the lip of the pan. In two or three hours afterwards the drops are taken off with the blade of a knife, and are at once put into bottles or tins. On the large scale, 'confectionery drops' are moulded by a machine consisting essentially of two metal rollers covered with hollows. A sheet of the warm and soft composition, on being passed between the rollers, is at once converted into a batch of symmetrical drops, the upper and lower halves being moulded by the corresponding hollows of the upper and lower rollers. See CANDYING, CONFECTION, ESSENCE, STAINS (Confectioner's), SUGAR PLUMS.

The following are a few of the principal *confectionery drops* kept in the shops:—

Drops, Acid'ulated. *Syn.* ACID DROPS. *Prep.* Tartaric acid, ½ oz., dissolved in a very little water, is added to each lb. of sugar, as above; with essence of lemon, orange, or jargonelle pear, to flavour, as desired.

Drops, Chocolate. *Prep.* Chocolate, 1 oz., is reduced to fine powder by scraping, and added to powdered white sugar, 1 lb.; when the mixture is made into drops as above, care being taken to avoid heating it a second time.

Drops, Cof'fee. *Prep.* A clarified, concentrated infusion of coffee, 1 oz., is used for each lb. of sugar.

Drops, Fruit. These are prepared according to the general description. (See *above.*) The flavouring essences (volatile oils or essences of lemon, orange, citron, raspberry, jargonelle pear, &c.) not being added until the sugar is melted, to avoid, as much as possible, loss by evaporation. The colouring matter may be any of the transparent 'stains' usually employed for cakes, jellies, and confectionery. In this way are made the majority of the first-class fruit drops and bon-bons of the sugar-bakers. In some cases the plan is varied by adding the clarified concentrated juice, or jelly of the fruit, to the sugar. One variety of raspberry and currant (red and black) drops are made in this way.

Drops, Gin'ger. *Prep.* From essence or tincture of ginger, as above. An inferior kind is made in the way described under GINGER CANDY.

Drops, Jargonelle'. Fruit drops flavoured with essence of jargonelle pear (SOLUTION OF ACETATE OF AMYLE).

Drops, Lem'on. Acidulated drops flavoured with essence of lemon. They are usually stained with an infusion of turmeric. (See *above.*)

Drops, Pep'permint. From the whitest refined sugar, flavoured with English oil of peppermint or its spirituous solution (essence of peppermint), or with peppermint water.

Drops, Rasp'berry. See FRUIT DROPS (*above*).

DROPS (Med'icated). *Syn.* GUTTÆ, L. This term is commonly applied to compound medicines that are only taken in small doses. At the present time they are almost exclusively confined to empirical and domestic medicine. The plan of directing liquids to be measured by dropping is objectionable, because the drops of different fluids vary in size, and are also further influenced by the size of the bottle and

the shape of its neck, as well as the quantity of liquid it is poured from. See ESSENCE, and *below*.

Drops, Acoust'ic. *Syn.* ACOUSTIC BALSAM; GUTTÆ ACOUSTICÆ, BALSAMUM ACOUSTICUM, L. *Prep.* 1. Oil of almonds, 1 oz.; laudanum and oil of turpentine, of each, 1 dr.; mix. For hardened wax, and to allay pain.

2. Tinctures of benzoin, castor, and opium, of each, 1 fl. oz.; essential oil of assafœtida, 5 drops. As the last, and in deafness arising from debility of the organism.

3. (Baumé's.) Tinctures of ambergris, assafœtida, castor, and opium, of each, 1 oz.; terebinthinated balsam of sulphur and oil of rue, of each, 15 drops. In atonic deafness.

4. (Bouchardat.) Compound spirit of balm, 2½ drs.; oil of almonds, 5 drs.; ox-gall, 10 drs.; creasote, 10 or 20 drops. In cases complicated with hardened wax, fetid discharges, &c.

5. (Dr. Hugh Smith.) Ox-gall, 3 drs.; balsam of Peru, 1 dr. In fetid ulcerations of the ear. One or two drops of the above are poured into the ear; or a piece of cotton wool moistened therewith is introduced instead. The last is the safest plan.

6. Glycerin, either alone or diluted with water. In deficiency of the natural secretions of the ear; used in sufficient quantity to moisten the first passages. See DEAFNESS, GLYCERIN.

Drops, A'gue. *Prep.* From white arsenic, 1 gr.; hot water, 1 oz.; dissolve.—*Dose.* ½ to 1 teaspoonful, twice a day. See SOLUTION (Arsenite of Potassa).

Drops, An'odyne. *Syn.* GUTTÆ ANODYNÆ, L. The solutions of acetate and hydrochlorate of morphia are commonly vended in the shops under this name.

Drops, Ant'acid. *Syn.* GUTTÆ ANTACIDÆ, L. *Prep.* (U. C. Hosp.) Liquor of potassa, 3 fl. oz.; powdered myrrh, 1 oz.; triturate together until thoroughly incorporated, add of liquor of ammonia, 1 fl. oz., mix well, place the mixture in a stoppered bottle, and the next day decant the clear portion. Antacid, tonic, and stomachic; useful in various indications. —*Dose.* 10 to 20 drops, or more, in water.

Drops, Antihyster'ic. *Syn.* GUTTÆ ANTIHYSTERICÆ, L. *Prep.* Cyanide of potassium, 2 grs.; rectified spirit, 5 fl. drs.; syrup of orange flowers, 3 fl. drs.—*Dose.* 10 drops to ½ teaspoonful, when the attack is expected, and repeated occasionally as required; in hysterical affections, gastrodynia, &c.

Drops, Antiscorbu'tic. *Syn.* GUTTÆ ANTISCORBUTICÆ, L. *Prep.* 1. Expressed juice of water-cress, 2 fl. oz.; salt of tartar, 1 oz.; agitate together occasionally for a few hours, and in 2 or 3 days decant the clear.—*Dose.* 12 or 15 drops, to a teaspoonful, twice a day, in a cupful of new milk.

2. Citrate of potassa, 4 drs.; ammonio-citrate of iron, 2 drs.; water, 10 fl. drs.—*Dose.* As the last, in water.

3. (GREEN'S ANTISCORBUTIC DROPS.) Merely a disguised solution of corrosive sublimate. Most of the other 'antiscorbutic' and 'anti-venereal drops' advertised by quacks have a like composition.

Drops, Antiscrof'ulous. *Syn.* GUTTÆ ANTISCROFULOSÆ, L. *Prep.* 1. Iodine, 10 grs.; iodide of potassium, 1 dr.; water, 1 fl. oz.

2. (Augustin.) Chlorides of iron and barium, of each, ½ dr.; distilled water, 1 fl. oz.—*Dose.* 10 to 30 drops, 2 or 3 times a day.

Drops, Antispasmod'ic. *Syn.* GUTTÆ ANTISPASMODICÆ, L. *Prep.* Tinctures of castor, valerian, and assafœtida, of each, 2 drs.; tincture of capsicum and balsam of Peru, of each, 1 dr.; camphor, 20 grs.; acetate of morphia, 3 grs.—*Dose.* 10 to 20 drops, as required.

Drops, Bateman's. See PECTORAL DROPS.

Drops, Battley's. See LIQUOR OPII SEDATIVUS.

Drops, Bitter. *Syn.* GUTTÆ AMARÆ, L.; GOUTTES AMÈRES, Fr. *Prep.* From nux vomica (rasped), 1 lb.; liquor of potassa, ½ fl. oz.; bistre, 1 dr.; compound spirit of wormwood, 32 fl. oz.; digest 10 days, express the tincture, and filter. A most unscientific preparation; said to be tonic and stomachic.—*Dose.* 1 to 8 drops in water or any bitter infusion. In large doses it is *poisonous*.

Drop, Black. *Syn.* ARMSTRONG'S BLACK DROP, LANCASTER'S B. D., QUAKER'S B. D., TOUSTALL'S B. D., BRAITHWAITE'S GENUINE B. D.; GUTTA NIGRA, L. This celebrated preparation was originally prepared nearly a century and a half ago by Edward Toustall, a medical practitioner, in the county of Durham, and one of the Society of Friends. The formula passing into the possession of a relative of his (John Walton, of Shildon), was found among his brother's papers, and, by the permission of Thomas Richardson, of Bishop's Wearmouth, one of his executors, was handed to Dr. Armstrong, who subsequently published it in his work on typhus fever.

Prep. 1. (Original formula.) Opium (sliced), ½ lb.; good verjuice, 3 pints; nutmegs, 1½ oz.; saffron, ½ oz.; boil them to a proper thickness; then add, of sugar, ¼ lb., and yeast, 2 teaspoonfuls. Set the whole in a warm place, near the fire, for 6 or 8 weeks, then place it in the open air until it becomes of the consistence of a syrup; lastly, decant, filter, and bottle it up, adding a little sugar to each bottle. To yield 2 pints of strained liquor.

2. (ACETUM OPII, L.—Ph. U. S.) Opium 8 oz.; nutmeg 1½ oz. (both in coarse powder); saffron, ½ oz.; distilled vinegar, 24 fl. oz.; digest on a sand bath with a gentle heat for 48 hours, and strain; digest the residuum with an equal quantity of distilled vinegar for 24 hours; then put the whole into a percolator, and return the filtered liquid as it passes until it runs clear; afterwards pour on the material fresh distilled vinegar, until 48 fl. oz. of filtered liquor shall be obtained; in this dissolve sugar,

12 oz., and gently evaporate the whole to 52 fl. oz.

3. (Wholesale.) Opium, 10 oz., and distilled vinegar, 1 quart, are digested together for about a fortnight, and after sufficient repose the clear portion is decanted. This is the form commonly adopted by the wholesale trade in England.—*Dose.* 5 to 10 drops. It is usually considered to be of fully 4 times the strength of laudanum.

Drops, Carmin'ative. *Syn.* GUTTÆ CARMINATIVÆ, L. *Prep.* (Radius.) Oil of mace, 1 dr.; nitric ether, 3 drs.—*Dose.* 6 to 10 drops on sugar; in flatulent colic, &c.

Drops, Cham'omile. See ESSENCE.

Drops, Dalby's. See PATENT MEDICINES (Dalby's Carminative).

Drops, Durande's. *Syn.* GUTTÆ ÆTHERIS TEREBINTHINATÆ, L. *Prep.* (M. Durande.) Rectified sulphuric acid, 3 parts; oil of turpentine, 1 part.—*Dose.* 20 to 30 drops, or more; in the passing of gall-stones.

Drops, Dutch. *Syn.* HAERLEM DROPS, TURPENTINE DROPS; BALSAMUM TEREBINTHINÆ, L. The genuine or imported 'Dutch Drops' is the residuum of the rectification of oil of turpentine. It is also prepared by distilling resin, and collecting the product in different portions. At first a white, then a yellow, and lastly a red oil, comes over. The last is the balsam. The article commonly sold under the name in this country is prepared by one or other of the following formulæ:—

1. Oil of turpentine, tincture of guaiacum, and sweet spirit of nitre, of each, 1 oz.; oils of amber and cloves, of each, 15 drops.

2. Balsam of sulphur, 1 part; oil of turpentine, 5 parts. This last is the form most generally employed. They are all regarded by those who use them as detergent, diuretic, stimulant, and vulnerary.

Drops, Female. *Syn.* EMMENAGOGUE DROPS; GUTTÆ EMMENAGOGÆ, L. *Prep.* (Brande.) Compound tincture of aloes and tincture of valerian, of each, 2 fl. oz.; tincture of sesquichloride of iron, 1 fl. oz.—*Dose.* A teaspoonful in water or chamomile tea; in obstructed menstruation, &c.

Drops, Fit. *Syn.* SOOT DROPS; TINCTURA FULIGINIS, GUTTÆ F., L. *Prep.* From wood-soot, 2 oz.; sal-ammoniac, 1 oz.; salt of tartar, ½ lb.; soft water, 4 lbs.; digest a week and filter. Reputed antispasmodic, and also useful in scurvy and certain skin diseases.—*Dose.* A teaspoonful or more, occasionally, in water.

Drops, Golden. *Syn.* DE LA MOTTE'S G. D.; BESTUCHEFF'S NERVOUS TINCTURE; GUTTÆ AUREÆ, L.; ELIXIR D'OR, GOUTTES D'OR DU GÉNÉRAL LAMOTTE, Fr. *Prep.* 1. (Original.) Chloride of iron (obtained by distilling iron pyrites with twice its weight of corrosive sublimate), 3 oz.; alcohol, 7 oz.; expose the mixture in a closely stoppered bottle to the rays of the sun until it becomes decoloured.

2. Chloride of iron, 1 part; alcohol and ether, of each, 3 parts. These drops have the remarkable property of losing their yellow colour in the sun, and recovering it in the shade. They are taken in gout, hypochondriasis, and nervous complaints, in *doses* of from 10 to 60 drops.

Drops, Hooping-Cough. *Syn.* GUTTÆ ANTIPERTUSSICÆ, L. *Prep.* 1 (Dr. Graves.) Tincture of assafœtida and compound tincture of camphor, of each, ½ fl. oz.; compound tincture of bark, 5 fl. oz.—*Dose.* A teaspoonful, 2 or 3 times a day.

2. (Potestates Succini.) Oil of amber, 1 oz.; carbonate (not sesquicarb.) of ammonia, ½ oz.; strongest rectified spirit (alcohol), ½ pint; digest 3 or 4 days, and decant the clear portion. *Dose.* 10 drops to 1 dr., applied as a friction.

Drops, Infantile. Several anodyne, carminative, and absorbent preparations, which pass by this name, will be found under MIXTURES, &c.

Drops, Jes'uits'. *Syn.* ELIXIR ANTIVENEREUM, L. *Prep.* 1. Gum guaiacum, 7 oz.; balsam of Peru, 4 drs.; root of sarsaparilla, 5 oz.; rectified spirit of wine, 1 quart; digest for 14 days.

2. (Quincy.) Copaiba, 1 oz.; gum guaiacum, 2 drs.; oil of sassafras, 1 dr.; salt of tartar, ½ dr.; rectified spirit, 5 fl. oz.; digest a week.

3. (Walker's.) Copaiba, 6 oz.; gum guaiacum, 1 oz.; chio turpentine and salt of tartar, of each, ½ oz.; cochineal, 1 dr.; rectified spirit, 1 quart; digest a week. See TINCTURE OF BENZOIN (Comp.).

Drops, Kœchlin's. *Prep.* (Augustin.) Solution of ammonio-chloride of copper and mercury, 1 fl. dr.; water, 10 fl. drs. In obstinate venereal affections, scrofula, &c.—*Dose.* A teaspoonful after each meal.

Drops, Lav'ender. *Syn.* RED DROPS; GUTTÆ LAVENDULÆ, L. The same as compound tincture of lavender.

Drops, Life. *Syn.* SALMON'S DROPS OF LIFE; GUTTÆ VITÆ, L. *Prep.* Tincture of castor, 8 fl. oz.; antimonial wine and water, of each 1 lb.; opium, 3 oz.; saffron, ½ oz.; cochineal, camphor, and nutmegs, of each, 2 drs.; digest for 10 days and filter. Anodyne and diaphoretic.—*Dose.* 20 to 60 drops.

Drops, Mercu"rial. *Syn.* GUTTÆ HYDRARGYRI BICHLORIDI, L. *Prep.* 1. Bichloride of mercury, 2 grs.; hydrochloric acid, 3 drops; rectified spirit and distilled water, of each, ½ fl. oz.—*Dose.* 12 to 20 drops.

2. Bichloride of mercury, 2 grs.; sal-ammoniac, 3 grs.; compound decoction of sarsaparilla, 2 fl. oz.—*Dose.* A teaspoonful.

3. (Sir A. Cooper.) Corrosive sublimate, 1 gr.; dilute hydrochloric acid, ½ dr.; dissolve, and add, tincture of bark, 2 fl. oz.—*Dose.* As the last. They are all taken 2 or 3 times daily, as alteratives in scrofula, syphilis, cancer, &c. It should not be measured in a metal spoon.

Drops, Norris's. An aqueous solution of

tartar emetic, mixed with spirit of wine, and coloured.

Drops, Odontal'gic. *Syn.* TOOTH-ACHE DROPS; GUTTÆ ODONTALGICÆ, L. *Prep.* 1. (Dr. Blake.) Alum (in fine powder), 1 dr.; sweet spirit of nitre, 7 fl. drs.; agitate together occasionally for an hour.

2. (Dr. Copland.) Powdered opium and camphor, of each, 10 grs.; oils of cloves and cajeput, of each, 1 dr.; highly rectified spirit and sulphuric ether, of each, ½ fl. oz.

3. (Cottereau.) A saturated ethereal solution of camphor, to which a few drops of liquor of ammonia is added.

4. (Dr. R. E. Griffith.) Wine of opium, Hoffman's anodyne, and oil of peppermint, equal parts. *Used* as a friction on the cheek or gum, as well as applied to the teeth.

5. (Perry's.) A concentrated ethereal tincture of camphor and pellitory.

6. (Righini.) Creasote, 6 drs.; rectified spirit, 4 drs.; tincture of cochineal, 2 drs.; oil of peppermint, ½ dr.

Obs. The above are applied to the tooth with a camel-hair pencil, or a little wad of lint or cotton wool is moistened with them, and placed in or against the tooth.

Drops, Pec'toral. *Syn.* BATEMAN'S P. D.; GUTTÆ PECTORALES, L. *Prep.* 1. Paregoric, 10 fl. oz.; tincture of castor, 4 fl. oz.; laudanum, 1 fl. oz.; tincture of saffron or of cochineal, ½ fl. oz.; oil of aniseed, 15 drops.

2. Castor, 1 oz.; oil of aniseed, 1 dr.; camphor, 5 drs.; cochineal, 1½ dr.; opium, ¾ oz.; treacle, 1 lb.; proof spirit, 1 gal.; digest for a week.

3. (Phil. Coll. of Pharm.) Camphor, catechu, powdered opium, and red sanders wood, of each, 2 oz.; oil of aniseed, 4 fl. drs.; proof spirit, 4 old wine-gallons; digest 10 days, and filter.—*Dose.* A teaspoonful, or more, in coughs, colds, hoarseness, &c., assisted by an aperient.

Drops, Rheumat'ic. *Syn.* GUTTÆ RHEUMATICÆ, L. *Prep.* 1. Iodide of potassium, 1 dr.; tincture of guaiacum, 2 fl. oz.; dissolve.—*Dose.* 20 to 30 drops. In both chronic and occasional rheumatism, assisted with the copious use of lemon juice.

2. (Lampadius.) Bisulphuret of carbon and ether, of each, 2 fl. drs.—*Dose.* 6 to 12 drops, on sugar, or in milk.

3. (Wutzer.) Bisulphuret of carbon, 1 fl. dr.; alcohol, 2 fl. drs.—*Dose.* As No. 2. The last two are sudorific, alterative, resolvent, and emmenagogue, and, besides rheumatism, have been used with advantage in amenorrhœa, in some cutaneous affections, in glandular swellings, &c.

Drops, Rousseau's. See WINE OF OPIUM (by Fermentation).

Drops, Sed'ative. *Syn.* GUTTÆ SEDATIVÆ, L. The solutions of acetate and hydrochlorate of morphia, black drop, Rousseau's drop, and Battley's liquor opii sedativus, are frequently sold under this name by the druggists. The anti-hysteric drops (*antè*) is also an excellent sedative.

Drops, Spilbury's. *Prep.* 1 (Dr. Paris.) From bichloride of mercury, gentian root, and dried orange peel, of each, 2 drs.; precipitated sulphuret of antimony and red sanders wood, of each, 1 dr.; proof spirit, 16 fl. oz.; digest ten days, and strain.

2. Levigated crocus metallorum ('crocus of antimony'), 6 drs.; corrosive sublimate, 45 grs.; red sanders, ½ dr.; gentian root and dried orange peel, of each 2 drs.; brandy (or equal parts of rect. sp. and water), 16 fl. oz.; digest as before.—*Dose.* 5 to 30 drops; as an anti-scorbutic, &c.

Drops, Steel. See TINCTURE OF SESQUICHLORIDE OF IRON.

Drops, Ton'ic. *Prep.* (Collier.) Elixir of vitriol, 2 fl. dr.; tincture of calumba, 6 fl. drs. A teaspoonful three times daily, in a wineglassful of cold water.

Drops, Torrington's. See TINCTURE OF BENZOIN (Comp.).

Drops, Van Swieten's. An aromatised solution of corrosive sublimate.

Drop, Ward's White. *Prep.* From quicksilver, 4 oz.; nitric acid, 16 fl. oz.; dissolve, add sesquicarbonate of ammonia, 7 oz.; evaporate and crystallise; then dissolve the resulting salt by the heat of a sand bath, in 4 times its weight of rose-water. Very poisonous.—*Dose.* 5 to 15 drops, as an antiscorbutic, antivenereal, &c.

Drops, Worm. *Syn.* GUTTÆ ANTHELMINTICÆ, G. VERMIFUGÆ, L. *Prep.* 1. Creasote, 1 dr.; oil of turpentine, 7 fl. drs.—*Dose.* A teaspoonful, 3 or 4 times a day.

2. (Peschier.) Oil of male-fern, 3 fl. drs.; rectified oil of turpentine, 5 fl. drs. As the last; in tape-worm.

3. (Schwartz'.) Barbadoes tar, 1 fl. oz.; tincture of assafœtida, 1½ fl. oz. — *Dose.* 30 to 40 drops, three times a day; in tape-worm.

DROPS (Scouring). *Prep.* 1. Oil of turpentine and oil of lemons, equal parts. Both of the ingredients should have been recently distilled or rectified.

2. Oil of lemon bottoms, 1¾ lb.; oil of turpentine, 1 quart; mix well, and distil by the heat of a sand bath, until 3 pints have come over, or as long as the distillate is clear, pale, and sweet. *Used* to remove paint, grease, &c., from cloth.

DROPSY. *Syn.* HYDROPS, L. An unnatural collection of aqueous fluid in any part of the body. Dropsy has received different names, according to the part of the body affected by the disease. When it occurs in the cellular membrane it is called ANASARCA; when in the cavity of the abdomen, ASCITES; in the cavity of the cranium, HYDROCEPHALUS; in the scrotum, HYDROCELE; in the uterus, HYDROMETRA; and in the chest, HYDROTHORAX. Dropsy is mostly a symptom of extreme debility and a broken-down constitution, and

frequently follows lengthened attacks of exhausting chronic diseases.

The treatment of dropsy, perhaps, more than any other disease, depends upon the circumstances with which it is connected, and, more especially, upon those which have caused it. The acute inflammatory forms of dropsy generally require depletion. In most other cases, tonics may be advantageously administered. To promote the absorption of the accumulated fluids, diuretics are commonly resorted to. Confirmed dropsy (especially HYDROCEPHALUS and HYDROTHORAX), occurring in patients either much debilitated by previous disease or of a bad habit of body, is seldom curable.

DROWNING. The cause of death from submersion in water is the entire seclusion of air from the lungs, by which the aëration of the venous blood is prevented. In consequence of this deprivation of air, venous blood circulates through the arterial system, whilst the pulmonary vein ceases to convey oxygenated blood to the heart. Under ordinary circumstances, in the course of 4 or 5 minutes after the access of air has been cut off, life becomes extinct. Many cases have, nevertheless, occurred of persons being submerged for 15 or 20 minutes, and even longer, and where perfect insensibility has existed, in which recovery has taken place.

Prev. The specific gravity of the human body is less than that of water, so long as the lungs are partially filled with air; and this difference is sufficient to keep the body floating with the mouth and nostrils free for respiration, provided the face is turned upwards by throwing the head back on the shoulders, by which the weight of the head is sustained by the water. When a person throws himself into the water, the body rises rapidly to the surface and assumes nearly the erect position, the upper part of the head, down to a little below the eyes, remaining above the surface of the water. This arises from the greater density of the legs and thighs compared to that of the chest, which acts as a species of float or buoy to the rest of the body. In this situation the head may be thrown back, so that the face may form the exposed portion, as before mentioned, when respiration may be carried on without inconvenience in still water, and regularly, but sufficiently, so as to sustain life for some time, even in a rough sea. The adoption of this simple precaution would have saved thousands of valuable lives.

Another point which should be remembered by every person in danger of drowning is, that there is always a considerable amount of residual air in the lungs, in a nearly deoxidised state, and that if this air is expelled by two or three forced inspirations, and a deep inspiration is then taken, a larger quantity of vital air will be introduced into the lungs, and the blood will continue aërated for a proportionally longer time; and, consequently, a longer period will elapse before another inspiration will be required. If we prepare ourselves by taking two or three forced inspirations, and then take a full inspiration, we may remain for 1½ or 2 minutes before a second attempt at respiration need be made. This is the plan adopted by the pearl fishers, and other divers who are remarkable for remaining beneath the surface of the water for some time. A person in danger of shipwreck, or expecting immediate submersion, in any other situation, should have recourse to this expedient, which would prevent the dreadful effects of attempting respiration whilst under water.

Treat. The first object is the restoration of the animal heat. For this purpose, the wet clothes should be removed, and the body, after being well dried, surrounded with warm air. In the absence of a warm-air bath, the body may be laid between well-heated blankets, and bottles of hot water applied to the feet and armpits. Gentle friction with warm flannel or the hands should also be assiduously employed. Meanwhile attempts should be made to excite respiration artificially; and when the apparatus is at hand, slight shocks of electricity should be kept up at the same time. On the appearance of returning life, such as sighing or convulsive twitching, a vein may be opened. The throat may be tickled with the finger or a feather, to excite vomiting, and a teaspoonful of warm water administered. If the power of swallowing exists, a table-spoonful of warm wine or brandy-and-water may be given. Even if no symptom of returning animation appear, these means of recovery should be persisted in for three or four hours.

In the treatment of this species of asphyxia, nasal stimulants, as ammonia, aromatic vinegar, &c., should be avoided, as well as the injection of tobacco smoke, both of which have been found highly prejudicial. The practice of holding the body with the head downwards, which is sometimes adopted by the vulgar and ignorant, under the idea of allowing the water to run out by the mouth, is still more dangerous and absurd. The supposition that water is inhaled by drowning persons, instead of air, is perfectly fallacious. The peculiar mechanism of the glottis, or upper portion of the windpipe, is such as to prevent, by the spasmodic closure of the epiglottis, the entrance of more than a very trifling and accidental quantity of water, which is altogether too insignificant to produce any very injurious effects. See ASPHYXIA.

DRUGS. Substances used in medicine, sold by druggists, and compounded by apothecaries and physicians. Our continental neighbours, wiser than ourselves, not merely require that persons engaged in selling and dispensing drugs and pharmaceutical preparations shall be fully qualified by previous education and training for the task, but also that the various articles they sell and use shall be commercially pure and of the proper quality. In the United

States of America this subject has also engaged the attention of the government and legislature. Under the Act of the 26th June, 1848, inspectors were appointed to examine the quality of imported articles of this class, before allowing them to pass the Customs for home use. An abridged copy of the order addressed to the "collectors and other officers under this act" is appended, and will be useful to the reader, as assisting to establish a standard by which the value of the substances named therein may be estimated.

TREASURY DEPARTMENT, *June 4th*, 1853.

The following articles are to be entitled to entry when ascertained by analysis to afford the per-centages as under, viz.:—

ALOES, 80% of *pure aloetic extract.*
ASSAFŒTIDA, 50% of its *peculiar bitter resin*, and 3% of *volatile oil.*
CINCHONA BARK,[1] 1% *of pure quinine*, or 2% of the several alkaloids, as *quina, cinchona, quinidine, aricine*, &c.
BENZOIN, 80% of *benzoin resin.*
Do 12% of *benzoic acid*
COLOCYNTH, 12% of *colocynthine.*
ELATERIUM, 30% of *elaterine.*
GALBANUM, 60% of *resin.*
Do. 10% of *gum*, and 6% *volatile oil.*
GAMBOGE, 70% of *pure gamboge resin*, and 2% of *gum.*
GUAIACUM, 80% of *pure guaiacum resin.*
GUM AMMONIACUM, 70% of *resin*, and 18% of *gum.*
JALAP,[2] 11% *of pure jalap resin.*
MYRRH, 30% of *pure resin*, and 50% of *gum.*
OPIUM, 9% of *pure morphia.*
RHUBARB,[3] 40% of *soluble matter.*
SAGAPENUM, 50% of *resin*, 30% of *gum*, and 30% of *volatile oil.*
SCAMMONY, 70% of *pure scammony resin.*
SENNA, 28% of *soluble matter.*

Medicinal leaves, flowers, barks, roots, extracts, &c., not specified above, must be, when imported, in perfect condition, and of as recent collection and preparation as practicable.

Pharmaceutical and chemical preparations, whether crystallised or ortherwise, used in medicine, to be pure, and of a proper consistence and strength, as well as of perfect manufacture, conformably with the standard authorities named in the Act; and must, in no instance contain over 3% of excess of moisture or water of crystallisation.

Essential or volatile oils, and expressed oils used in medicine, must be pure and of the standard sp. gr. noticed and declared in the dispensatories named in the above Act.

"Patent" or "Secret Medicines" are by law subject to the same examination as other medicinal preparations, and cannot be permitted to pass the Custom-house for home consumption, but must be rejected and condemned, unless the special examiner is satisfied, after due investigation, that they are fit and safe to be used for medical purposes.

An appeal from the examiner to the collector to be admitted within 10 days.

JAMES GUTHRIE,
Secretary to the Treasury.

DRUM'MOND LIGHT. See LIGHT (Artificial).

DRUNK'ENNESS. See ABSTINENCE, INTEMPERANCE, &c.

DRY'ERS (Painter's). *Prep.* 1. Litharge (best) ground to a paste with drying oil. For dark colours.

2. From white copperas and drying oil; as the last.

3. From sugar of lead and drying oil. The last two are for pale colours.

4. From white copperas and sugar of lead, of each, 1 lb.; pure white lead, 2 lbs. For 'whites,' and opaque light colours, grays, &c. Dryers are employed, as the name implies, to increase the drying and hardening properties of oil paints. A little is beat up with them at the time of mixing them with the oil and turpentine for use.

DRY'ING. See DESICCATION, &c.

DRY'ING-OIL. See OILS.

DRY-ROT. A peculiar disease that attacks wood, and renders it brittle and rotten. It is generally caused by dampness and the subsequent development of the spores of fungi, particularly those of *Merulius lacrymans* and *vastator* and *Polyporus destructor*. The dry-rot principally attacks 'ill-seasoned' timber, and more particularly that of ships and badly ventilated buildings.

Prev. Various means have been proposed to prevent the attacks of dry-rot, and to arrest its progress when it has commenced, among which the process called 'KYANIZING' (Kyan's patent) is that most generally known and most extensively adopted. It consists in immersing the timber in a bath of corrosive sublimate. The process termed 'PAYNIZING' (Payne's patent) consists in first filling the pores with a solution of chloride of calcium, under pressure, and next forcing in a solution of sulphate of iron, by which an insoluble sulphate of lime is formed in the body of the wood, which is thus rendered nearly as hard as stone. Wood so prepared is now largely employed in our public works and railways. Sir W. Burnett's process (patented in 1836) consists in impregnating the timber with a solution of chloride of zinc. Mr. J. Bethell's process (patented in 1838) consists in thoroughly impregnating the wood with oil of tar containing creasote and a crude solution of acetate of iron, commonly called 'pyrolignite of iron.' The impregnation is effected in a strong cylindrical vessel, connected with a powerful air-pump, so that in the first instance, a vacuum being formed, and subsequently a pressure of several atmospheres applied, the liquid may as much as possible be forced into all the pores of the wood. The above processes for 'seasoning' preserve the timber not only from dry-rot, but from the influence of the weather and the attacks of insects and worms.

DUB'BING. *Prep.* 1. By boiling the waste cuttings of sheep-skins in crude cod oil. 2. Black resin, 2 lbs.; tallow, 1 lb.; crude cod oil or train oil, 1 gal.; boil to a proper consistence. *Used* by the curriers to dress leather, and by shoemakers and others to soften leather, and to render boots and shoes waterproof.

DUCK. See POULTRY.

DUCTIL'ITY is the property of being drawn out in length without breaking. See METALS.

DULCAMA'RA. See NIGHTSHADE (Woody).

DUMB'NESS. *Syn.* APHONIA, I. As speech is an acquired and imitative faculty, persons who are either born deaf or become so in early

[1] Of whatever denomination.
[2] Root or powder.
[3] Only Turkey, East Indian, and Russian, admissible.

infancy are also, necessarily, dumb. The first step in treating dumbness must therefore be directed to the removal of the deafness on which the imperfection rests. The exertions of modern philanthropists have, however, been so far successful in such cases, as to enable the deaf-mute to converse with those around him by signs. Those interested in the subject may consult an admirable treatise on 'Deaf-dumbness,' by M. E. Hubert-Valleroux, of which an excellent translation appeared in the 'Medical Circular,' vol. ii, for 1853. See DEAFNESS.

DUNG'ING. *Syn.* CLEANSING. One of the principal processes in the arts of calico printing and dyeing, its object being to free the cloth from loose matters, which would interfere with the dyeing. After the thickened mordants have been applied to the fabric, and properly fixed, it is necessary to remove the now useless thickening matter, together with the excess of mordant, which has not come into actual contact with the cloth. Formerly, a bath formed of cow-dung, diffused through hot water (130° to 212° Fahr.) was always used to wash away these loose matters; but now various manufactured substances are successfully employed for the purpose. The best dung substitutes are the arsenite and arseniate of soda, the silicate of soda, and phosphate of lime. Experience proves that, in the case of these substitutes, a final wince in cow-dung before dyeing is advantageous. A process very similar to 'dunging' is employed after dyeing, to clear and give purity to the undyed parts. This subsequent process is distinguished by the term 'clearing.' Cow-dung has been used in 'clearing' operations, but its employment is not to be recommended. Bran scalded and mixed with water is employed for certain goods, but bleaching powder is the most generally used 'clearing agent.'

DUTCH LIQ'UID. See OLEFIANT GAS.

DYE'ING. The act of tinging or colouring absorbent materials, by impregnating them with solutions of colouring matters or dye-stuffs. The colouring matters which impart their tints without the intervention of other substances are called 'substantive colours;' while those which require such aid are called 'adjective colours.' The bodies employed to fix and develop the latter class are called 'mordants.' The exact way in which dye-stuffs act upon fibrous materials has not yet been investigated as fully as it deserves; the generally received opinion is that the fibre has a chemical affinity for the colouring matter in the case of substantive dyes, and likewise for the mordant, which, in its turn, has an affinity for the colouring matter of adjective dyes. Another opinion is that the fibres have pores, which, when expanded by heat or chemical agents, admit particles of colouring matter. However this may be, it is certain that different materials 'take' dyes in different proportions; thus, silk and wool take the coal-tar dyes in the most perfect manner, but cotton requires the intervention of a most powerful mineral or animal mordant. WOOL takes the colouring matters of most dye-stuffs so well that the deepest tints can readily be produced. SILK and COTTON are dyed with greater difficulty, whilst LINEN shows still less disposition to take dyes. The operations which take place in dyeing are 'mordanting,' 'ageing,' 'dunging,' 'dyeing,' and 'clearing.' The first of these operations is noticed under MORDANT. After the fabric has been mordanted, it is generally hung up in a room through which a current of steam and air is passing, by means of which the union between the fibre and the mordant is quickened very considerably. This exposure to moist air is the step in the process to which the term 'ageing' is applied. The operations of 'dunging' and 'clearing' are noticed above (see DUNGING). The 'dyeing' proper, which follows the 'dunging,' is effected by running the fabric through the solution of the dye-stuff, the colour being modified more or less by the nature of the mordant used. Under the names of the different colours the means used to dye such colours are minutely described. See BLACK DYE, BLUE DYE, &c.

The following particulars respecting the production of the more common colours may prove interesting to the reader who merely requires some general information on the subject:—

BLACK is usually produced by logwood or galls with an iron mordant. Common black silks are dyed with logwood and fustic, iron being used as a mordant. The best silks are dyed black on a blue ground. Woollen goods are first dyed blue with indigo, and afterwards with sumac, logwood, and green or blue copperas. Cotton and linen goods are dyed black in a very similar manner.

BLUE is commonly produced from indigo, either in the form of sulphate or in aqueous solution. Prussian blue, with a persalt of iron or tin as a mordant, gives a very splendid dark blue. Of late several blues of novel shades have been produced from coal-tar.

RED is obtained in various shades by using cochineal, safflower, lac-dye, madder, or logwood, with a tin mordant.

PURPLE. Until the last few years the dyer was dependent for his purples on orchil or cudbeer, but he has now at his disposal the magnificent series of aniline, or coal-tar, colours, ranging from the most delicate violet, or 'mauve,' to the full crimson-purple, known as 'magenta.' See PURPLE DYE.

YELLOW. The most important yellow dyes are made from quercitron, fustic, turmeric, arnotto, and French and Persian berries. For further information, see BLEACHING, CALICO-PRINTING, &c.

DYER'S SPIRITS. See TIN MORDANTS.

DYES. See DYEING, and the names of the principal colours.

DYE-STUFFS. The colouring material

used in dyeing are so called. The more important of them are noticed under the respective names.

DYS'ENTERY. *Syn.* BLOODY FLUX; DYSENTERIA, L. A disease arising from inflammation of the mucous membrane of the large intestines, and characterised by stools consisting chiefly of blood and mucus, or other morbid matter, accompanied with griping of the bowels, and followed by tenesmus. There is generally more or less fever, and the natural fæces are either retained or discharged in small, hard balls (*scybala*). The common causes of this disease are marsh miasma, improper diet, excessive exhaustion, and fatigue, and, above all, exposure to the cold and damp air of night after a hot day.

Treat. The common dysentery of this country generally gives way to gentle aperients (castor oil or salts-and-manna), to cleanse the bowels, followed by mild opiates or morphia, to allay irritation. The chronic symptoms, which frequently hang about for some time, are best combated by mild tonics and vegetable bitters (bark, calumba, cascarilla). Occasionally, chalybeates (ammonia-citrate of iron, lactate of iron, wine of iron, saccharine carbonate of iron) will be found useful during convalescence. Throughout, the diet should be light and nutritious.

The contagious dysentery, of camps and hot climates, is a severe and often fatal disease, in which the preceding symptoms are complicated with remittent or typhoid fever. Its treatment is tedious and difficult, and depends chiefly on judiciously meeting the several symptoms as they develop themselve. Aperients, diaphoretics, and nauseants, followed by tonics, are the remedies generally relied on. The febrile symptoms must be treated according to their inflammatory or putrid tendency. This variety of the disease frequently gives rise to organic diseases of the abdominal viscera, dropsy, &c. It is regarded by some as contagious, but without sufficient reason.

DYSMENNORHŒ'A. See MENSTRUATION.

DYSPEP'SIA. [L.] *Syn.* DYSPEP'SY, INDIGESTION. This complaint pervades every rank of society, and is, perhaps, of all others, the most general. Few indeed are there who wholly escape it, in one or other of its forms. The common symptoms of dyspepsia are—want of appetite, sudden and transient distensions of the stomach, frequent eructations, heartburn, stomachic pains, occasional vomiting, and, frequently, costiveness or diarrhœa. Sometimes the head is affected, and dimness of sight, double vision, muscæ volitantes, and slight vertigo, are experienced, along with a multitude of other symptoms, depending on a derangement of the functions of the nervous system.

The causes of dyspepsia are numerous. In the higher ranks of society it is a common consequence of over-indulgence in the luxuries of the table, of late hours, or of the want of proper exercise, both of body and mind. In the studious, and those who lead a sedentary life, it is usually caused by excessive mental exertion or anxiety, or by the fatigues of business, and the want of sufficient bodily exertion and of pure air. In the lower orders of society it generally results from inebriety, or a deficiency of proper food and clothing, bad ventilation, &c.; and is not unfrequently occasioned by the physical powers being over-taxed, especially soon after meals.

The treatment of dyspepsia depends less on medicine than on the adoption of regular habits of life. Moderation in eating, drinking, and the indulgence of the passions; early rising, due exercise, and retiring to rest at an early hour, will do much to restore the tone both of the stomach and nerves. Excessive study and mental exertion should be avoided, and recourse should frequently be had to society and amusements of a lively and interesting character. If the bowels are confined, mild aperients should be taken, and if diarrhœa is present, antacids and absorbents may be had recourse to with advantage. The stomach may be strengthened by the use of mild bitters, tonics, and stimulants, and sea bathing, or the shower or tepid bath, may be taken, when convenient, to strengthen the nervous system. When dyspepsia is a secondary or symptomatic disease, the cause should be sought out, and the treatment varied accordingly. Among the aperient medicines most suitable to dyspepsia may be mentioned—Epsom salts, phosphate of soda, and Seidlitz powders, each of which should be taken largely diluted with water. An occasional dose of the '*Abernethy Medicines*' (which *see*) has also been recommended. Among antacids, are the bicarbonates and carbonates of potassa and soda, either of which may be taken in doses of half a teaspoonful dissolved in water; or if the spirits are depressed, one or two teaspoonfuls of spirit of sal-volatile will be more appropriate; and in cases accompanied by diarrhœa, a little prepared chalk. As bitters, the compound infusion of orange peel, or of gentian, are excellent. As tonics, small doses of bark, or of sulphate of quinine, to which chalybeates may be added, if there is pallor of countenance, or a low pulse, with no disposition to fever or headache.

When dyspepsia is complicated with hysteria, hypochondriasis, or chlorosis, the treatment noticed under those heads may be conjoined to that above recommended. When it depends on constipation, or a deficiency of bile, the mildest and most effective of all remedies will be found supplied in inspissated ox-gall. "In all cases of incipient constipation, ox-gall is a remedy of undoubted efficacy; and even in protracted cases, when hope has almost fled—but where evidences of strangulation are not unequivocally manifested—it should never be omitted by the practitioner. In habitual or chronic constipation, accompanied by indi-

gestion, clay-coloured stools, and a feeling of oppression after food has been taken, it acts with almost specific certainty. When, however, the liver begins to assume its healthy action, its employment should be discontinued, and it will then produce all the symptoms of regurgitation of bile into the stomach. This state will be readily recognised as a favorable omen of returning power." (Dr. Allnatt.)

DYSPNŒ'A. Difficulty of breathing. It is generally symptomatic of some other affections. When it occurs in persons of a nervous or irritable habit of body, perfect quiet, a semi-recumbent posture, fresh air, and some small doses of ether, ammonia, or opium, will generally effect a cure. Those of a full habit require aperients and depletion. To prevent attacks of the kind, excess in eating and drinking, and the use of stimulants, should be avoided.

DYSU"RIA. [L.] *Syn.* DYS'URY. Difficult urination. It is generally symptomatic of disease of the kidneys, bladder, or urethra. The treatment depends on the exciting cause.

EAR (Inflamma'tion of). *Syn.* OTITIS, L. This affection, when it attacks the internal part of the ear, is generally accompanied with confusion of sound, deafness, and more or less fever. It is most frequent among children, and is commonly produced by exposure to draughts of cold air, and, occasionally, by foreign matters, as cherry-stones, insects, &c., having got into the external ear. In such cases, the removal of the offensive matter, and due attention to warmth and cleanliness, with a dose of laxative medicine, will be all the treatment required. The pain may generally be relieved by throwing warm water into the ear by means of a syringe, and fomenting the surrounding parts with decoction of poppy-heads and chamomile flowers. Should this treatment not succeed, a drop or two of laudanum, with one drop of oil of cloves and a little oil of almonds, may be dropped in the ear, and a piece of cotton wool introduced afterwards. Cases of acute inflammation of the internal ear are occasionally met with in adults, which assume a very serious character, and demand the most careful treatment. See DEAFNESS.

Earache. Pain in the ear may arise from various causes, amongst which, in the absence of organic disease, cold, and that peculiar derangement of health popularly called 'nervousness,' are the most common. In the one case, the proper remedy is warmth; in the other, the attention should be directed to the restoration of the body to the healthy standard.

EARTHS. In *chemistry*, a group of metallic oxides. The principal earths are baryta, strontia, lime, magnesia, alumina, berylla or glucina, yttria, zirconia, and thoria. The first four are termed ALKALINE EARTHS; the remainder, together with the oxides of the very rare metals erbium, terbium, norium, cerium, lanthanum, and didymium, constitute the EARTHS PROPER.

The term *earth* was very loosely applied by the older chemical and pharmaceutical writers, and the practice is still common among the vulgar at the present day. Thus, ABSORBENT EARTH (chalk); ALUMINOUS E., ARGILLACEOUS E. (alumina); BOLAR E. (bole); BONE-E. (phosphate of lime); FULLER'S E. (an absorbent clay); HEAVY E. (baryta); JAPAN E., or TERRA JAPONICA (catechu); SEALED E. (bole), &c., are names even now frequently encountered both in trade and in books.

EAU. (Fr.) Water. This word, like its English synonym, is applied to numerous substances, differing in their composition, sensible properties, and uses, of which the following are a few useful examples:—EAU DOUCE, fresh or river water; EAU DE MER, sea or salt water; EAU DE FONTAINE, EAU DE SOURCE, spring water; EAU DE PUITS, well or pump water; EAU DE RIVIÈRE, river water; EAU DISTILLÉE, distilled water; EAU DE ROSE, rose water; EAU DE VIE, brandy; EAU DE COLOGNE, Cologne water; EAU D'HONGRIE, Hungary water; EAU BÉNITE, holy water; EAU FORTE, aquafortis; EAU DE SAVON, soap-suds; EAU DE SENTEUR, scented water, &c.

Eaux, in perfumery, are solutions of the fragrant essential oils in spirit, as eau de Cologne, eau de bouquet, &c.; or they are distilled waters, largely charged with the odorous principles of plants, as eau de rose, eau de fleurs d'oranges, &c.

Eaux, of the liqueuriste, are aromatised spirits or cordials.

Eau Medicinales are either simple watery solutions (HYDROLÉS, HYDROLATURES, SOLUTIONS PAR L'EAU), or distilled water (EAUX DISTILLÉES); or they are vinous or alcoholic tinctures or solutions of essential oils, aromatics, or more active drugs. See CORDIALS, HAIR DYES, PERFUMERY, SPIRITS, TINCTURES, WATERS, &c.

EB'LANINE. The yellowish-red, crystallisable, solid substance, which is left behind in the retort, when wood spirit is rectified from quicklime. It is insoluble in water, and sublimes without fusion at 273° Fahr.

EB'ONY. The wood of the *Diospyrus Melanoxylon*, an East Indian tree, of the natural order *Ebenaceæ*. Two other species of the same genus, namely, *Diospyrus Ebenus* and *D. Ebenaster*, yield respectively MAURITIUS EBONY and the BASTARD EBONY of Ceylon. Pale-coloured woods are stained in imitation of ebony (FACTITIOUS EBONY), by washing them with or steeping them in a strong decoction of logwood or of galls, and, when dry, washing them over with a solution of sulphate or acetate of iron. They are then rinsed in clean water, and the process is repeated, if required. The wood is lastly polished or varnished.

EBRI'ETY. See INTOXICATION.

EBULLI"TION. The state of boiling, or

the agitation of a liquid arising from its rapid conversion into vapour by heat. Ebullition occurs in different liquids at very different temperatures, such temperatures being called their 'boiling-points.' Under the same circumstances the boiling-points are constant, and by observing them the chemist is often able to distinguish liquids which much resemble each other. The boiling-point of the same liquid may, however, vary considerably under different circumstances. The causes which induce variation are increased or diminished atmospheric pressure, the greater or less depth of the liquid, and the character of the containing vessel. Thus, boiling water is colder by some degrees when the barometer is low, in bad weather, or at the top of a hill, than when the barometer is higher, in fine weather, or at the bottom of a valley or mine. There is a very simple and beautiful experiment, illustrative of the effect of diminished pressure in lowering the boiling-point of a liquid. A little water is made to boil for a few minutes in a flask or retort placed over a lamp, until the air has been expelled, and the steam issues freely from the neck. A tightly fitting cork is then inserted, and the lamp at the same moment withdrawn. When the ebullition ceases, it may be renewed at pleasure for a considerable time by the affusion of cold water, which, by condensing the vapour within, occasions a partial vacuum. Liquids in general boil from 60° to 140° lower than their ordinary boiling-points when heated *in vacuo*.

The following table furnishes very exact information respecting the effect of increasing pressure upon the boiling-point of water:—

TABLE I.—*Boiling-points of Water at different Pressures.* By Mr. C. GREVILLE WILLIAMS.

Boiling-point ° Fahr.	Barometer Inches.	Boiling-point ° Fahr.	Barometer Inches.
184	16·676	200	23·454
185	17·047	201	23·937
186	17·421	202	24·441
187	17·803	203	25·014
188	18·196	204	25·468
189	18·593	205	25·992
190	18·992	206	26·529
191	19·407	207	27·068
192	19·822	208	27·614
193	20·254	209	28·183
194	20·687	210	28·744
195	21·124	211	29·331
196	21·576	212	29·922
197	22·030	213	30·516
198	22·498	214	31·120
199	22·965	215	31·730

Boiling water contained in a deep vessel is hotter than that in a shallow one, on account of the greater resistance in the one case than the other to the escape of the steam. It is also found that fluids boil at a lower temperature and more quietly in vessels with rough and spicular surfaces, than in those with smooth or polished ones. The boiling-point of water, as marked on the scale of the thermometer, is 212° Fahr., but in glass vessels, under common circumstances, it varies from 212·54° to 215·6°; whilst in perfectly pure and smooth glass vessels water may be heated to 221° Fahr. without boiling. That the elevation of the boiling-point in this case is due to the nature of the surface, may be at once demonstrated by throwing into water, about to boil in a glass matrass, a little iron filings or coarsely powdered glass, when ebullition will commence with almost explosive violence, at the same time that the temperature of the fluid will sink about 2° Fahr.

The boiling-point of water contained in ordinary vessels may be raised considerably above 212° Fahr., by the addition of saline matter, as will be seen in the following table, extracted from Mr. C. G. Williams's excellent 'Handbook of Chemical manipulation:'—

TABLE II.—*Boiling-points of Saturated Solutions of various Salts at the ordinary Atmospheric Pressure.* By C. G. WILLIAMS.

Name of Salt.	*Boiling-point.*
Chloride of calcium	355° Fahr.
Acetate of soda	256 „
Nitrate of soda	246 „
Sal-ammoniac	236 „
Common salt	224 „
Cream of tartar	214 „

The above solutions are suitable for chemical baths. With the exception of the first, they furnish in their boiling-points temperatures, as nearly as can be obtained, 10° above each other. They were chosen by Mr. Williams because, in 'fractionating' volatile substances, it is usual to separate the distilled products by differences of temperature equal to 10° Fahr. In long operations it is found inconvenient to employ a saturated saline solution for a bath (by which the highest temperature would be obtained), as the constant evaporation of the water induces the crystallisation of the salt. It is hence usual to keep it considerably below that point.

The following table, compiled chiefly from the pages of Dr. Miller's 'Elements of Chemistry,' gives the boiling-points of several interesting substances.

TABLE III.—*Boiling-points of various Liquids at the ordinary Atmospheric Pressure.*

Name of Substance.	*Boiling-point.*
Liquid carbonic acid	—108° Fahr.
Liquid sulphurous acid	+ 17·6 „
Chloric ether	51·9 „
Aldehyd	69·4 „
Ether	94·8 „
Bisulphuret of carbon	118·5 „
Bromine	145·4 „

Name of Substance.	*Boiling-point.*
Wood spirit . . .	149·9 Fahr.
Alcohol (sp. gr. ·815) . .	173·1 „
Benzol	176·8 „
Dutch liquid . . .	184·7 „
Acetic acid . . .	243·1 „
Sulphur (melted) . .	609· „
Mercury	662· „

EBUL'LIOSCOPE. *Syn.* EBULLITION ALCOHOLOMETER, THERMO-ALCOHOLOMETER. "This instrument is essentially a thermometer, and its application to alcoholometry is based upon the fact that the boiling-point of a spirituous liquid is scarcely altered by the presence, within certain limits, of the substances which may be dissolved in it, and which, by increasing its specific gravity, render the ordinary alcoholometers or hydrometers useless for the purpose of indicating its alcoholic richness. The ebullioscope was invented by the Abbé Brossard-Vidal, of Toulon, and in its original form consisted of a spirit-lamp surmounted by a small boiler, into which a large cylindrical glass bulb was plunged, having an upright stem of such calibre that the quicksilver contained in them, by its expansion and ascent when heated, raised before it a little glass float in the stem, which was connected by a thread with a similar glass bead, hanging in the air. This thread passed round a pulley, which, turning with the motion of the beads, caused an index to move along a graduated circular scale, which represented on its face the per-centage of absolute alcohol in spirituous liquors of different boiling-points. This form of the apparatus being found inconvenient and liable to get disarranged, various improvments were made in it by MM. Conaty, Lerebour, and others. The modification of the instrument now in use, and known as Field's PATENT ALCOHOLOMETER, was made by the late Dr. Ure, and can scarcely be improved on. It consists of a thermometer having a very minute bore and a large bulb, similar to that employed to determine the height of mountains from the boiling-point of water, but instead of thermometric degrees being marked upon the scale the per-centage under proof is placed on the left-hand side of the stem, and the per-centage content of proof spirit on the right-hand side. These commence at 178·5° Fahr., the temperature at which 'proof spirit' boils, and which here forms the bottom of the scale. The succeeding numbers are based upon the boiling-points of mixtures of alcohol and water. The little boiler being charged, and about a teaspoonful of salt (35 grs.) being added, to prevent loss of alcohol by evaporation, the thermometer is set in its place, and the spirit-lamp lighted. When the mercury begins to rise out of the bulb of the thermometer, the 'damper-plate' is pushed in a little way, to moderate the heat. The eye is now kept steadily on the instrument, and as soon as the liquor boils freely, and the mercury becomes stationary in the stem, the indicatior is carefully noted, and the damper-plate pushed home to extinguish the flame.

"The ebullioscope is adjusted to the mean boiling-point of water under an atmospheric pressure of 29·5 inches. When the pressure is either higher or lower, both water and alcohol boil at a somewhat different temperature, to meet which a barometrical equation is attached to the thermometer by means of a small subsidiary scale. It is therefore necessary, prior to commencing the operation of testing any liquor, to charge the little boiler with pure water only, and to fix the thermometer in its place. When the water boils freely, the mercury becomes stationary in the stem, exactly opposite the true barometrical indication at the time. Should this be against the line 29·5, no correction will be required; but should it stand at any other line, above or below, then the various boiling-points will bear reference to that boiling-point only. In the latter case, the boiling-point of the water on the barometrical indicator must be set against the boiling-point of the liquid on the scale, when opposite the line —29·5 will be found the true strength. Thus:—the barometer being at 30 inches, and the indication or boiling-point being 72 u. p., 30 on the indicator must be placed against 72 u. p. on the thermometer, when against the line of 29·5 will be seen 69·6 u. p., the real strength of the sample tested.

"When a spirit is stronger than the 'excise proof,' its boiling-point varies too little with its alterations of strength to render the ebullioscope of much practical value. To make it applicable to the stronger spirits, it is therefore necessary to dilute them with exactly their own bulk of pure water before testing them, and then to double the resulting indication, as suggested by Dr. Ure. Our own plan is always to do this when the spirit is stronger than 20 u. p.

"By means of the ebullioscope the alcoholic content of beer, wines, and spirits, of every variety and class, may be readily determined with sufficient accuracy for all practical purposes; and by methods which we shall hereafter point out, the amount of saccharine extractive, or sugar, in cordialised spirit, malt liquors and wines, may also be ascertained.

"The ebullioscope (Field's ALCOHOLOMETER) employed by us in numerous and extensive investigations connected with public hygiène, was made by Mr. Long, of Little Tower Street, and is an instrument which should be in the hands of every wine and spirit merchant and licensed victualler, as well as every private gentleman who feels interested in the quality of the liquors in his cellar. The instrument is accompanied by a useful little pamphlet of directions and tables, which has been very accurately got up, as we understand, by the late Dr. Ure, expressly for Mr. Long." (A. J. Cooley.)

EDULCORA'TION. The affusion of water on any substance for the purpose of removing the portion soluble in that fluid. Edulcoration is usually performed by agitating or triturating the article with water, and removing the latter, after subsidence, by decantation or filtration. It is the method commonly adopted to purify precipitates and other powders which are insoluble in water. The washing-bottle is a most useful instrument for the edulcoration of precipitates. In its simplest form, it is a bottle fitted with two bent glass tubes, one drawn to a fine point and reaching to the bottom of the bottle, the other only entering the cork a few inches. By blowing down the latter tube, the water is forced out of the former in a fine stream.

EEL. *Syn.* ANGUILLA, L. A family of fishes belonging to the 'apodal' section of the *malacopterygii*. At least three species of eels are found in this country—the 'sharp-nosed,' the 'broad-nosed,' and the 'snig.' The first, which is common in streams and lakes, attains the greatest size—sometimes 25 lbs. or even 30 lbs. The 'snig' is considered superior to other kinds for the table. As articles of food, eels are said to be laxative and far from wholesome. The fat (EEL FAT; ADEPS ANGUILLÆ, OLEUM A.) is among the simples of the Ph. L. 1618, and was formerly considered 'good against stripes,' and is even now used by the vulgar as a friction for stiff joints. For the table, eels are generally dressed by stewing, frying, baking, or potting, which is done in the usual way, the fish being cut into pieces 2 or 3 inches long, and melted butter, onions, sweet herbs, and anchovy sauce, added at will. The CONGER EEL is a distinct and gigantic species of the same family. Its flesh is coarse and oily, but is much esteemed by the inhabitants of the southern coast of Devon, on which it abounds.

EFFERVES'CENCE. The rapid escape of gas in small bubbles from a liquid. See DRAUGHT, POWDER, &c.

EFFLORES'CENCE. The spontaneous conversion of a crystalline solid into a dry pulverulent form. Crystals which in a dry atmosphere lose their water of crystallisation, and become crusted over with a mealy powder, are said to be EFFLORESCENT.

EGG. *Syn.* OVUM, L. A body produced in the females of birds and certain other animals, containing an 'embryo' of the same species, or body, from which a similar animal may ultimately be produced. The eggs of the common domestic fowl are nutritious and easily digestible; and when lightly cooked by boiling, and eaten with a little salt, are admirably adapted as an aliment for the sick and delicate. When boiled hard or fried, they are rendered less digestible, and possess no advantage in this respect over butcher's meat. A new-laid egg, beaten up in a cup of tea, coffee, or chocolate, is an excellent ingredient in the breakfast of a person with a poor appetite, and is very supporting. A glass of wine, beer, or porter, similarly treated, along with a biscuit, has been recommended as a light and nutritious luncheon or supper, well suited to the debilitated and dyspeptic. Raw eggs may be advantageously substituted for cod-liver oil in all the cases in which this last is ordered, occurring in persons with delicate or irritable stomachs. The addition of fresh salad oil vastly increases their medicinal virtues. A fresh egg is said to contain about the same amount of nourishment as 1½ oz. of fresh meat and 1 oz. of wheaten bread, but in a more digestible form.

Egg, White of (ALBUMEN OVI), is officinal in the B. P. Yelk of egg (*vitellus ovi*) is an ingredient in the BRANDY MIXTURE (MISTURA SPIRITUS VINI GALLICI) of the London College. It is also a popular application to chaps, cracked nipples, abrasions, &c., and is largely used to render oleaginous substances miscible with water, in the preparation of emulsions.

The average weight of the new-laid egg of a hen is about 2¼ oz., and its sp. gr. is 1·080 to 1·090; the white generally weighs about 1½ oz.; the yolk, a little under ¾ oz.; and the shell and skin, ¼ oz. Dr. Prout found that an egg, on being kept for 2 years in a dry situation, lost 544 $\frac{3}{10}$ grs., from the evaporation of a portion of its water through the shell. By boiling in water an egg loses from 2% to 3% of its weight.

Choice. The larger end of a new-laid egg feels cold when placed against the tongue. New-laid eggs appear semi-transparent when placed between the eye and a strong light, and have a small and perceptible division of the skin from the shell, which is filled with air. This mode of examination among the trade is called 'candling.' When they shake they are stale. The eggs of turkeys and pea-hens are much esteemed for some purposes; those of ducks and geese are coarse and inferior.

Pres. Eggs may be preserved for any length of time by excluding them from the air. One of the cleanest and easiest methods of doing this is to pack them with the small end downwards, in clean dry salt, in barrels or tubs, and to place them in a cool and dry situation. We have eaten eggs thus preserved that were more than a twelvemonth old, and that had been for some months on shipboard, in a tropical climate, and which yet retained all the peculiar sweetness of new-laid eggs. With a like intention, eggs are placed in vessels containing milk of lime, or strong brine, or are rubbed over with butter, lard, or gum water, all of which act by excluding the air. Eggs for keeping should never be laid on their sides, and when kept in the air should be occasionally turned to prevent the yolk attaching itself to the side, instead of floating in the albumen. Some persons place the eggs in a netting, or on a sieve or colander, and immerse them for an instant in a caldron of boiling water, before packing them away. The practice of packing eggs in damp straw, or anything else that can

convey a flavour, should be carefully avoided. The shells of eggs are porous, and readily admit the passage of gaseous substances, especially of fetid odours. It is from inattention to this point that a large portion of the eggs imported from the coast of France have a less delicate flavour than those of our poultry yards. Damp chopped straw, as well as most other organic substances exposed to warmth and moisture, readily ferment or putrefy; and during fermentation a considerable increase of temperature takes place, as any one may readily perceive by examining the common hotbeds in our gardens, which are merely masses of organic matter in a state of decomposition. Eggs, as long as they retain the embryo of the future chick, in a vital state, possess in themselves a certain degree of warmth, which tends materially to promote the decomposition of the substances they are packed in, particularly in the presence of moisture.

Egg, Elas'tic. Take a good and sound egg, place it in strong vinegar, and allow it to remain for 12 hours; it will then become quite soft and elastic. In this state it can be squeezed into a tolerably wide-mouthed bottle; when in, it must be covered with water, having a little soda dissolved in it. In a few hours the egg will be restored to nearly its original solidity; after which the liquid may be poured off, and the bottle dried, the whole being kept as a curiosity to puzzle one's friends for an explanation how the egg got there. ('Parlour Pastime.')

Egg Flip. *Prep.* 1. Beer, 1 pint; eggs, 3 in no.; sugar, 2 oz.; nutmeg and ginger, q. s. to flavour; the eggs are broken into one half of the beer, the sugar added, and the whole beaten well together; the mixture is then placed in a clean warmer, and heated over the fire to nearly the boiling-point, and stirred one way all the time, care being taken not to let it either boil or curdle; the other portion of the beer and the spices are then added, and the whole mixed well together.

2. As above, but adding a glass of spirit. Some persons also add a little lemon peel.

Egg, Glaire of. *Prep.* Separate the whites from the yolks, and whisk them to a froth, let them stand 24 hours, and strain them through muslin. *Used* as a glaze or varnish by bookbinders and others.

Egg, Liquid. *Prep.* (Jayne.) From lime, 1 bushel (slaked with water); common salt, 2 or 3 lbs.; cream of tartar, ½ lb.; water, q. s. to form a mixture strong enough to float an egg. *Used* to preserve eggs, which it is stated it will do for two years, by simply keeping them in it. Once patented. Simple milk of lime answers quite as well.

Egg Wine. As egg flip, but using equal parts of white wine and water, instead of beer.

ELA'IDINE. A fatty compound of elaïdic acid and glycerin, formed by the action of nitrous acid or nitrate of mercury on olive oil. It is neutral; melts at 90° Fahr.; and is very soluble in ether, scarcely so in alcohol. It is one of the components of CITRINE OINTMENT. By saponification it is resolved into its two constituents.

ELA'IN. See OLEIN.

ELAIOM'ETER. *Syn.* OLEOM'ETER. An instrument for ascertaining the specific gravity of oils. See HYDROMETER and OIL.

ELAL'DEHYD. A peculiar crystalline substance which forms in ALDEHYD when kept for some weeks at a temperature of 32° Fahr. It melts into a colourless liquid at about 38°, in which state it is miscible with water, alcohol, and ether. It is isomeric with aldehyd, but its vapour has about three times the density of that substance, whilst it neither combines with ammonia nor comports itself with potassa and solution of silver like aldehyd.

ELAOP'TENE. See OIL (Volatile).

ELAT'ERIN. *Syn.* MOMORDICINE. The active principle of ELATERIUM. It was discovered by Dr. Clutterbuck in 1819, but first obtained in a state of purity in 1830, by the late Mr. Hennel.

Prep. 1. (Dr. Morries.) Elaterium is digested in hot alcohol, the resulting tincture filtered, evaporated to the consistence of thin oil, and then thrown into boiling distilled water. When the whole is cold, the precipitate is collected and purified by redissolving it in alcohol and precipitation by water, as before.

2. (Hennel.) The alcoholic extract of elaterium is digested in ether, and the residuum dissolved in hot alcohol; crystals form as the solution cools.

3. An alcoholic tincture is evaporated to the consistence of a syrup, and thrown into a mixture of equal parts of liquor of potassa and water at a boiling temperature. Almost pure elaterin separates as the liquid cools.

Obs. Elaterin forms delicate, white, silky crystals, having a bitter taste; it is fusible at about 365° Fahr.; tastes bitter; odourless; neutral; insoluble in water; and dissolves readily in hot alcohol. Its medicinal action is similar to that of elaterium, differing only in its greater activity.—*Dose.* $\frac{1}{16}$ gr. to $\frac{1}{10}$ gr.

ELATER'IUM. *Syn.* SQUIRTING CUCUMBER In *pharmacy*, 'the fresh unripe fruit' of the wild cucumber, '*Ecbalium officinarum* — Richard,' Ph. L. (*Momordica Elaterium*, Linn.). According to present usage, the word is more generally applied to the feculence deposited from the juice of the wild cucumber. It is thus applied in Ph. E. & D. (See *below*.)

Elaterium. B. P. *Syn.* EXTRACT OF ELATERIUM, E. OF SQUIRTING CUCUMBER; EXTRACTUM ELATERII (Ph. L.), ELATERIUM (Ph. E. & D.), L. The feculence of the juice of the above fruit.

Prep. 1. (Ph. L.) Slice wild cucumber before it is quite ripe in the long direction, and strain the juice, very gently expressed, through a fine hair sieve; then set it aside for some hours, until the thicker part has subsided. The thinner supernatant fluid being rejected, dry the thicker portion with a gentle heat. The processes of the other colleges are essentially the same.[1]

2. (Dr. Clutterbuck.) The cucumbers (fully ripe) are cut longitudinally, and sprinkled with cold water, and the juice allowed to strain through a fine sieve into an earthenware vessel. The seeds and surrounding pulp are next placed on the sieve, with the split fruit, and washed repeatedly with cold water. The washings being received in the same vessel with the juice, the whole is allowed to repose for a few hours, when the clear portion is decanted and the sediment spread thinly on fine linen, and dried by exposure to the air and a gentle heat, avoiding the sunshine or a bright light. Quality very fine. Forty fruits, by this process, yield only 6 grs. of elaterium.

3. (Apothecaries' Hall.) The fruit, slit into halves, is placed in hempen or horsehair bags, and submitted to slight pressure in a tincture press. The juice, as it runs off, passes through a fine hair sieve into a cylindrical glass jug or jar, where it is allowed to remain for two hours, when the clear supernatant liquor is poured off, and the thick portion containing the sediment is poured on a paper filter, supported on linen, and allowed to drain, after which it is dried by a gentle heat in a stove. The product has a green colour, and constitutes the finest elaterium of commerce. A darker and inferior article is obtained from the liquor, poured from the first sediment by placing it in shallow pans, and allowing it again to deposit.

Prop., &c. Elaterium is sold in thin cakes, and when pure has a pale-gray or greenish-gray colour, floats on water, is easily pulverised by pressure, and forms with rectified spirit a rich, green-coloured tincture. Elaterium obtained as a second deposit (ELATERIUM NIGRUM), is dark and inferior. Alcohol dissolves from 50% to 60% of good elaterium. "When exhausted by rectified spirit, the solution, concentrated, and poured into hot dilute solution of potassa, deposits, on cooling, minute silky, colourless crystals (of ELATERIN), weighing from $\frac{1}{3}$th to $\frac{1}{4}$th of the elaterium operated on." (Ph. E.)

Obs. To procure a fine sample of elaterium, it is necessary to remove it as soon as it is deposited, as a heavy mucilage falls down soon afterwards, which materially injures its quality and appearance. English elaterium is the best. The foreign is uniformly adulterated with chalk or starch, and coloured with sap green.

Dose. $\frac{1}{10}$ gr. to $\frac{1}{2}$ gr., formed into a pill with extract of gentian and liquorice powder; as a hydragogue and cathartic in dropsies, twice a day, repeated every other day for a week or ten days. Its use must be avoided when there is much debility or any inflammatory symptoms. Larger doses than $\frac{1}{2}$ gr. of pure elaterium are poisonous. The *antidotes* are emetics, followed by demulcents, opium, and stimulants.

EL'DER. *Syn.* SAMBUCUS (Ph. L. & E.), L. A large shrub or small tree belonging to the natural order *Caprifoliaceæ*. It is indigenous in Europe, and has long been valued for its medicinal properties. "The recent flowers of the *Sambucus nigra*" (Ph. L.) or common elder are regarded as diaphoretic and pectoral, and a distilled water (ELDER-FLOWER WATER; AQUA SAMBUCI) is made of them. The inner bark of the same tree is purgative and emetic, and is used in dropsy; the leaves are purgative; the juice of the fresh berries is made into wine (ELDER WINE), and is largely used to make FACTITIOUS PORT WINE, and to adulterate the real wine. See WATERS (Distilled).

ELECAMPANE'. *Syn.* INULA (Ph. L.), L. "The root of *Inula Helenium*" (Ph. L.). A plant of the nat. order *Compositæ*. Tonic, diaphoretic, and expectorant.—*Dose.* 20 grs. to 1 dr., or more, either in the form of powder or decoction; in catarrh, dyspepsia, &c. It is now seldom used.

ELEC'TRIC. *Syn.* ELECTRICAL. Exhibiting the effects of ELECTRICITY when 'excited' by friction; pertaining to, derived from, or produced by electricity.

Electric. *Syn.* INSULATOR, NON-CONDUCTOR. A substance which may under ordinary circumstances be readily made to evince electrical properties by friction. Electrics do not transmit, or conduct, electricity; whilst, on the other hand, ANELECTRICS are good transmitters or conductors of electrical action. The most perfect electrics are shell-lac, sulphur, amber, jet, resinous bodies, gums, gun-cotton, glass, silk, diamond, agate, and tourmaline; dry fur, hair, wood, feathers, and paper; turpentine and various oils; dry atmospheric air and other gases, steam of high elasticity, and ice at 0° Fahr. The most perfect anelectrics or conductors are the metals, charcoal, and saline fluids.

Electric Eel. The *Gynotus electricus*, a fish having the power of giving violent electric 'shocks'; which power it exerts for killing or stunning its prey. It is an inhabitant of the fresh-water lakes and rivers of the warmer regions of America, Africa, and Asia.

Electrical Machine. An instrument for the excitation and collection of electricity. The term is only applied to contrivances in which friction is the immediate cause of the electrical disturbance; those which act through chemical

[1] At the Mitcham Gardens, elaterium is manufactured in much the same way, only that considerable force is used in the expression of the juice, and the product therefore less potent, though more in quantity. The manufacture usually commences about the second week in September. (Dr. Royle.)

force, magnetism, or heat, being known by various distinctive names, as 'voltaic battery,' 'electro-magnetic machine,' 'induction-coil,' 'thermo-electric pile,' &c.

The electrical machines in common use are composed of a hollow glass cylinder, or circular plate of glass, turning on an axis, and rubbing against two or more leather rubbers covered with silk, the electricity being collected by sharp points fixed in a metal rod standing on a glass pillar. A description of these instruments, however, would be out of place in the present work, which does not aim at giving information that may be easily obtained from other sources.

Cylinder machines are seldom made of greater size than 13 inches by 9, and are about as powerful as an 18-inch plate machine. The latter are commonly made up to 3 and 4 feet diameter, and will, with a suitable condenser, give 15-inch sparks in air.

ELECTRI"CITY (-tris'-it-e). The name given primarily to one of the great forces of nature, and secondarily to that department of *physical science* which embraces all that is known respecting this particular force. Many theories respecting the nature of electricity have been advanced for the purpose of explaining electrical phenomena. The theory of Dr. Franklin supposed the existence of a single homogeneous, imponderable fluid, of extreme tenuity and elasticity, in a state of equable distribution throughout the material world. This fluid is assumed to be repulsive of its own particles, but attractive of all other matter. When distributed in bodies, in quantities proportionate to their capacities or attraction for it, such bodies are said to be in their 'natural state.' When we increase or diminish the natural quantity of electricity in any substance, excitation is the result, and the substance, if 'overcharged,' is said to be electrified 'positively;' or if 'undercharged,' 'negatively.' These theories, and all others based upon the assumption that electricity is a form of matter, have been found to be inadequate for the elucidation of electrical phenomena.

At the present day, however, two kinds of electric forces are recognised, and distinguished as negative and positive, but they are both assumed to be analogous in principle, and very generally assumed to be simply due to different analogous motions of matter. For a full exposition, however, the reader must refer to some of the especial works on the subject.

ELECTRO-CHEM'ISTRY. That branch of *chemistry* which treats of the agency of electricity in effecting chemical changes.

ELECTRO-ETCH'ING. See ETCHING.

ELECTROL'YSIS (-trŏl'-e-sĭs). Electro-chemical decomposition. The voltaic current has the power of loosening and separating the constituents of certain compound bodies when these are interposed in the circuit. The substances which are thus susceptible of decomposition are termed electrolytes. They are all binary compounds, containing single equivalents of their components, which are held together by very powerful affinities. The amount of electrical power required to effect decomposition varies greatly with different electrolytes: solution of iodide of potassium, melted chloride of lead, hydrochloric acid, water mixed with a little sulphuric acid, and pure water, demand very different degrees of decomposing force, the resistance increasing from the first-mentioned substance to the last, which latter it has been denied can be decomposed. One of the indispensable conditions of electrolysis is fluidity. When a liquid is electrolysed its components are disengaged solely at the limiting surfaces, where, according to the usual figurative mode of speech, the current enters and leaves the liquid, all the intermediate portions appearing quiescent. The terms 'anode' and 'cathode' have been proposed respectively for the surfaces which are supposed to receive and let out the current of positive electricity. The anode is therefore directly against or opposite the positive pole of the battery, or, according to the improved nomenclature, the positive electrode; and the cathode against the negative pole, or electrode. The bodies which are set free by the action of the current are termed ions; those which go to the anode and appear at the positive electrode being distinguished by the term anions, and those which go to the cathode and appear at the negative electrode by the term cathions. This nomenclature has, however, been but partially adopted, and is making but slow way, if any, many preferring the old terms of electro-positive for anions, and electro-negative for cathions.

The relative decomposing effects produced by the same current in different electrolytes are exactly expressed by the chemical equivalents of the electrolytes. Thus, if a current be made to traverse acidulated water, iodide of potassium, and chloride of lead, these three electrolytes will suffer decomposition at the same time, but by no means to the same extent; for the current which decomposes but 9 parts of water will separate into their elements 166 parts of iodide of potassium and 139 parts of chloride of lead. The electrolysis of metallic salts is now carried out on a large scale in the beautiful arts, which we notice under the general head of ELECTROTYPE.

ELECTRO-PLA"TING and GILD'ING. See ELECTROTYPE.

ELECTROPH'ORUS. A simple instrument for exciting electricity, generally used in the chemical laboratory for charging small Leyden jars when gases have to be exploded by the electric spark. To construct it, a plate of tinned iron is made into a circle of about 12 inches diameter; a raised border is then turned up for about half an inch, and the extreme edge is turned outwards over a wire to avoid a sharp border. A mixture of equal parts by weight of shell-lac, Venice turpentine, and resin, is made by gently heating them together

with stirring until well fused and thoroughly incorporated. This composition is poured into the plate, to quite fill it, and kept melted until all bubbles have disappeared. Another portion of the instrument, serving the same purpose as the conductor of an electric machine, is a circle of wood, rather smaller than the resinous plate, rounded at the edge, and neatly covered with tin-foil. An insulating handle, formed of a piece of stout glass rod, is cemented into the centre of this wooden disc. Before using the instrument it must be carefully dried and slightly warmed. The resinous surface is excited by beating it obliquely with a folded piece of warm flannel. When this has been done for about a minute, the warm, dry cover of the instrument is to be placed upon the resinous plate, and touched with the finger. If the cover is then raised a few inches, and the knuckle approached, a powerful spark of positive electricity will pass; and if the cover be again replaced, touched, and raised, a second spark will pass. This may be repeated many times without again exciting the resinous plate. By receiving the sparks with the knobs of a Leyden jar, a charge strong enough to give a powerful shock, or explode a gaseous mixture, may be rapidly obtained. Other forms have been given to the instrument, but the essential part of every one is a plate of some resinous substance.

ELEC'TROTYPE. *Syn.* ELECTRO-MET'ALLURGY, GALVAN'O-PLAS'TIC. The art of working in metals by the aid of electricity. Strictly speaking, the term electrotype is only applicable to one branch of 'electro-metallurgy'—that which relates to the production of copies of engraved plates, medals, coins, and other works—but it is now commonly employed in the sense indicated by our definition. According to this extended signification of the term, the art of electrotype includes ELECTRO-PLATING and ELECTRO-GILDING.

General principles.—If a current from a voltaic battery be passed, by means of platinum electrodes, through water to which some sulphuric acid has been added, electrolysis takes place, hydrogen appearing at the cathode, and oxygen at the anode. If into the acid liquid some crystals of sulphate of copper be now thrown, electrolysis will still go on, but only one of the elements of the water, namely, oxygen, will be evolved; for the hydrogen, on being released, will take the place of the copper in the solution, and the copper thus liberated will be deposited on the platinum plate or wire which constitutes the negative electrode. This experiment may be continued until all the copper is abstracted from the solution. Let this experiment be repeated with a copper plate for the positive electrode, and it will be found that neither of the gases will be evolved. The hydrogen, as before, will take the place of the copper in the solution; the oxygen, instead of escaping at the anode, will combine with the copper of the electrode and the sulphuric acid to form sulphate of copper. The chemical forces called into action by the current are so beautifully balanced, that in the last experiment the quantity of copper supplied by the positive electrode exactly equals the quantity withdrawn from the solution and deposited upon the negative electrode. The whole art of electrotype consists in applying the metals thus released from their solutions to artistic or useful purposes. To obtain compact and brilliant deposits, many precautions have to be observed. The solutions must be kept saturated, or nearly so; the mould to be copied, or object to be coated, must not be too small in proportion to the size of the zinc plate of the battery; in fine, the power employed must be carefully regulated according to the work to be done. In all arrangements the moulds or objects which receive the deposits act as negative electrodes, and are consequently in connection with the zinc of the battery or generating cell.

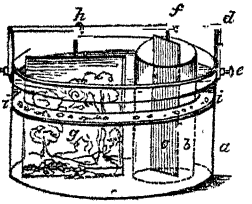
Electrotype processes. Although reguline deposits of many metals can be obtained through the agency of voltaic electricity, we shall only treat of those of copper, silver, gold, and platinum. When copper is deposited, the object is generally to produce a substantial copy of a medal, an engraved plate, or other work of art; but when solutions containing the precious metals are electrolysed, the deposits are nearly always used for covering the surface of inferior metals. We shall notice the operations connected with the deposition of copper, and those relating to electro-plating under separate heads.

1. DEPOSITION OF COPPER:—

The moulds or models intended to receive the deposited metal may be formed of various materials. For medals and similar small works, moulds of fusible metal, white wax, stearine, stearic acid, and gutta percha, are commonly used. The first are formed by dropping or pressing the medals to be copied upon the melted metal, taking care that the former are quite cold, and that the surface of the metal is bright or free from oxide. To make a mould in gutta percha, the material must be softened in warm water, and then pressed upon the medal by means of a strong screw press. With the other materials the manipulation is very easy. A ribbon of cardboard or thick paper is placed round the medal, so as to form a rim; the material, which has been melted in an earthen vessel, is then poured on, and allowed to remain until quite cold and hard, when it is cautiously removed. For large works, moulds of plaster of Paris are usually employed; these require to be saturated with wax or tallow, by standing them in a shallow vessel containing these substances in a melted state. For copying seals and small coins, impressions in ordinary sealing-wax may be used as electrotype moulds. Non-

metallic moulds must be coated with some substance which has the property of conducting electricity, before they can be used as negative electrodes. The substance commonly employed is plumbago or black-lead. It must be in the condition of an impalpable powder. It is rubbed briskly over the surface of the monld (wax, stearine, plaster, &c.) by means of a strong, fine camel-hair brush, till the whole presents the well-known black-lead polish. The adhesion of the plumbago may be often promoted by breathing slightly on the mould. To cause it to adhere to sealing-wax impressions, the wax may be slightly moistened with spirits of wine, or exposed to the vapour of ether. Delicate moulds and objects, which cannot well be black-leaded, may be covered with a conducting film of silver, by first dipping them in bisulphuret of carbon holding about $\frac{1}{10}$th part of phosphorus in solution, and then, after a few seconds, immersing them in a weak solution of nitrate of silver, and allowing them to dry in the light. Metallic moulds require no preparation.

The voltaic apparatus used may now be described. The single-cell arrangement, used for small works, is formed on the principle of Daniell's Constant Battery. It consists of a vessel of glass, earthenware, or wood, containing a smaller cell of thin biscuit ware, or other porous material; a rod or plate of amalgamated zinc, placed within the porous cell, and a wire connecting the zinc with the mould to be copied; the latter being placed in the outer vessel. The annexed figure represents a convenient form of the single-cell:—



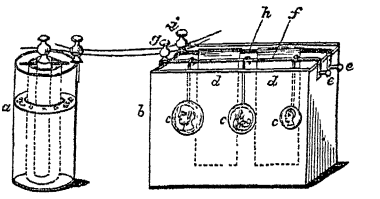
a. An oval vessel of salt-glazed earthenware or wood nearly filled with a saturated solution of sulphate of copper.

b. A porous diaphragm, containing the cylinder or plate of zinc (*c*), and filled with dilute sulphuric acid.

d. A small bar of brass or copper, fastened to the vessel by the binding screws (*e*, *e*), and supporting the plate of zinc (*c*), by the hook of copper wire (*f*), and the mould (*g*), by the hook (*h*).

i. A small shelf or partition to support crystals of sulphate of copper, to keep up the strength of the solution.

The battery arrangement has many advantages over that described above, and should always be employed when large objects are to be electrotyped, or when a number of small moulds are to be operated upon. In this arrangement the copper solution is electrolysed in a separate vessel, termed the decomposition cell, and the current generated by one or more cells of a Daniell's or Smee's battery. This arrangement is shown in the following engraving:—



a. A constant battery cell.

b. Decomposition cell; a cubical vessel made of wood or earthenware, and filled with a mixture of 1 part of dilute sulphuric acid (1 acid + 9 water), and 2 parts of saturated solution of sulphate of copper, by measure.

c, c, c. Moulds suspended to the brass rod (*f*), and connected with the zinc or positive element of the battery (*a*), by means of the screw (*g*).

d, d. Pieces of sheet copper suspended on the brass rod (*h*), and connected with the zinc end of the battery, by means of the screw (*i*), employed to keep up the strength of the cupreous solution in the decomposition cell.

To connect the moulds with the zinc or positive element, stout copper wires or strips of thin sheet copper are employed. In the case of a non-metallic mould, the wire must lead directly to the plumbagoed surface, or, what amounts to the same thing, the plumbago must be extended to the point of attachment. The connecting wires, and the backs and edges of metallic moulds, must be covered with sealing-wax varnish, or other non-conducting substance, to prevent them receiving the deposit. Before a mould is placed in the copper solution it is advisable that everything should be arranged, so that the immersion may occasion immediate voltaic action. If the connection between the zinc and the mould is not effected until after the immersion, the solution may act chemically on the surface of the mould, and cause the deposit to appear dark and dirty. When a mould has remained in the solution long enough to receive a complete coating of copper, it may be lifted out with impunity for examination. If everything is going on well, the deposited metal will present a brilliant, light, copper-coloured surface. When sufficiently thick, the deposit is removed with care, washed, and placed to dry. Etlectrotype medals may be polished with wash-leather and the plate brush, or bronzed. Various natural objects, such as insects, fruits, &c.; small works of art, such as busts and statuettes; chemical vessels, particularly glass flasks and retorts; and numerous classes of articles, may be rendered less fragile by coating them with copper by the electrotype process.

II. DEPOSITION OF THE PRECIOUS METALS —

The solutions generally employed as electrolytes from which silver and gold are respectively separated, are those of the argento-

cyanide and the auro-cyanide of potassium. These compounds are what chemists call double salts; for instance, cyanide of potassium is simply a compound of potassium and cyanogen; but argento-cyanide of potassium is cyanide of silver united with cyanide of potassium. When a solution of this double salt is electrolysed silver appears at one electrode and cyanogen at the other, while a proportionate amount of the simple cyanide of potassium is formed in the solution. But if the positive electrode is of silver, the cyanogen combines with it, and forms cyanide of silver, which unites with the liberated cyanide of potassium, and so keeps up the strength of the solution.

As in the deposition of copper, the apparatus used for plating or gilding may be the single cell or the decomposition cell and battery. The necessity of economising solutions of silver and gold has, however, led to certain modifications in the apparatus. The single-cell arrangement consists, as before (see *above*), of an outer vessel of glass or earthenware, containing a cell of porous biscuit ware; but the object to be silvered or gilded is placed, with the cyanide solution in the latter, while the zinc is placed in the outer vessel, with the dilute sulphuric acid.[1] The zinc is usually employed in the form of a cylinder, completely surrounding the porous cell. In the battery arrangement the decomposition cell may be of porcelain or glass; the silver or gold employed to keep up the strength of the solution may be in plates, wires, or ingots. For plating small objects, a single cell of a Daniell's battery will afford ample decomposing power; gilding may be better accomplished by using 3 such cells. The battery arrangement is much more convenient, effective, and economical than the single-cell arrangement.

On a large scale, electro-plating is carried out in oblong vats, occasionally holding from 200 to 250 gallons of solution. Silver plates, connected with a powerful voltaic or magneto-electric battery, are placed at intervals in the vats; they form the positive electrodes, and correspond in extent of surface with the articles to be coated, and face them on both sides. The articles (tea-pots, cruet-frames, forks, spoons, &c.) act as the negative electrodes, and are suspended by copper wires from brass rods laid lengthways over the vats, and connected with the battery. The articles plated are usually formed of nickel silver or German silver, which is chosen on account of its silvery whiteness, a quality of great importance when portions of the coating of noble metal have been worn away by use.

To prepare the articles for plating, they are first boiled in a solution of potassa, to free them from grease; they are then quickly dipped in red nitrous acid, to remove any oxide that may have formed on the surface, and after this well washed in water, to remove every trace of acid. They are then suspended from copper wires, and dipped into a solution of mercury in cyanide of potassium, or some other mercurial solution, and afterwards washed in water, as before. The amalgamation of the surface effected by the last operation promotes the adhesion of the film of silver. The articles having been weighed, are now immersed in the silvering solution, and left until a sufficient amount of silver has been deposited on them. Their condition at any time may be ascertained by weighing a test-object removed from the solution. In some electro-plating establishments the silvering solution is kept constantly stirred by simple mechanical arrangements; in others, continual motion is given to the suspended articles. On being removed from the vats the plated articles are well brushed with brushes of fine brass wire attached to a lathe, and cleaned with fine Calais sand; they are afterwards polished on revolving brushes with rottenstone, then by hand with soft leather and rouge, and, lastly, with the naked female hand. A lasting polish is given to some articles by burnishing with a burnisher formed of highly polished hardened steel, bloodstone, agate, or flint. The process of electro-gilding on the large scale is nearly the same as that of electro-plating or silvering, but, of course, plates of gold are suspended in the solution instead of silver plates.

Various solutions for silvering, plating, and platinising, have been recommended. We give below those generally employed.

1. Solvent solution. Cyanide of potassium, 2 oz.; distilled water or rain water, 1 pint; dissolve. Other proportions may be employed. *Used* as a general solvent for salts of silver, gold, and platinum.

2. Silver solution. Oxide of silver?[2] (not dried), 1 oz.; the solvent solution (No. 1), 1 pint. *Used* for the single-cell apparatus; its strength being maintained as the deposition proceeds by a fresh supply of oxide from time to time.

Cyanide of silver dissolved in solvent solution (No. 1). This is the solution generally employed for plating with a separate decomposition cell.

3. Gold solution. Add to a pint of No. 1 oxide of gold, ¼ oz. *Used* in the same manner as the second silver solution.

Cyanide of gold dissolved in solution of cyanide of potassium (No. 1). *Used* as last.

4. Platinum solution. The double chloride of platinum and potassium, dissolved in solution of caustic potassa. Other solutions have been proposed, but this appears to be decomposed with the greatest ease.

The above sketch of the electrotype art is

[1] The strength of the acid water acting upon the zinc must be regulated according to the work to be done. If the action between the acid and the zinc be too energetic, the electricity developed will be more than sufficient to release pure metal, and hydrogen will be evolved, which will interfere with the deposition.

[2] Precipitated from pure solution of nitrate of silver by excess of lime water. It should be well washed, and preserved in bottles with distilled water.

necessarily very imperfect. For minute details respecting manipulation, the reader is referred to the excellent treatises on the subject that have been written.

ELEC'TUARY. *Syn.* ELECTUARIUM, L. Electuaries (ELECTUARIA) are formed of light powders, generally vegetable, mixed up with honey, syrup, or sugar, to the consistence of a stiff paste. In the present Pharmacopœia they are included under the title Confection, but this arrangement is manifestly improper, as the words are not synonymous. In Conserves and Confections, the addition of the saccharine matter is in much larger proportion, and is designed to preserve the vegetable matter; in Electuaries, the syrup is designed merely to communicate the required form. (Dr. Murray.)

The preparation of electuaries is similar to that of confections and conserves, and the same precautions must be observed to reduce the dry ingredients to very fine powder before adding them to the syrup or other substances used to give them form. Care must also be taken to diffuse the ingredients equally through every portion of the mass, by patient and laborious stirring. The neglect of this point has often led to disagreeable consequences, from some portion of the electuary being nearly inert, while another portion has possessed increased activity. See CONFECTION, CONSERVE, LINCTUS, &c.

Electuary of Ac'etate of Potassa. See CONSERVE.

Electuary of Al'um. *Syn.* ELECTUARIUM ALUMINIS, L. *Prep.* 1. (Phœbus.) Alum, 1 dr.; extract of logwood, 4 drs.; balsam of Peru, 6 drops; water of sage, q. s. Astringent and antiseptic; in diarrhœa, sponginess of the gums, &c.

2. (St. Marie.) Alum, 1 dr.; catechu and extract of bark, of each, 2 drs.; conserve of roses, 6 drs.; simple syrup, q. s.—*Dose.* A teaspoonful, every 4 hours; in chronic diarrhœa, leucorrhœa, hæmorrhages, &c. See CONFECTION.

Electuary, An'odyne. *Syn.* ELECTUARIUM ANODYNUM, L. *Prep.* See CONFECTION OF OPIUM.

Electuary, Ar'abic. *Syn.* ELECTUARIUM SARZÆ COMPOSITUM, E. ARABICUM, L.; ELECTUAIRE ARABIQUE, Fr. *Prep.* From sarsaparilla, 5 oz.; senna and China root, of each, 3 oz.; dried walnut peel, 1 oz. (all in fine powder); honey, q. s.—*Dose.* 1 to 4 drs. See TRAITEMENT ARABIQUE.

Electuary, Aromat'ic. *Syn.* ELECTUARIUM AROMATICUM (Ph. E.). This preparation differs from the aromatic confection of the other British colleges, in not containing chalk. It is aromatic and stomachic, but not antacid or absorbent. See CONFECTION.

Electuary, Bath. *Syn.*, ELECTUARIUM ANTICACHECTICUM, E. MARTIALE, E. FERRI COMPOSITUM, L. *Prep.* From blacksmiths' clinkers, reduced to an impalpable powder, and made into an electuary with honey or treacle, q. s.; afterwards adding powdered ginger and carbonate of magnesia, of each, 1 oz., to every lb. of the mixture.—*Dose.* A teaspoonful night and morning every day, for 3 or 4 days, and again, after an equal interval, as long as thought necessary; as a chalybeate tonic, and in worms.

Electuary of Bitar'trate of Potas'sa. *Syn.* ELECTUARIUM POTASSÆ TARTRATIS, L. *Prep.* (Monro.) Cream of Tartar, 1 oz.; powdered ginger and conserve of roses, of each, 1 dr.; syrup of orange peel, q. s.—*Dose.* 1 to 3 drs.; as a hydragogue purge. It is also a useful laxative in common cases. See CONFECTION OF CREAM OF TARTAR.

Electuary, Black. *Syn.* TROUSSEAU'S ELECTUARY, TROUSSEAU'S BLACK TONIC; ELECTUARIUM NIGRUM, E. FERRI TANNATIS, L. *Prep.* From sesquichloride of iron, 4 drs.; tannin, 1 dr.; confection of roses, 2 oz.; syrup of orange peel, 1 oz. Tonic and astringent. —*Dose.* 5 to 30 grs.

Electuary of Black Pep'per. See CONFECTION OF PEPPER.

Electuary of Burnt Sponge. *Syn.* ELECTUARIUM SPONGIÆ USTÆ, L. *Prep.* (Hulse.) Burnt sponge, 10 grs.; rhubarb, 4 grs.; conserve of roses, q. s. For a *dose*, to be taken night and morning; in scrofula, glandular swellings, &c. See CONFECTION OF SPONGE.

Electuary of Cas'sia. *Syn.* ELECTUARIUM CASSIÆ (Ph. D. 1826.), E. C. FISTULÆ (Ph. E.), L. *Prep.* (Ph. D. 1826.) Fresh cassia pulp and syrup of orange, of each, ½ lb.; manna, 2 oz.; tamarind pulp, 1 oz.; mix, and evaporate to a proper consistence.—*Dose.* 2 drs. to 1 oz.; as a gentle laxative for children, or as a vehicle for other cathartics. That of the shops is commonly made with equal parts of tamarind and cassia pulps, mixed with ⅛th of manna, and flavoured with a few drops of tincture of orange peel, without any evaporation. See CONFECTION.

Electuary of Cat'echu. *Syn.* ELECTUARIUM CATECHU, CONFECTIO C., C. JAPONICA, L. *Prep.* (Ph. E.) Powdered catechu and kino, of each, 4 oz.; cinnamon and nutmegs, of each, 1 oz.; opium (dissolved in a little sherry), 1½ dr.; syrup of red roses (evaporated to the consistence of honey), 1½ pint. See CONFECTION, and *below*.

Electuary of Catechu (Compound). *Syn.* ELECTUARIUM CATECHU COMPOSITUM (Ph. D.). See CONFECTIONS. Both the above are astringent, aromatic, and anodyne.—*Dose.* 15 grs. to 1 dr., or more; in diarrhœa, dysentery, &c.

Electuary, Cathar'tic. *Syn.* ELECTUARIUM CATHARTICUM, L. *Prep.* 1. Confection of senna, 1½ oz.; flowers of sulphur, ½ oz.; syrup of roses or of orange peel, q. s.—*Dose.* A teaspoonful, 3 or 4 times a day, in piles; or, 2 to 3 teaspoonfuls, as a gentle laxative for females, and in skin diseases, gonorrhœa, &c. A mild and excellent medicine. It may be safely given in larger doses.

2. (Brera.) Aloes, 8 grs.; cream of tartar, 2 drs.; honey, q. s. For a *dose*. In amenorrhœa, attributed to abdominal engorgement.

Electuary, Cephal'ic, *Syn.* ELECTUARIUM CEPHALICUM, E. VALERIANÆ COMPOSITUM, L. *Prep.* (Hosp. F.) Valerian root and mistletoe of the oak, of each, 1 oz.; honey, 1½ oz.; tincture of henbane, q. s. to make an electuary. In nervous and rheumatic headache, &c.; assisted by an aperient.

Electuary of Char'coal. *Syn.* ELECTUARIUM CARBONIS, E. CARBONII, CONFECTIO C., L. *Prep.* 1. (Hosp. F.) Confection of senna, 2 oz.; fresh burnt charcoal, ½ oz.; carbonate of soda, ½ oz.; syrup of orange peel, q. s.

2. (Radius.) Electuary of senna, 2 oz.; powdered charcoal and carbonate of soda, of each, 1 dr. Both the above are given in obstinate constipation.—*Dose.* 1 to 3 teaspoonfuls twice a day. See TOOTH ELECTUARY.

Electuary for Chol'era. *Syn.* ELECTUARIUM ANTI-CHOLERICUM, L. The preparations that come under this name are numerous, including aromatic confection, and several like absorbent or astringent preparations. This name has been given to the American remedy for cholera, noticed at page 335.

Electuary of Cincho'na Bark. *Syn.* ELECTUARY OF BARK; ELECTUARIUM CINCHONÆ, L. *Prep.* 1. From yellow bark and simple syrup, of each, 1 oz.; conserve of red roses and confection of orange peel, of each, ½ oz, Tonic and febrifuge.—*Dose.* 1 to 4 drs.; in debility, agues, &c.

2. (Radius.) Peruvian bark, 1 oz.; syrup of orange peel, q. s. As the last.—*Dose.* A teaspoonful or more, 3 or 4 times daily. (See *below*.)

Electuary of Cinchona (Compound). *Syn.* ELECTUARIUM CINCHONÆ COMPOSITUM, L. *Prep.* 1. (ACIDULATED,—Copland.) Yellow bark, 1 oz.; confection of roses, ½ oz.; diluted sulphuric acid, 1 dr.; syrup of ginger, 1½ oz.

2. (ASTRINGENT,—Saunders.) Powdered Peruvian bark, orange peel, and conserves of roses and hips, of each, 6 drs.; crabs' eyes (or prepared chalk), 2 drs.; syrup of catechu, q. s.—*Dose.* A teaspoonful, 2 or 3 times daily; in chronic diarrhœa, &c.

3. (WITH CATECHU,—Pierquin.) Peruvian bark, 1 oz.; catechu and balsam of tolu, of each, 1 dr.; syrup of comfrey (*Symphytum officinale*,—Linn.), q. s.—*Dose.* As the last; in spitting of blood, hæmorrhages, &c.

4. (WITH CLOVES,—Dewees.) Peruvian bark, 2 oz.; cloves, 1 dr. (better, 4 drs.); simple syrup, q. s. A piece the size of a walnut, every hour or two, during the intermission of an ague.

5. (WITH IRON,—Cadet.) Peruvian bark, 6 drs.; oxide of iron and confection of opium, of each, 2 drs.; syrup of cinnamon, q. s.—*Dose.* A teaspoonful, or more, twice a day; in dropsy of the belly, after the evacuation of the fluid, and as a tonic in debility, accompanied by nervous excitement, &c., in the absence of fever.

6. (Quarin's.) Red bark, 1 oz.; ammoniated iron, 1 dr.; made into an electuary with equal parts of oxymel of squills and syrup of the 'five roots' (diuretic). Tonic, febrifuge, and pectoral.

7. (WITH SAL-AMMONIAC,—P. Cod.) Gray bark, 2½ oz.; hydrochlorate of ammonia, 1 dr.; honey and syrup of wormwood, of each, 2 oz. In intermittents occurring in scrofulous subjects.

8. (WITH SODA,—P. Cod.) Powdered cinchona, 1 oz.; carbonate of soda, 2 drs.; thin mucilage, q. s. to mix. Tonic, febrifuge, and stomachic.—*Dose.* 2 drs., 2 or 3 times a day; in agues, complicated with acidity and dyspepsia.

9. (WITH SULPHUR,—Cadet.) Peruvian bark, 1 dr.; sulphur, crabs' eyes (chalk), and spermaceti, of each, 2 drs.; extract of opium, 4 drs.; conserve of roses, 4 drs.; syrup of milfoil, q. s. Highly praised in debility from phthisis.—*Dose.* A teaspoonful, 2 or 3 times a day, assisted with the liberal use of raw or lightly boiled eggs and cod-liver oil.

10. (WITH TIN,—Cadet.) Peruvian bark, 1 oz.; tin filings and valerian root, of each, ½ oz.; syrup of saffron, q. s. In epilepsy, worms, &c.—*Dose.* A teaspoonful, morning and evening. See CONFECTION OF BARK.

Electuary of Copai'ba. *Syn.* ELECTUARIUM COPAIBÆ, L. *Prep.* 1. Copaiba and powdered cubebs, equal parts; conserves of roses and orange peel, of each (in equal quantities), q. s.

2. (Caspar.) Blanched almonds, 6 drs.; powdered marsh-mallow root, 1 dr.; catechu, ½ dr.; balsam of copaiba, 3 drs.

3. (Ricord.) Confection of almonds, 1 oz.; copaiba, ½ oz.; hard extract of rhatany, 3 drs.; syrup of orange peel, q. s. All the above are excellent in gonorrhœa, gleets, &c. The last two agree better with the stomach than most other like preparations.—*Dose.* 1 teaspoonful, or more (rapidly increased to 2 or 3 drs.), 3 or 4 times daily. See CONFECTION.

Electuary of Cow'hage. *Syn.* ELECTUARIUM DOLICHOS, E. MUCUNÆ, L. *Prep.* 1. Dip the pods of dolichos in treacle, allow them to drain a moment, and then scrape off the hairs for use.

2. (Chamberlain.) As the last, nearly.

3. (Correa.) Cowhage (the hairs or setæ), 40 grs.; syrup, ½ oz.

4. (Ellis.) Cowhage (hairs), 1 dr.; honey, q. s.

5. (Guy's Hosp.) Cowhage (hairs), any quantity, made into an electuary with treacle, q. s. In worms.—*Dose.* For a child, a teaspoonful; for an adult, a table-spoonful; in the morning, fasting, and at night, for 3 or 4 days; followed by a dose of castor oil, to which a teaspoonful of turpentine may be advantageously added. See COWHAGE.

Electuary of Cu'bebs. *Syn.* ELECTUARIUM

CUBEBÆ, L. *Prep.* 1. See ELECTUARY OF COPAIBA.

2. (Beral.) Cubebs and copaiba, of each, 2 oz.; powdered alum, 1 oz.; extract of opium, 5 or 6 grs.; mix.

3. (Bouchardat.) Cubebs, 1½ oz.; copaiba, 1 oz.; sweet spirit of nitre, ½ fl. dr.; oil of peppermint, 8 or 10 drops; powdered sugar, q. s.

4. (Radius.) Cubebs, ½ oz.; honey, 1 oz. In gonorrhœa, mucous discharges from the vagina, bladder, &c.—*Dose.* 1 teaspoonful, afterwards increased to 2 or 3 teaspoonfuls, twice or thrice daily. See CONFECTION OF COPAIBA, ELECTUARY OF C., &c.

Electuary, Demul'cent. *Syn.* ELECTUARIUM DEMULCENS, L. *Prep.* From spermaceti, syrup of poppies, and syrup of tolu, of each, 2 drs.; powdered gum tragacanth, 1 dr.; confection of roses, 6 drs.; nitre, ½ dr.—*Dose.* A piece the size of a small filbert, frequently; as a pectoral and demulcent in coughs, hoarseness, &c.

Electuary, Deob'struent. *Syn.* ELECTUARIUM DEOBSTRUENS, L. *Prep.* (Copland.) Confection of senna, 1½ oz.; cream of tartar, 1 oz.; sulphur and syrup of ginger, of each, 6 drs.; borax, 3 drs.; syrup of poppies, 2 drs.—*Dose.* A teaspoonful, or more, nightly; in the obstinate constipation of females, painful and suppressed menstruation, &c.

Electuary for Dys'entery. *Syn.* ELECTUARIUM ANTI-DYSENTERICUM (Ph. E. 1744), L. Electuary of catechu, mixed with half its weight of Locatel's balsam.

Electuary, Emmen'agogue. *Syn.* ELECTUARIUM EMMENAGOGICUM, L. *Prep.* From myrrh, 1 dr.; ammoniated iron, 1 scrup.; syrup of ginger, q. s. to mix.—*Dose.* ½ dr. to 1 dr., night and morning; in deficient or suppressed menstruation.

Electuary for Epilep'sy. *Syn.* ELECTUARIUM ANTI-EPILEPTICUM, L. *Preps.* 1. See ELECTUARY OF CINCHONA (Comp.), No. 10.

2. (Dr. Mead.) Powdered cinchona, 1 oz.; valerian and tin (both in powder), of each, ½ oz.; syrup, q. s. to mix.—*Dose.* A teaspoonful, night and morning.

Electuary, Feb'rifuge. See ELECTUARY OF CINCHONA, &c.

Electuary of In'digo. *Syn.* ELECTUARIUM INDIGI, E. PIGMENTI INDICI, L. *Prep.* (Phœbus.) Powdered indigo, 4 drs.; aromatic powder, ½ dr.; syrup, 1 fl. oz. or q. s. In spasmodic diseases, especially in epilepsy, chorea, and hysteria, and the convulsions of children. It has also been used with advantage in that species of impotence in which strychnia is useful. The above quantity is to be all taken, in divided doses, during the day. To be of permanent advantage, it should be continued for several weeks.

Electuary of Ipecacuan'ha. See CONFECTION.

Electuary of Jal'ap. See CONFECTION.

Electuary of Kermes. MARMELADE DE ZANETTI; ELECTUARIUM KERMETIS, E. K. MINERALIS, L. *Prep.* From manna, 4 oz.; pulp of cassia and oil of almonds, of each, 2 oz.; butter of cacao, ½ oz.; Kermes mineral, 10 grs.; syrup of marsh-mallow, 3 fl. oz.; syrup of orange flower, q. s. A diaphoretic laxative.—*Dose.* 1 to 4 teaspoonfuls, or more.

Electuary of Lau'rel Ber'ries. See CONFECTION OF RUE.

Electuary, Len'itive. See CONFECTION OF SENNA.

Electuary, Mahomed's. *Prep.* 1. From grocer's currants, 2 oz.; powdered senna, ½ oz.; powdered ginger, 1 dr.; finely powdered capsicum and cloves, of each, 20 grs.; croton oil, 3 drops; conserve of roses and syrup of saffron, of each, in equal parts, q. s. to mix.

2. (Bateman.) Currants, 1 oz.; senna, ½ oz.; ginger, ½ dr.; syrup of roses, q. s.; croton oil, 1 drop.—*Dose.* 1 or 2 teaspoonfuls, early in the morning; in dyspepsia and habitual constipation. The first formulary produces a most useful medicine, particularly for free-livers.

Electuary of Male Fern. *Syn.* ELECTUARIUM FELICIS MARIS, L. *Prep.* 1. Powder of male fern, 3 drs.; conserve of roses, 1 oz.

2. (Radius.) Ethereal extract of male fern, ½ dr.; honey of roses, 1 oz. The half of either to be taken at night, and the remainder the next morning. In worms.

Electuary of Ni'tre. *Syn.* ELECTUARIUM POTASSÆ NITRATIS, L. *Prep.* (Hosp. F.) Nitre, 3 drs.; confection of roses, 2 oz.—*Dose.* A piece of the size of a filbert, where the use of nitre is indicated. See CONFECTION.

Electuary of O'pium. See CONFECTION OF OPIUM.

Electuary, Pec'toral. *Syn.* ELECTUARIUM PECTORALE, L. *Prep.* 1. (Ph. E. 1744.) From conserve of roses, 2 oz.; compound powder of tragacanth, 4 drs.; flowers of benzoin, 1 dr.; syrup of tolu, q. s.—*Dose.* A little, *ad libitum.*

2. Oxymel of squills, syrup of marsh-mallows, mucilage of gum arabic, and syrup of tolu, of each, ½ oz.; powdered lump sugar, 2 oz. As the last.

Electuary of Pep'per. See CONFECTION, and *above.*

Electuary for Piles. *Syn.* ELECTUARIUM HÆMORRHOIDALE, L. *Prep.* 1. See CONFECTION and ELECTUARY OF PEPPER.

2. (Dr. Copland.) Cream of tartar, 1 oz.; precipitated sulphur (pure), 3 drs.; confection of senna, 2 oz.; syrup of orange peel or ginger, q. s. to mix.

3. (Dr. Graves.) Confection of senna and sulphur, of each, 1 oz.; balsam of copaiba and cream of tartar, of each, ½ oz.; jalap and ginger, of each, 1 dr.; syrup of orange peel, q. s.

4. (Hosp. F.) Confection of senna 2 oz.; black pepper and precipitated sulphur, of each, ½ oz.; oil of cubebs, 1 dr.; syrup, q. s. The last three are useful laxatives in piles, and by

their preventing the accumulation and hardening of the fæces, often remove the affection. —*Dose.* A teaspoonful, three or four times a day. From the difficulty experienced in procuring pure precipitated sulphur, washed sublimed sulphur may be advantageously substituted.

Electuary of Pomegran'ate. *Syn.* ELECTUARIUM GRANATI, L. *Prep.* 1. From the root-bark, 1 dr.; assafœtida, ½ dr.; croton oil, 6 drops; conserve of roses, 1 oz.—*Dose.* A teaspoonful, night and morning.

2. (Radius.) Extract of the root-bark, 6 drs.; lemon juice, 2 fl. drs.; linden water, 3 fl. drs.; gum tragacanth, q. s. to make an electuary. One half to be taken at once; the remainder in an hour. Both are given in tape-worm.

Electuary of Rhubarb. *Syn.* ELECTUARIUM RHEI, L. *Prep.* (Saunders.) Powdered rhubarb, 1½ dr.; sulphate of potassa, 1 dr.; cream of tartar, 4 drs.; pulp of tamarinds, 2 oz.—*Dose.* A teaspoonful, as a mild stomachic laxative.

Electuary of Scam'mony. See CONFECTION.

Electuary for Scur'vy. See CONSERVE (Anti-scorbutic).

Electuary of Sen'na. See CONFECTION OF SENNA.

Electuary of Squills. *Syn.* ELECTUARIUM SCILLÆ, L. *Prep.* 1. Oxymel of squills, 2 fl. oz.; cream of tartar and powdered sugar, of each, 1½ oz.—*Dose.* 1 to 2 teaspoonfuls, as a laxative and expectorant; in old coughs, &c.

2. (Radius.) Squills, nitre, gum ammoniacum, and tartrate (bitartrate) of potassa, of each, 2 drs.; sal-ammoniac, 20 grs.; syrup of cinnamon, q. s.—*Dose.* 2 drs., three times a day; in dropsies. See CONSERVE OF SQUILLS.

Electuary of Steel. *Syn.* ELECTUARIUM FERRI, E. CHALYBEATUM, L. *Prep.* 1. (Dr. Collier.) Potassio-tartrate of iron, ½ oz.; confection of roses, 1 oz.; syrup, q. s. to mix.

2. (Collier.) Precipitated sesquioxide of iron, 1 oz.; honey, 2 oz.; ginger syrup, ½ fl. oz. Both the above are tonic and emmenagogue. —*Dose.* One teaspoonful, thrice a day. See CONFECTION.

Electuary, Stim'ulant. *Syn.* ELECTUARIUM STIMULANS, L. *Prep.* From gum ammoniacum (strained), 1 oz.; vinegar of squills, ½ oz.; mixed with a gentle heat, and spread on leather. Applied to the chest or pit of the stomach, as a mild counter-irritant and antispasmodic; and as a discutient to tumid glands and indolent tumours. It is wrongly called an electuary.

Electuary, Stomach'ic. *Syn.* DINNER ELECTUARY; ELECTUARIUM STOMACHICUM, CONFECTIO STOMACHICA, L. *Prep.* 1. Rhubarb, ginger, and extract of chamomile, of each, 1 dr.; confection of orange peel, 4 drs.; syrup, q. s.

2. Rhubarb and gentian, of each, 1½ dr.; extract of hops and powdered capsicum, of each, ½ dr.; oil of chamomile, 12 drops; confection of hips and syrup of orange peel, of each, ½ oz.

3. Green peppermint, lump sugar, and confection of orange peel, equal parts.—*Dose.* A teaspoonful, an hour before a meal. They are all excellent stomachics, and are useful to improve the appetite, and in dyspepsia.

Electuary of Sul'phur. See CONFECTION OF SULPHUR, and *below*.

Electuary of Sulphur (Compound). *Syn.* ELECTUARIUM SULPHURIS COMPOSITUM, L. *Prep.* 1. Sulphur, ¾ oz.; cream of tartar, 1 oz.; confections of senna and black pepper, of each, 2 oz.; syrup of ginger, 1 fl. oz. An excellent medicine in piles.—*Dose.* A teaspoonful, twice a day.

2. (WITH BORAX.) Flowers of sulphur, 1 oz.; cream of tartar, 1½ oz.; borax, ½ oz.; confection of senna, 2½ oz.; syrup of orange peel, q. s. to mix.—*Dose.* 1 to 3 teaspoonfuls, in diseases of the uterine organs and lower bowels. See CONFECTION.

Electuary for the Teeth. *Syn.* ELECTUARIUM DENTIFRICUM, L. See TOOTH PASTE, DENTIFRICE, &c.

Electuary of Tin. See CONFECTION OF TIN, and *below*.

Electuary of Tin (Compound). *Syn.* ELECTUARIUM STANNI COMPOSITUM, L. *Prep.* 1. Powdered tin, 1 oz.; confection of oil of turpentine, 2 oz.

2. (Dr. Cheston.) Tin filings, 4 drs.; carbonate of iron (sesquioxide), 1 dr.; conserve of wormwood, 3 drs.

3. (Foy.) Powder of tin, 1 oz.; extract of wormwood and powdered jalap, of each, 1 dr.; compound syrup of chicory, q. s. In worms. —*Dose.* A table-spoonful, or more, for 2 or 3 successive mornings, fasting; followed by a purge.

Electuary of Tur'pentine. *Syn.* ELECTUARIUM TEREBINTHINÆ, L. *Prep.* 1. (St. B. Hosp.) Common turpentine, 1 oz.; honey, 2 oz.—*Dose.* 1 to 2 teaspoonfuls; in complaints of the urinary organs, worms, &c.

2. (Radius.) Turpentine, soap, and rhubarb, of each, 1 dr.; syrup of wormwood, q. s.—*Dose.* Three teaspoonfuls a day; in dropsy, worms, &c.

3. (E. OLEI TEREBINTHINÆ, — Copland.) As Confection of Turpentine,—Ph. D. See CONFECTION.

Electuary, Ver'mifuge. *Syn.* ELECTUARIUM ANTHELMINTICUM, E. VERMIFUGUM, L. *Prep.* 1. (Bresmer.) Worm-seed and tansy-seed, of each, 4 drs.; powdered valerian root, 2 drs.; jalap and sulphate of potassa, of each, 1½ to 2 drs.; oxymel of squills, q. s. to mix.—*Dose.* A teaspoonful, or more; repeated night and morning, followed by a brisk purge.

2. (Rosenstein.) Worm-seed, 10 grs.; sulphate of iron, 4 grs.; jalap and honey, of each, 20 grs. For two doses, as the last. 2 or 3 drs. of confection of senna are often substituted for the jalap and honey.

3. (Foy.) Aloes, ½ oz.; common salt, 3 drs.;

flour, 2 oz.; honey, q. s. to form a stiff paste. *Used* as a suppository in ascarides.

4. Flowers of sulphur, 4 oz.; powdered jalap, 1 oz.; powdered bark, 1 oz.; syrup of buckthorn, q. s.—*Dose.* Two or three teaspoonfuls, every morning early. See CONFECTION and ELECTUARY OF TIN, TURPENTINE, WORM'SEED, &c.

Electuary for Worms. See VERMIFUGE ELECTUARY (*above*).

EL'EMENTS. *Syn.* ELEMENTARY BODIES, SIMPLE B.; ELEMENTA, L. In *chemistry*, those substances or bodies which have hitherto resisted every attempt which has been made to decompose them, or to resolve them into simpler forms of matter. Earth, air, fire, and water, were regarded by the ancients as simple bodies, of which all others are composed, and they still constitute the 'four elements' of the vulgar. The imaginary principles or elements of the alchemists were termed salt, sulphur, and mercury. About sixty-four different kinds of matter are at present recognised as elementary bodies. They are substances having the most diverse characters. The great majority exist in the solid state; bromine and mercury are liquid; while oxygen, hydrogen, nitrogen, and chlorine, are gaseous. About four fifths of the elements are metallic, as instanced by gold, silver, copper, iron, &c.; the remainder are non-metallic, as instanced by carbon, sulphur, phosphorus, &c. A list of the known elements is given under the head of ATOMIC WEIGHTS (which *see*).

EL'EMI. *Syn.* GUM ELEMI; ELEMI (B. P.). "A terebinthinate concretion, from an uncertain plant." (Ph. L.) MEXICAN ELEMI is known to be the produce of a species of the genus *Elaphrium.* MANILLA ELEMI is probably the product of *Canarium commune.*

Prop., &c. The elemi of commerce is of a pale-yellow colour, brittle without, but soft and tough within; it has a warm bitter taste, and a fragrant aromatic smell, partaking of fennel and juniper. It is only partially transparent even in thin plates, is very fusible, and has a density a little greater than that of water. It contains 12½ per cent. of volatile oil (oil of elemi). It is used to give toughness to lacquers and varnishes, and in medicine in the preparation of ELEMI OINTMENT.

Pur. The elemi of the shops is often adulterated, but more frequently a factitious kind is sold for the genuine gum. This fraud may be detected by exposing the suspected article to heat, along with a little water, when the factitious fragrance of the spurious article evaporates, and the coarse terebinthinate smell of the resin used to adulterate it, or which is sold for it, becomes readily distinguishable.

Elemi, Facti''tious. *Prep.* 1. Yellow resin, 8 lbs.; melt, add Canada balsam, 2 lbs.; withdraw the vessel from the heat, and further add, of oil of juniper, 2 drs.; oil of sweet fennel, 1 dr.; oil of nutmeg, ½ dr.

2. Yellow resin, 7 lbs.; Canada balsam, 1 lb.; juniper oil bottoms, 4 drs.; oil of mace, 3 drs.; mix as before.

EL'EMIN. The crystalline resin of gum elemi.

ELIX'IR. In *pharmacy*, a name formerly applied to various compound tinctures, and to preparations supposed to contain the quintessence of other substances. (It is still applied to several popular remedies.) The elixirs of the alchemists were solutions employed in their fruitless attempts to transmute the baser metals into gold.

Elixir, Ac'id. *Syn.* ELIXIR ACIDUM, L. *Prep.* 1. (Dippell's.) Sulphuric acid, 1 part, dropped gradually into rectified spirit of wine, 5 parts; placed in a large flask, and afterwards coloured by digestion on animal kermes and saffron, of each, 1 part.

2. (Haller's,—Ph. Sax. 1837.) From sulphuric acid and rectified spirit, of each, 1 part; as before.

3. (Vogler's.) From sulphuric acid and nitrous ether, equal parts, as above. Astringent and antiseptic.—*Dose.* A few drops, in water.

Elixir of Al'oes. *Syn.* COMPOUND TINCTURE OF ALOES; ELIXIR ALOËS, L. See TINCTURE.

Elixir of Aloes (Compound). *Syn.* ELIXIR ALOËS COMPOSITUM, L. *Prep.* (Dr. Copland.) Acetate of potassa, inspissated ox-gall, socotrine aloes, and myrrh, of each, 2 drs.; hay saffron, 1 dr.; brandy (or proof spirit), 2½ fl. oz.; digest a week, and strain. Stomachic and laxative.—*Dose.* A teaspoonful, or more; in dyspepsia, constipation, &c.

Elixir, Anti-asthmat'ic. *Syn.* ELIXIR ANTIASTHMATICUM, L. *Prep.* 1. Oil of aniseed, camphor, and balsam of tolu, of each, 1 oz.; cochineal, 1 dr.; proof spirit, 1 gal.; digest a week, and filter.

2. As the last, adding powdered opium, 1½ oz. —*Dose.* A teaspoonful, to allay irritation, assisted by an occasional dose of aperient medicine; in asthma, chronic coughs, &c.

3. (Boerhaave's.) Aniseed, asarabacca, elecampane, liquorice root, orris root, and sweet flag (calamus), of each, equal parts; made into a tincture, with brandy.—*Dose.* 20 to 40 drops.

Elixir, Anti-scrof'ulous. *Syn.* ELIXIR ANTISCROFULOSUM, L. *Prep.* 1. (P. Cod.) The ammoniated tincture of gentian. See TINCTURE.

2. (Desforges.) Guaiacum, 5 oz.; cinchona bark and pellitory, of each, 3 oz.; cloves, 5 drs.; orange peel and benzoin, of each, 2 drs.; hay saffron, ½ dr.; rectified spirit and brandy, of each, ½ pint; digest a week, and filter. *Used* as an application to scorbutic gums.

Elixir, Boerhaave's Asthmat'ic. See ANTIASTHMATIC ELIXIR (*above*).

Elixir, Boerhaave's Vis'ceral. *Syn.* ELIXIR BOERHAAVII, E. B. VISCERALE. L. *Prep.* (Ph. Han.) Aloes, myrrh, and saffron, of each, 1 oz.; tartrate of potassa, 2 oz.; alcohol (strongest rectified spirit), 14 oz.; water, 1 oz.; macerate

3 days, and filter. This preparation "has been highly praised in visceral obstruction." (Dr. Griffith.)—*Dose.* 1 to 3 teaspoonfuls.

Elixir, Clauder's. *Syn.* ELIXIR CLAUDERI, L. 1. (Pideret.) Salt of tartar, sal-ammoniac, strained aloes, and myrrh, of each, 1 oz.; elder-flower water, 1½ pint, digest, with agitation, for 24 hours, and filter.

2. (Parrish.) Carbonate of potassa, 1 oz.; aloes, guaiacum, myrrh, saffron, and rhubarb (contused), of each, 2 drs.; water, 18 fl. oz. Macerate a few days, and decant.—*Dose.* 1 to 2 teaspoonfuls; in amenorrhœa, constipation, scurvy, visceral obstructions, &c.

Elixir, Cough. *Syn.* ELIXIR ANTI-CATARRHALE, L. *Prep.* 1. See ANTI-ASTHMATIC ELIXIR.

2. (Hufeland.) Extracts of blessed thistle and dulcamara, of each, 1 dr.; cherry-laurel water, 1 fl. dr.; fennel water, 1 fl. oz.—*Dose.* 1 to 2 teaspoonfuls, 3 or 4 times a day. It is a most useful remedy in coughs occurring in nervous, hysterical, or irritable patients. See ELIXIR OF IPECACUANHA, LETTSOM'S ELIXIR, &c. (*below*).

Elixir, Daffy's. *Syn.* ELIXIR SALUTIS, E. SENNÆ COMPOSITUM, TINCTURA SENNÆ COMPOSITA, L. This is an aromatised and sweetened tincture of senna, to which other cathartics are generally added. Nearly every drug-house has its own formula for this article. The following are those employed in the London trade:—

Prep. 1. East India senna, 1½ lb.; jalap, 5 oz.; coriander seed and aniseed, of each, ½ lb.; rhubarb, ¼ lb.; red sanders wood, 2 oz.; salt of tartar, 2 oz.; treacle, 7 lbs.; rectified spirit of wine, 2½ galls.; water, 3¼ galls. All the solids are well bruised, and macerated in the mixed fluids for 14 days, when the whole is pressed, and strained through a flannel bag. It is too glutinous to run through filtering paper.

2. Senna, rhubarb, and aniseed, of each, 2 lbs.; jalap and caraways, of each, 1 lb.; red sanders wood, ½ lb.; brown sugar, 7 lbs.; proof spirit, 10 galls.; as the last.

3. Senna, 56 lbs.; aniseed, 7 lbs.; rhubarb (East India), 14 lbs.; coriander seed, 6 lbs.; caraway seed and red sanders wood, of each, 5 lbs.; cassia bark and jalap, of each, 3 lbs.; proof spirit, 100 galls.; digest for 14 days, press, strain, and add molasses, 84 lbs.; mix well, and either clarify or strain through flannel.

4. For proof spirit in the last two formulæ, equal parts of spirit of wine and water are employed by the smaller houses.

5. (Redwood.) Senna, ½ lb.; aniseed, caraways, and jalap, of each, 1 oz. 2 drs.; juniper berries, 2½ oz.; proof spirit, 6 pints; macerate for 14 days, then add of treacle, 10½ oz.; water, 1 lb. 5 oz.; mix and strain.

6. (Dicey's.) Senna, 1 lb.; guaiacum shavings, elecampane root (dried), aniseed, caraway seed, coriander seed, and liquorice root, of each, ½ lb.; stoned raisins, 2 lbs.; proof spirit or brandy, 9 quarts; macerate for 10 days.

7. (Swinton's.) Senna, 1 lb.; jalap, 3 lbs.; coriander seed, caraway seed, liquorice root, and elecampane root, of each, 4 oz.; moist sugar, 2 lbs.; rectified spirit of wine and water, of each, 1 gal.; as the last.

Obs. Daffy's elixir is a favorite purge with drunkards, and is a common and very popular remedy in flatulent colic, dyspepsia, diarrhœa, &c.—*Dose.* 1 to 4 table-spoonfuls, or more.

Elixir, Devil's. *Syn.* ELIXIR CAPSICI COMPOSITUM, L. *Prep.* From pods of capsicum, and cloves (bruised), of each, 1 oz.; ginger and saffron, of each, 3 oz.; cantharides, 5 drs.; proof spirit, 7 lbs.; digest for 10 days.—*Dose.* ½ dr. to 3 drs., in mixtures. It is stimulating, anti-choleraic, and aphrodisiac.

Elixir of Garlic. *Syn.* ELIXIR ALLII, L. *Prep.* From garlic roots (bruised), 80 in no.; rectified spirit, 1 pint; digest, distil to dryness, and repeat the process with the same spirit from fresh roots, a second and a third time; lastly, add camphor, 2 dr. Diaphoretic and pectoral.—*Dose.* A teaspoonful, twice a day; in asthma, old coughs, diarrhœa from debility, &c.

Elixir, Garus's. *Syn.* ELIXIR GARI, L.; ELIXIR DE GARUS, Fr. *Prep.* 1. Myrrh, 1 oz.; aloes and saffron, of each, ½ oz.; cinnamon, cloves, and nutmeg, of each, 1 dr.; proof spirit, 1 quart; digest a week, add water, 5 fl. oz., and distil over 1 quart; to the distillate (ALCOOLAT DE GARUS) add of syrup of maidenhair, 2 lbs.; orange-flower water, 1½ fl. oz.

2. (Foy.) Compound tincture of saffron, 8 pints; syrup of maidenhair, 10 pints; mix; add caramel, q. s. to colour, dissolved in orange-flower water, ½ pint.

3. (P. Cod.) Aloes and saffron, of each, 1 oz.; myrrh, cinnamon, and cloves, of each, ½ oz.; nutmeg, ½ dr.; proof spirit, 12 pints; orange-flower water, 16 fl. oz.; macerate 2 days, distil 6 pints, and add to the distillate (ALCOOLAT DE GARUS), of syrup of capillaire, 7½ pints; and colour with saffron, q. s.

4. (Soubeiran.) Socotrine aloes and saffron, of each, 1 oz.; myrrh, canella alba, citron, and nutmegs, of each, ½ oz.; spirit (sp. gr. ·923), 20 lbs.; orange-flower water, 16 fl. oz.; macerate as last, distil 10 lbs., and add to the distillate (ALCOOLAT LE GARUS), of syrup of capillaire, 12½ lbs.; orange-flower water, 8 fl. oz.; with saffron q. s. to colour.

5. (Thierry.) Aloes, myrrh, and saffron, of each, 2 drs.; nutmeg, 4 drs.; canella alba and cloves, of each, 1 oz.; spirit (·864), 13 lbs.; draw over 12 lbs. of 'alcoolat;' add to the residue of the distillation, rose water, 10 lbs.; distil 6 lbs., and add as much of this aromatic water to the alcoolat as will raise its sp. gr. to ·890. Then to every 11 lbs. of the above mixed liquor, add of simple syrup, 15 lbs.; tincture of vanilla and orange peel, of each, 2½ fl. oz.; fresh milk (skimmed), 1 lb.; and tincture

of saffron, q. s. to colour; digest with agitation for two days, and filter. *Used* as a stomachic, carminative, and stimulant, in doses of a wine-glassful. That prepared without distillation forms an excellent stomachic purge. With the exception of that from the 2nd formula, the products may be regarded as agreeable cordial liquors, rather than medicines. It is much employed on the Continent.

Elixir of Gold. *Syn.* ELIXIR AURII, L.; ELIXIR D'OR, Fr. *Prep.* 1. De la Motte's Golden Drops.

2. Terchloride of gold, 20 grs.; rectified spirit, 6 fl. drs.; ether, 3 fl. drs.; dissolve.—*Dose.* 5 to 15 drops, taken in distilled water; in gout, scrofula, nervous diseases, cancer, indurated glands, secondary syphilis, &c. This last preparation is often confounded with the *gouttes d'or du Général de la Motte*; but the two are evidently distinct articles. See DROPS.

Elixir, Haller's. See ACID ELIXIR (*above*).

Elixir, Hoffman's Visceral. *Syn.* ELIXIR HOFFMANNI, E. H. VISCERALE, L. *Prep.* 1. As ELIXIR OF ORANGE-PEEL,—Ph. Bor. 1847.

2. Thin outside peel of orange (dried), myrrh, and centaury, of each, 2 drs.; extracts of carduus benedictus, cascarilla, and gentian, of each, 1 dr.; white wine (sherry), 1 quart. Aromatic and stomachic.—*Dose.* A dessert-spoonful, or more.

Elixir of Ipecac'uanha. *Syn.* ELIXIR IPECACUANHÆ, L. *Prep.* (Cadet.) Powdered ipecacuanha and balsam of tolu, of each, 4 drs.; flowers of benzoin, opium, and saffron, of each, 2 drs.; oil of aniseed, 1 dr.; camphor, 40 grs.; alcohol (rectified spirit), 1½ pint; digest a week, and filter.—*Dose.* 1 to 2 drs., as a stimulant, diaphoretic, expectorant, and stomachic; in chronic coughs, asthmas, and old colds, and in certain forms of deficient appetite, dyspepsia, diarrhœa, &c.

Elixir of Jal'ap. *Syn.* ELIXIR JALAPÆ COMPOSITUM, L. *Prep.* From jalap, 4 oz.; scammony, 4 drs.; gamboge, 2 drs.; proof spirit, 1 quart.—*Dose.* ½ dr. to 3 drs., as a purgative; especially in worms.

Elixir, Lettsom's. *Prep.* (Augustin.) Oil of aniseed, 1 dr.; camphor, 1½ dr.; benzoic acid, opium, and saffron, of each, 2 drs.; ipecacuanha and balsam of tolu, of each, 4 drs.; rectified spirit, 2 lbs.; digest 10 days, and filter.—*Dose.* 5 to 15 drops for a child; ½ to 1 teaspoonful, for an adult; in ordinary coughs, hooping-cough, &c.

Elixir, Live-long. *Syn.* ELIXIR OF LONG LIFE; E. LONGÆ VITÆ, L. *Prep.* 1. See TINCTURE OF RHUBARB AND ALOES.

2. (ELIXIR VITÆ MATTHIOLI.) A mixture of several aromatics and stimulants, made with rectified spirit.

Elixir of Myrrh. *Syn.* ELIXIR MYRRHÆ, L. See TINCTURE OF SAVINE (Comp.),—Ph. L. 1788.

Elixir d'Or. See ELIXIR OF GOLD.

Elixir of Or'ange Peel. *Syn.* ELIXIR AURANTIORUM COMPOSITUM, L. *Prep.* 1. (Ph. Bor. 1847.) Orange peel, 6 oz.; cinnamon, 2 oz.; carbonate of potassa, 1 oz.; Madeira wine, 4 lbs.; macerate 6 days, express the tincture, and add of extracts of buckbean, cascarilla, gentian, and wormwood, of each, 1 oz.; dissolve, and after repose for subsidence, decant and filter. An excellent aromatic bitter and stomachic.

2. (Moscati.) Orange peel, 1 oz.; cascarilla, ½ oz.; waters of citron peel and wormwood, and rectified spirit, of each, ½ pint; digest a week. Resembles the last.—*Dose* (of either). A table-spoonful to a wine-glassful.

Elixir, Paregor'ic. *Syn.* ELIXIR PAREGORICUM, L. See TINCTURE OF CAMPHOR (Comp.).

Elixir, Paregoric (Scotch). *Syn.* ELIXIR PAREGORICUM SCOTICUM, L. See TINCTURE OF OPIUM (Ammoniated).

Elixir, Pec'toral. *Syn.* ELIXIR PECTORALE, L. (Ph. E. 1745) Balsam of tolu, 2 oz.; gum benzoin, 1½ oz.; saffron, ½ oz.; rectified spirit, 32 fl. oz.; digest in a gentle heat for 4 days, and filter.—*Dose.* ½ to 1 teaspoonful. (See *above*.)

Elixir, Pol'ychrest. *Syn.* ELIXIR POLYCHRESTON, L. *Prep.* (Ph. E. 1745.) Guaiacum (gum), 6 oz.; balsam of Peru, ½ oz.; rectified spirit, 23 fl. oz.; digest as last, strain, and add oil of sassafras, 2 fl. drs. Pectoral and anti-rheumatic.—*Dose.* 10 to 60 drops, or more.

Elixir, Paracelsus's. See ELIXIR PROPRIETATIS (*below*).

Elixir Proprieta'tis. [L.] *Syn.* PARACELSUS'S ELIXIR OF PROPRIETY; ELIXIR DE PROPRIÉTÉ DE PARACELSE, Fr. An old preparation, nearly corresponding to the compound tincture of aloes of modern pharmacy, and which is now sold for it. *Prep.* 1. (Soubeiran.) Tincture of myrrh, 4 oz.; tinctures of aloes and saffron, of each, 3 oz. ('Trait. Pharm.' 1847.)

2. (ELIXIR PROPRIETATIS CUM ACIDO.)—*a.* The last, slightly acidulated with oil of vitriol, and filtered.

b.—Ph. Bor. 1847.—Aloes and myrrh, of each, 2 oz.; saffron, 1 oz.; spirit (sp. gr. ·900), 2 lbs.; dilute sulphuric acid (1 to 5), 2 oz.; macerate 4 days, and filter.

3. (ELIXIR PROPRIETATIS TARTARIZATUM; E. P. ALKALIZATUM.) From elixir proprietatis, alkalised with salt of tartar, and filtered. The last two are old preparations, now seldon inquired for in this country, except in places remote from London.

Elixir, Radcliffe's. *Prep.* 1. From socotrine aloes, 6 drs.; rhubarb, 1 dr.; cinnamon (cassia), cochineal, and zedoary root, of each, ½ dr.; syrup of buckthorn, 2 fl. oz.; brandy, 1¼ pint; digest 10 days, and strain.

2. As the last, but substituting proof spirit, 1 pint, and water, ½ pint, for the brandy. Aromatic, stomachic, and aperient.—*Dose.* 1 to 4 drs.; in similar cases to those in which 'DAFFY'S ELIXIR' is taken.

Elixir of Ro'ses. *Syn.* ELIXIR ROSÆ, L.

Prep. 1. Eau de rose, 2 fl. oz.; spirits of horseradish and scurvy grass, of each, 1 fl. oz.; otto of roses, 3 drops; camphor and cochineal (both in powder), 12 grs.; powdered sugar-candy, ½ oz.; digest, with frequent agitation, for a week, and after repose decant the clear, and strain through a piece of muslin. *Used* as an elegant application in scurvy of the gums, and also to perfume the breath.

2. (Beasley.) Cinnamon, 3 oz.; ginger, 2 oz.; cloves, 1 dr.; essence of peppermint, 1 oz.; oil of orange peel, 1 dr.; otto of roses, 15 (? 25) drops; rectified spirit, 2½ pints; digest 15 days, and filter. *Used* as a tooth cosmetic.

Elixir Sa'crum. Tincture of aloes and rhubarb.

Elixir Salu'tis. *Syn.* ELIXIR OF HEALTH. The compound tincture of senna of old pharmacy. See DAFFY'S ELIXIR.

Elixir of Scam'mony. *Syn.* ELIXIR SCAMMONII, L. *Prep.* (Guibourt.) Scammony (pure), 2 drs.; proof spirit, 8 fl. oz.; mix in a suitable vessel, apply heat, set the spirit on fire, and add of sugar, 4 oz.; when the whole is dissolved (melted down), extinguish the flame, and further add of syrup of violets, 2 fl. oz.; mix well, and after sufficient repose decant the clear portion from the dregs. The product should be 12 oz., containing 12 grs. of scammony per oz.—*Dose.* 1 to 2 dessert-spoonfuls in milk or aromatised water; or made into an emulsion with aromatics; in worms, &c.

Elixir, Squire's. *Prep.* 1. (Original Formula.) Aurum musivum, 3 oz.; opium, 2 oz.; camphor, 1 oz.; cochineal, ½ oz.; sweet fennel, ¼ oz.; tincture of serpentary, 1 pint (old meas.); spirit of aniseed, 1 gal. (old meas.); sugar, 1 lb.; dissolved in water, 1 pint (old meas.); digest 10 days, and filter.

2. Powdered opium, 2 oz.; ginger, red sanders wood, and camphor, of each, 1 oz.; oil of aniseed, ½ oz.; oil of sweet fennel, ½ dr.; tincture of serpentary, 1 pint; proof spirit, 5 pints; water, 1 quart; as last. Stimulant, anodyne, diaphoretic, and pectoral.—*Dose.* 1 to 2 teaspoonfuls; in chest affections, nervous headaches, &c., in the absence of inflammatory symptoms.

Elixir, Stomach'ic. Compound tincture of gentian was formerly so called.

Elixir, Stoughton's. *Prep.* 1. Raisins (stoned and bruised), 1 lb.; gentian root, ¾ lb.; dried orange peel, 6 oz.; serpentary, ½ lb.; calamus aromaticus, 1½ oz.; cardamoms, ½ oz.; sugar colouring, ½ pint; brandy or proof spirit, 2 galls.; digest a week, and strain.

2. Tincture of gentian (compound), and brandy or proof spirit, of each, 1 quart; tincture of serpentary and syrup of saffron, of each, 1 pint; tinctures of aloes and rhubarb, of each, ½ pint; bitter almonds (bruised), 8 in no.; digest as before.

3. (Foy.) Aloes and cascarilla, of each, 1 dr.; rhubarb, 4 drs.; gentian, germander, dried orange peel, and wormwood, of each, 6 drs.; rectified spirit, 32 fl. oz.; as before. Stimulant, tonic, and stomachic.—*Dose.* 20 drops to a teaspoonful.

Elixir, Ton'ic. *Syn.* ELIXIR ROBORANS. See TINCTURE OF CROWN BARK (Comp.,—Ph. Bor. 1847).

Elixir, Tooth. *Syn.* ELIXIR DENTIFRICUM, L. *Prep.* 1. (Lefandinière's.) Guaiacum raspings and cloves, of each, 1 oz.; pellitory of Spain and nutmeg, of each, 2 drs.; oil of rosemary, 20 drops; bergamotte, 10 or 12 drops; brandy, 1 quart; macerate a fortnight, and filter.

2. Cinnamon, cloves, and nutmeg, of each, 1 dr.; vanilla, ½ dr.; camphor, 10 grs.; tincture of pellitory, 2 fl. oz.; brandy or proof spirit, ½ pint; digest as before. See ANTISCORBUTIC and ROSE ELIXIRS (*above*).

Elixir, Vis'ceral. *Syn.* ELIXIR VISCERALE, L. See BOERHAAVE'S and HOFFMAN'S ELIXIRS (*above*).

Elixir of Vit'riol. 1. The old name for aromatic SULPHURIC ACID (which *see*).

2. (Mynsicht's.) See TINCTURE (Acid Aromatic).

3. (Scourer's.) Dilute sulphuric acid (1 to 5). *Used* to scour metals.

4. (SWEET E. OF V.; E. VITRIOLI DULCI, L.) The old name for aromatic SPIRIT OF ETHER (which *see*).

5. (Virgani's.) *Prep.* From spirit of sulphuric ether, 2 lbs.; aromatic tincture, 3 lbs.

Elixir, Woroneje. Capsicum, 1 oz.; nitre, ½ oz.; sal-ammoniac, 2 drs.; nitro-hydrochloric acid, 2 fl. drs.; vinegar, 1½ pint; native white or rose naphtha, or petroleum, 1½ fl. dr.; olive oil, 1 fl. oz.; oil of peppermint (Mitcham), 15 fl. oz.; strongest rectified spirit, 6 quarts; digest 12 days, with constant agitation, and filter.—*Dose.* 2 teaspoonfuls, every 15 minutes; in cholera, diarrhœa, &c.

ELLAGIC ACID. $HC_7H_2O_4$. Aq. When an aqueous infusion of nut-galls is left for some time exposed to the atmosphere, the tannic acid gradually disappears, and is replaced by gallic acid, and an insoluble gray powder, to which the term ellagic acid was applied by Chevreul. It is soluble in alkalies, forming salts, and is precipitated by acids.

ELM. *Syn.* ULMUS, L. A genus of trees forming the type of the natural order *Ulmaceæ*. The interior bark of the *Ulmus campestris*, or *common small-leaved elm* (*Ulmi cortex*), is officinal in B. P. This substance is demulcent, diaphoretic, and diuretic, and slightly febrifuge, astringent, and tonic. It has been employed in agues, and as a substitute for sarsaparilla in cutaneous eruptions, but is now little used. The *leaves* of the elm tree are reported to be vulnerary. See DECOCTION and ULMINE.

ELUTRIA'TION. Cleansing by washing. The term is commonly applied to the operation of washing insoluble powders with water, to separate them from foreign matter, or the coarser portion. It is usually performed by

grinding or triturating the mass with a little water, until reduced to a very fine powder, and this paste is suddenly diffused through a large quantity of water, contained in a deep vessel, from which, after the subsidence of the grosser portion, the liquid is poured into another vessel, and allowed to deposit the fine powder it still holds in suspension. When this has taken place, the clear supernatant liquor is decanted, and the sediment drained and dried. The coarse sediment deposited in the first vessel is now submitted to a fresh grinding and diffusion through water, and the entire operation is repeated, until the whole of the pulverisable portion is washed over. The proper length of time for the liquid to remain in the first vessel depends solely on the density of the powder and the degree of fineness required in the product; heavy powders subsiding almost immediately, while light ones often take several minutes to deposit the coarser portion. Sometimes three or more vessels are employed, and the muddy liquor, after remaining a short time in the first, is poured into the next one, and this, in a short time longer, into the third, and so on, until the last vessel is filled, by which means powders of different degrees of fineness are obtained, that deposited in the last vessel being in the minutest state of division. The elutriated paste or moist powder is then drained, and dried. On the small scale, the trituration is performed with a stone and muller, or in a mortar; on the large scale, in a mill, driven by either horse or steam power. Antimony, chalk, bistre, and other pigments, as well as various other substances insoluble in or unacted on by water, are commonly obtained in the state of an impalpable powder by elutriation, or 'washing over,' as it is called by amateurs and operatives.

ELYDOR'IC PAINTING. A method of painting invented by M. Vincent, of Montpetit, in which the pigments are mixed up with an emulsion of oil and water. It is said to add the fresh appearance of water colours, and the finish of miniature painting, to the mellowness of oil colours.

EMBALM'ING. *Syn.* MUMMIFICATION. The preservation of the dead bodies of animals. See MUMMY and PUTREFACTION.

EMBOS'SING. The formation of ornamental figures in relief on *cloth*, *leather*, *paper*, and *wood*, has now been brought to such perfection, as to place this species of decoration within the reach of almost every class of society. EMBOSSED CLOTH and PAPER are now employed by the bookbinder to cover even the low-priced volumes that pass through his hands; whilst the EMBOSSED LEATHER that encloses the album or ornaments our furniture, frequently bears the richest patterns of the arabesque or moresque. *Cloth* and *paper* are usually embossed by machinery; *leather* and *wood*, more frequently by hand labour.

EMBROCA'TION. *Syn.* EMBROCATIO, L. A fluid medicine for external and local use. Embrocations do not differ, materially, from liniments and lotions, and are applied in the same manner. (See those preparations, and *below*.)

Embrocation, Guestonian. *Syn.* EMBROCATIO TEREBINTHINÆ CUM ACIDO, L. *Prep.* (Dr. Paris.) Oil of turpentine and olive oil, of each, 1½ oz.; dilute sulphuric acid, 3 fl. drs.; agitate together until mixed. *Used* in rheumatism, &c.

Embrocation, Lynch's. Olive oil (coloured with alkanet root), 5 fl. oz.; oils of amber, rosemary, and turpentine, of each, 1 dr. In bruises, rheumatism, &c.

Embrocation, Roche's. *Prep.* 1. (Dr. Paris.) Olive oil, mixed with half its weight of the oils of cloves and amber.

2. Olive oil, 2 oz.; oil of amber, 1 oz.; oils of cloves and lemons, of each, 1 dr. For hooping-cough.

Embrocation, Ward's. See ESSENCE.

EMBROID'ERY. Gold and silver fancy work of this description may be cleaned with a little spirit of wine, either alone or diluted with an equal weight of water. Gin is frequently used for the same purpose. The common practice of using alkaline or acid liquors is very injurious, and frequently destroys the beauty of the articles instead of cleaning them.

EM'ERALD. *Syn.* SMARAGDUS; EMERAUDE, Fr. This beautiful deep-green gem ranks next to the diamond in value. The finest are brought from Peru, but fair varieties are found in Bavaria, Siberia, and India. A fine emerald weighing 4 or 5 grs. is worth as many pounds; one of 10 grs., about £2 per gr.; one of 15 grs., £3 to £4 per gr.; and so on in proportion to the increase in size. One of 24 gr., if of pure water, is worth about £100. According to the analysis of Vauquelin, the purest specimens consist of 65 parts silica, 14 alumina, 13 glucina, 2·56 lime, and 3·50 oxide of chromium, to which last the gem owes its rich green colour. See BERYL, GEMS, PASTES, &c.

Emerald Green. See GREEN PIGMENTS.

EMERY is an impure, amorphous, compact, and opaque variety of corundum, and consists of alumina, with a small per-centage of silica and peroxide of iron. It occurs in Spain, the isles of Greece, and other localities, and derives its name from Cape Emeri, in the island of Naxos. Its hardness is so great, that it scratches and wears down nearly all minerals except the diamond; hence the use of its powder for cutting and polishing glass and various other hard substances. For commercial purposes, the lumps of emery, as taken from the mine, are broken into pieces about the size of a hen's egg, which are then crushed under stampers, similar to those used for pounding metallic ores. The coarse powder is then sifted through sieves covered with wire-cloth of different degrees of fineness, by which

it is sorted into different sizes. In this state it forms the emery of the shops, or flour emery. For delicate purposes, it is afterwards prepared by elutriation.

Emery Cakes are formed by melting emery flour with a little bees' wax, and after thorough admixture, forming it into solid lumps of suitable sizes. *Used* to dress the edges of buff and glaze wheels.

Emery Cloth is prepared by brushing the surface of thin cotton cloth over with liquid glue, and sifting the emery powder over the surface while still warm.

Emery Paper is made in the same way as emery cloth. Both are used either with or without oil, in the same way as glass paper.

Emery Sticks are made of pieces of wood in the same way, and are used for the same purposes, as emery paper.

Emery Stones are formed of emery, of the requisite coarseness, mixed with about half its weight of good Stourbridge loam, and water q. s. to make a stiff paste, which is forced into metallic moulds by a powerful press. The pieces, when thoroughly dry, are exposed in a muffle for a short time to a temperature just under a full white heat. In this way 'discs' and 'laps' are generally made. For 'wheels,' only $\frac{1}{4}$th of loam is used. Another method, applicable for 'cutting-stones' generally, is to press the flour emery, previously moistened with water, into moulds, with strong pressure, as before, without any other addition, and then to fire it at nearly a full white heat.

EMETIA. *Syn.* EMETIN, EMETINA. A feebly basic or alkaloidal body, existing in and forming the active principle of ipecacuanha.

Prep. 1. (Medicinal—EMETIC EXTRACT.)—*a.* Ipecacuanha (in coarse powder) is digested first in ether, and then in rectified spirit for 3 or 4 days; the alcoholic tincture is next expressed and evaporated (distilled) to dryness; the residuum is dissolved in distilled water, and the solution precipitated with acetate of lead; the precipitate is then diffused through distilled water, in a tall glass vessel, and sulphuretted hydrogen is passed through it, to throw down the lead; after which the liquor is decanted, filtered, evaporated to the consistence of a thick syrup, and spread in a thin layer on warm plates of glass, and allowed to dry in a current of warm air, or by a gentle heat in a stove. The maceration in ether is frequently omitted.

b. Ipecacuanha, 1 part; rectified spirit (·835), 7 parts; make a tincture, distil off the spirit, dissolve in cold distilled water, 5 parts; filter the solution, and evaporate, &c., as before. Inferior to the last.

c. (P. Cod.) As the last, nearly.

Obs. Medicinal or impure emetia is brownish red, deliquescent, and emetic in doses of $\frac{1}{4}$ to $\frac{1}{2}$ gr.

2. (Pure.)—*a.* Ipecacuanha (in coarse powder), 1 part, is digested for 24 hours in distilled water, 10 parts; together with calcined magnesia, added in slight excess; the deposit is then thrown on a filter, washed carefully with very cold water, and dried; it is next dissolved in rectified spirit and neutralised with dilute sulphuric acid; the filtered solution is decoloured with animal charcoal, again filtered, and again precipitated by digestion with magnesia; the last deposit forms a colourless solution with rectified spirit, which, by gentle evaporation, gives up its emetia as a yellowish-white pulverulent mass, which may be rendered perfectly white by redissolving it in alcohol, &c., as before. The process is rendered easier by first digesting the powdered ipecacuanha in ether.

b. (P. Cod.) Alcoholic extract of ipecacuanha, 1 part; water, 10 parts; dissolve, filter; add calcined magnesia, 1 part; evaporate to dryness, wash the product on a filter with very cold water, 5 parts; dry it again, and dissolve it in boiling alcohol; evaporate the filtered tincture to dryness, redissolve the residuum in a little water, acidulate (slightly) with dilute sulphuric acid, decolour with animal charcoal, filter, precipitate with liquor of ammonia, and dry the precipitate by a gentle heat.

c. (Ph. Suec. 1845.) Powdered ipecacuanha, 1 part; water acidulated with sulphuric acid, 6 parts; digest, filter; add lime, 1 part, and evaporate to dryness over a water bath; the residuum is then exhausted with boiling rectified spirit, and otherwise treated as in the last formula.

Prop., &c. Pure emetia is white, pulverulent, inodorous, and bitter; fusible at 122° Fahr.; very soluble in alcohol and boiling water, but only slightly so in ether, oils, and cold water. It restores the blue colour of reddened litmus, and partially neutralises the acids, forming scarcely crystallisable salts. It is reddened by nitric acid, and this red colour is deepened by ammonia. Tincture of iodine produces a reddish precipitate in an alcoholic solution of emetia. With tincture of galls this solution behaves like morphia; but, unlike the last substance, the salts of iron produce no change of colour in it. These reactions, combined with its emetic properties, are sufficient for its identification.—*Dose.* White and pure emetia is emetic in doses of $\frac{1}{20}$ to $\frac{1}{10}$ gr. The large doses ordered in certain pharmaceutical compilations, evidently in error of the difference between the strengths of the pure and the impure or medicinal emetia, have, in several cases which have been reported on, produced very serious consequences.

EMETICS. *Syn.* VOMITS, ANACATHARTICS; ANACATHARTICA, EMETICA, VOMITORIA, L. Medicines which induce vomiting. The principal emetics are ipecacuanha and tartarised antimony, and their preparations; and the sulphates of zinc and copper. Of these the first is commonly employed either in substance or infused in wine (ipecacuanha wine), when it is merely wished to evacuate the contents of the stomach, when that organ is in a dis-

ordered state or overloaded with food; and is the one most adapted, in ordinary cases, for children and females. Tartar emetic (tartarated antimony) (dissolved in water) and antimonial wine, either alone or combined with ipecacuanha, are preferable at the commencement of fevers and other inflammatory disorders, in consequence of the nausea, relaxation, and depression of the muscular power and circulation which commonly follow their use. When poison has been taken, sulphate of zinc is generally preferred as an emetic, on account of the promptness and completeness of its action, and its effects ceasing as soon as it is ejected from the stomach. Sulphate of copper is employed in the same cases as sulphate of zinc, but its action is more violent and disagreeable, whilst its intense metallic taste is a great objection to its use. 25 to 30 grs. of either of the above sulphates are dissolved in 3 or 4 fl. oz. of warm water, and a fourth of the solution is given every ten minutes, until copious vomiting ensues. In the absence of other substances, when an immediate emetic is required, a teaspoonful of flour of mustard (an article always at hand), stirred up with half a pint of warm water, and drank at a draught, will generally act easily and effectively, and relieve the stomach before other remedies can be obtained and applied.

The operation of emetics is powerfully promoted by drinking copiously of diluents, especially of warm or tepid water. The latter, in fact, is itself an emetic, when taken in quantity. Its use will also prevent that dreadful straining and retching, which make emetics so much dreaded by the nervous and delicate.

The timely administration of an emetic at the commencement of fevers and other inflammatory affections, will frequently cause copious diaphoresis, and produce a cure, or at least greatly mitigate the severity of the symptoms. Dropsies have also been cured by vomiting; and swelled testicle, bubo, and other glandular swellings, have occasionally been dispersed by the action of emetics. Visceral obstructions, in both sexes, have also yielded to the same treatment. Small and repeated doses of emetics are frequently administered, with advantage, to produce nausea, in many diseases of the lungs and stomach. Certain chronic and obstinate diseases, as rheumatism and asthma, are sometimes relieved by emetics, when every other line of treatment has failed.

Emetics should be avoided in plethoric habits, in hernia, pregnancy, and whenever visceral inflammation is suspected. They should also be given with great caution to young children and females, and to the nervous and delicate. In such cases, wine or powder of ipecacuanha should alone be employed.

Emetic Cups. *Syn.* ANTIMONIAL CUPS; POCULA EMETICA, CALICES VOMITORII, L. Small cups made of metallic antimony. Wine left in them for 10 or 12 hours becomes emetic.

Emetic Tartar. See ANTIMONY, TARTARATED.

EM'ETINE. See EMETIA.

EMMEN'AGOGUES. *Syn.* EMMENAGOGA, L. Medicines which are considered to have the power of promoting the menstrual discharge when either retained or suspended. There are, probably, few remedies which exert this specific power on the uterus, the majority of repeated emmenagogues acting rather by their influence on the system generally, or on parts contiguous to the uterus, than in the uterus itself. Among the substances usually arranged under this class are—aloes, black hellebore, birthwort, borax, cubebs, ergot, gamboge, gin, iodide of potassium, iodine, madder, mercurials, the peppers, rue, savine, stimulants (generally), stimulating diuretics, stinking goosefoot, stinking orache, wine, &c.

Of the above, ergot and madder are the only articles which exercise a direct power on the uterus, and that rather in increasing its expulsive energy than in promoting the menstrual function, though they are advantageously employed for the latter purpose. Several of the other substances named are drastic purgatives, or possess cerebro-spinal properties, or local powers of irritation, by which they increase the pelvic circulation, or produce excitement in the neighbouring parts, in many cases of a dangerous and irreparable character. Hence many writers on pharmacology deny the existence of emmenagogues.

To ensure the successful administration of this class of medicines, the system must be previously prepared for their use by invigorating it, if there is either relaxation or debility; and an opposite course should be pursued when there is an undue degree of arterial action. In the majority of cases, the restoration of the discharge is rather attributable to a proper regulation of the system than to any specific power in the medicine administered.

EMOLLIENTS. *Syn.* EMOLLIENTIA, L. In *pharmacy* and *therapeutics*, demulcents of an oleaginous, saponaceous, or emulsive character, applied to surfaces (generally external), to soften and relax their fibres. See DEMULCENTS.

EMUL'SIN. *Syn.* SYNAPTASE. An azotised substance, forming a large proportion of the white pulp of both bitter and sweet almonds. It is yellowish-white, soluble in cold water, and coagulated by heat and alcohol. Its most remarkable property is its action on amygdalin, by which the volatile oil of almonds and hydrocyanic acid, with other products, are formed. It has never been obtained in a state of purity.

EMUL'SION. *Syn.* EMULSIO, L. A milky fluid, formed by the mechanical admixture of oil and water, by means of some other substance that possesses the power of combining

with both. The emulsions of the Pharmacopœia are in the 'British Pharmacopœia' included in the class *Misturæ* (which *see*).

In the preparation of emulsions, the oily or resinous ingredients are usually suspended by means of mucilage of gum arabic, almonds, or yolk of egg. 1 dr. of the first, made with equal parts of gum and water; 1 oz. of the second (usually 26 in number); and one in no. of the last, will form 2 drs. of any oil into an emulsion with about 1 oz. of water, gradually added. In some cases, instead of the above substances, a little liquor of potassa is employed, by which a saponaceous emulsion is formed. In all cases, the mucilage or other viscid substance should be put into the mortar before anything else. The oil or resinous matter may then be very gradually rubbed in, taking care not to add it more quickly than it can be subdued by the pestle; and if, during this part of the manipulation, the mixture should begin to assume a breaking or curdling appearance at the edges, a few drops of water must be immediately incorporated with it, before adding the remainder of the oil. From the want of this precaution, it is common for an emulsion suddenly to lose its tenacious consistence in the mortar, and it is then in vain to endeavour to restore it. After the oil is thoroughly incorporated, some care is requisite to avoid separating it again by too hasty an effusion of the water or other fluid of the mixture. If any alcoholic or acid liquid is to be added, it must be at the very end of the process. Indeed, the addition of an acid liquid, even a slightly acescent syrup, will often entirely destroy an emulsion. Mixtures of copaiba are frequently spoiled by the addition of spirit of nitric ether; a misfortune which might be avoided by first diluting it with one or two parts of water.

An excellent method of preparing emulsions of resins and gum-resins, is to put the article into a marble or wedgwood mortar, and to pour over it about 4 times its weight of rectified spirit, which is then to be ignited, and the mixture triturated until an equal consistence is obtained. The liquid is then to be added gradually, and the whole patiently triturated or shaken until cold. Yolk of egg or mucilage may be added to the fluid resin or gum-resin, if desired, as in the common method, but an excellent emulsion may be made without them.

The presence of soluble salts in an emulsion is apt to occasion the separation of the oleaginous portion. Spirit produces the same effect in those which are made with yolk or mucilage; and acids in those made with an alkali. The addition of these substances to emulsions should be therefore avoided as much as possible. Emulsions of wax, spermaceti, oil of turpentine, and balsam of copaiba, are the most readily and completely formed with yolk of egg. Volatile oils are more readily made into emulsions if mixed with an equal volume of some simple fixed oil, before proceeding to operate on them. Scammony is generally formed into an emulsion with milk; and resin of jalap, with almonds and water.

The following formulæ, for certain emulsions, are merely given here for examples. Various others will be found under MIXTURE, LOTION, WASH, &c.

Emulsion of Al'monds. *Syn.* MILK OF ALMONDS, ALMOND MIXTURE; EMULSIO AMYGDALÆ, MISTURA A., L. *Prep.* 1. Blanched almonds, 1 oz.; beat them to a smooth paste, add, gradually, water, ½ pint; and when the whole is thoroughly incorporated, strain through a piece of gauze.

2. As the last, adding sugar, 1 oz.; or syrup (either simple or flavoured), 1½ fl. oz. See EMULSION OF OIL OF ALMONDS (*below*).

Emulsion of Assafœt'ida. *Syn.* EMULSIO ASSAFŒTIDÆ, MISTURA A., L. *Prep.* (Duclow.) Assafœtida, 1 oz.; powdered gum, 2 oz.; oil of almonds, 3½ fl. oz.; water, 6 fl. oz. Antispasmodic.—*Dose.* 1 or 2 table-spoonfuls; in hysterical affections, &c.

Emulsion of Cam'phor. *Syn.* EMULSIO CAMPHORÆ, E. CAMPHORATA, MISTURA CAMPHORÆ (Ph. E.), L. *Prep.* 1. (Ph. Castr. Ruth. 1840.) Camphor, ½ dr.; triturate with milk, ½ fl. oz., gradually added; then further add of water, 7½ fl. oz.

2. (Ph. E.) Camphor, 20 grs.; lump sugar, ½ oz.; triturate together, and add of blanched almonds, ½ oz.; again triturate, then gradually add of water, 1 pint. Stimulant, antispasmodic, and diaphoretic.—*Dose.* 1 fl. oz. to 2 fl. oz.

Emulsion of Cas'tor Oil. *Syn.* EMULSIO OLEI RICINI, MISTURA O. R., L. *Prep.* 1. Castor oil, 1 oz.; thick mucilage, 1½ oz.; syrup of orange peel, 1 fl. oz.; water, 6 fl. oz.

2. As the last, but using milk instead of water.—*Dose.* One third; as an aperient for females who object to taking the unprepared oil.

Emulsion of Copai'ba. *Syn.* EMULSION OF CAPIVI; EMULSIO COPAIBÆ, MISTURA C., L. *Prep.* 1. Balsam of copaiba and syrup of orange peel, of each, 2 oz.; yolks of 5 eggs; milk, 14 fl. oz.

2. (Beral.) Copaiba and mucilage, of each, 2 oz.; water, 12 fl. oz.—*Dose.* ½ oz. to 1 oz., 2 or 3 times a day; where the use of copaiba is indicated.

Emulsion of Gum. *Syn.* EMULSIO ACACIÆ, MISTURA ACACIÆ (Ph. E.), L. *Prep.* From sweet almonds (blanched), 10 drs.; white sugar, 5 drs.; mucilage, 3 fl. oz.; water, 1 quart. Demulcent. In coughs, &c., *ad libitum.*

Emulsion of Oil of Almonds. *Syn.* EMULSIO OLEI AMYGDALÆ, L. *Prep.* From oil of almonds, 3 drs.; thick mucilage and simple syrup, of each, 5 drs.; rose water, 1 fl. oz.; distilled water, 3 or 4 fl. oz. An elegant and efficient substitute for almond milk. See EMULSION OF ALMONDS (*above*).

Emulsion of Peru'vian Balsam. *Syn.* EMULSIO BALSAMICA, E. BALSAMI PERUVIANI, L. *Prep.* 1. As emulsion of copaiba.

2. (Hosp. F.) Balsam of Peru, ½ oz.; oil of almonds, 6 drs.; powdered gum, 1 oz.; triturate together, and add, gradually, rose water, 4 fl. oz.—*Dose.* 1 or 2 table-spoonfuls; in old asthmas, chronic coughs, winter coughs, &c.

Emulsion of Scam'mony. *Syn.* EMULSIO SCAMMONII, MISTURA S. (Ph. E.), L. *Prep.* 1. (Ph. E.) Resin of scammony, 7 grs.; new milk, 3 fl. oz. For a dose.

2. (Planche.) Aleppo scammony, 7 grs.; sugar, 2 drs.; new milk, 3 fl. oz.; cherry-laurel water, 5 drops. For a dose. Purgative; in torpor of the intestines, dropsy, worms, &c. The formula of the Paris Codex is similar.

Emulsion of Spermace'ti. *Syn.* EMULSIO CETACEI, MISTURA C., L. *Prep.* As emulsion of wax. Demulcent.

Emulsion of Tur'pentine. *Syn.* EMULSIO TEREBINTHINÆ, MISTURA T., L. *Prep.* 1. Chio turpentine, 2 drs.; white sugar, 1 oz.; yolk of 1 egg; milk of almonds, 4 fl. oz. In gleets.—*Dose.* 2 table-spoonfuls, 3 or 4 times a day.

2. (Clossius.) Venice turpentine, 1½ dr.; yolk of 1 egg; peppermint water, 4½ fl. oz. (See *below*.)

Emulsion of Oil of Turpentine. *Syn.* EMULSIO OLEI TEREBINTHINÆ, MISTURA O. T., L. *Prep.* (Carmichael.) Rectified oil of turpentine, 1 fl. oz.; yolk of 2 eggs; emulsion of almonds, 4 fl. oz.; syrup of orange peel, 2 fl. oz.; spirit of lavender, 4 fl. drs.; oil of cinnamon, 5 or 6 drops.—*Dose.* 1 fl. oz., twice or thrice a day; in nephritic pains, and that variety of ophthalmia termed iriditis. (See *above*.)

Emulsion of Wax. *Syn.* EMULSIO CERÆ, E. CERÆ ALBÆ, MISTURA C., LAC C., L. *Prep.* (Guibourt.) White wax, 1 oz.; powdered gum, 1½ dr.; water, 24 fl. oz.; simple syrup, 4 fl. oz.; put the syrup and gum into a warm mortar, add the wax, and triturate with a warm pestle until united; then add the water (warm) gradually, and continue the agitation till the whole is quite cold. Demulcent. *Ad libitum*.

ENAM'EL. A species of vitreous varnish, coloured with metallic oxides, applied in a thin stratum to brightly polished metallic surfaces (copper or gold), on which it is fused by the flame of a lamp urged by the blowpipe, or by the heat of a small furnace.

The basis of all enamels is a highly transparent and fusible glass, called 'frit,' 'flux,' or 'paste,' which readily receives a colour on the addition of metallic oxides. It may be made by one or other of the following formulæ:—

Prep. 1. Red lead, 16 parts; calcined borax, 3 parts; powdered flint glass, 12 parts; powdered flints, 4 parts; fuse in a Hessian crucible for 12 hours, then pour it out into water, and reduce it to a powder in a biscuit-ware mortar.

2. Tin, 3 parts; lead, 10 parts; mix, calcine in an iron pot at a dull cherry-red heat, and scrape off the oxide as it forms, observing to obtain it quite free from undecomposed metal; then reduce it to fine powder by grinding and elutriation. In this state it is known among enamellers as 'flux' or 'calcine.' 4 parts of this 'calcine' are next mixed with an equal weight of pure sand or powdered flints, and 1 part of sea salt, or other alkaline matter; the mixture is then partially fused in a Hessian crucible, by which it undergoes semi-vitrification.

3. (Chaptal.) Lead and tin, equal parts; calcine as above, and take of the mixed oxides or 'calcine' and ground flints, of each, 1 part; pure carbonate of potash, 2 parts; and proceed as before.

4. (Wynn.) Flint glass, 3 oz.; red lead, 1 oz.; as last.

5. (Wynn.) Red lead, 18 parts; borax (not calcined), 11 parts; flint glass, 16 parts; as last.

6. (Wynn.) Powdered flints, 10 parts; nitre and white arsenic, of each, 1 part; as last.

Obs. The precise qualities of the products of the above processes depend greatly upon the duration and degree of heat employed. By increasing the quantity of sand, glass, or flux, the enamel is rendered more fusible, and the opacity and whiteness is increased by the addition of oxide of tin. The use of borax should be avoided, or it should be used sparingly, as it is apt to make the enamel effloresce and lose colour.

Enamel, Black. *Prep.* 1. Calcined iron (protoxide), 12 parts; oxide of cobalt, 1 part; mix, add an equal weight of white flux, and fuse, as before.

2. (Clouet.) Pure clay, 3 parts; protoxide of iron, 1 part. A fine black.

3. Peroxide of manganese, 3 parts; zaffre, 1 part; mix, and add it, as required, to white flux.

Enamel, Blue. *Prep.* 1. White 'frit' or 'flux,' coloured with oxide of cobalt.

2. Sand, red lead, and nitre, of each, 10 parts; flint glass or ground flints, 20 parts; oxide of cobalt, 1 part, more or less; depending on the desired depth of colour.

Enamel, Brown. *Prep.* 1. Manganese, 5 parts; red lead, 16 parts; flint powder, 8 parts; as before.

2. (Wynn.) Manganese, 9 parts; red lead, 34 parts; flint powder, 16 parts.

3. Red lead and calcined iron, of each, 1 part; antimony, litharge, and sand, of each 2 parts. To be added in any required proportion to white 'frit,' according to the colour desired. A little oxide of cobalt or zaffre is frequently added to alter the shade.

Enamel, Green. *Prep.* 1. 'Flux' or 'frit,' 2 lbs.; black oxide of copper, 1 oz.; as before.

2. As the last, but adding red oxide of iron, ½ dr. Less decisive.

3. Copper dust and litharge, of each, 2 oz.; nitre, 1 oz.; sand, 4 oz.; 'flux' or 'frit,' q. s.

4. From transparent 'frit,' any quantity; oxide of chromium, q. s. to colour. Colour superb; it will stand a great heat; in common hands, however, it frequently turns on the dead-leaf tinge.

5. Transparent 'flux,' 5 oz.; black oxide of copper, 20 to 40 grs.; oxide of chromium, 2 grs. Resembles the emerald.

6. From blue and yellow enamel mixed in the required proportions.

Enamel, Ol'ive. *Prep.* Blue enamel, 2 parts; black and yellow enamel, of each, 1 part. See BROWN ENAMEL.

Enamel, Or'ange. *Prep.* 1. Red lead, 12 parts; red sulphate of iron and oxide of antimony, of each, 1 part; flint powder, 3 parts; calcine together, powder, and melt with 'flux,' 50 parts.

2. (Wynn.) Red lead, 12 parts; oxide of antimony, 4 parts; flint powder, 3 parts; red sulphate of iron, 1 part; calcine, then add 'flux,' 5 parts, to every 2 parts of this mixture.

Enamel, Pur'ple. *Prep.* 1. 'Flux' or 'frit,' coloured with oxide of gold, purple precipitate of cassius, or peroxide of manganese.

2. Sulphur, nitre, green vitriol, antimony, and oxide of tin, of each, 1 lb.; red lead, 60 lbs.; mix, fuse, cool, powder, and add rose copper (red oxide), 19 oz.; zaffre, 1 oz.; crocus martis, 1½ oz.; borax, 3 oz.; and of a compound formed of gold, silver, and mercury, 1 lb.; fuse, stirring the melted mass with a copper rod all the time, then place it in crucibles, and submit them to the action of a reverberatory furnace for 24 hours. This is said to be the purple enamel used in the mosaic pictures in St. Peter's at Rome.

Enamel, Red. *Prep.* 1. 'Paste' or 'flux,' coloured with the red oxide or protoxide of copper. Should the colour pass into the green or brown, from the partial peroxidation of the copper, from the heat being raised too high, the red colour may be restored by the addition of any carbonaceous matter, as tallow, or charcoal.

2. By tinging the glass or 'flux' with the oxide or salts of gold, or with the purple precipitate of cassius. These substances produce shades of red, inclining to crimson or purple of the most exquisite hue. The enamel often comes from the fire quite colourless, and afterwards receives its rich hue at the lamp.

3. (Wynn.) Sulphate of iron (calcined dark), 1 part; a mixture of 6 parts of 'flux' (No. 5), and 1 of colcothar, 3 parts. Dark red.

4. (Wynn.) Red sulphate of iron, 2 parts; 'flux' (No. 1), 6 parts; white lead, 3 parts. Bright red.

Enamel, Rose-col'oured. *Prep.* Purple enamel (or its elements), 3 parts; 'flux,' 90 parts; mix, and add silver leaf or oxide of silver, 1 part, or less.

Enamel, Transpa"rent. The 'frit' or 'flux' described *above*.

Enamel, Vi'olet. *Prep.* 1. Purple enamel, 2 parts; red enamel (No. 2), 3 parts; 'frit,' 6 parts.

2. Saline or alkaline 'frit' or 'flux,' any quantity; peroxide of manganese, q. s. to colour. As the tint depends on the metal being at the maximum of oxidation, contact with oily or carbonaceous substances should be particularly avoided.

Enamel, White. *Prep.* 1. 'Calcine' (from 2 parts of tin and 1 part of lead), 1 part; fine crystal glass or 'frit,' 2 parts; manganese, a few grains; powder, mix, melt, and pour the fused mass into clean water; again powder, and fuse, and repeat the whole process 3 or 4 times, avoiding contamination with smoke, dirt, or oxide of iron. A fine dead white.

2. Washed diaphoretic antimony, 1 part; fine glass (free from lead), 3 parts; mix, and proceed as before. Very fine.

3. Lead, 30 parts; tin, 33 parts; calcine as before, then fuse 50 parts of this 'calcine' with an equal weight of flints, in powder, and 100 parts of salt of tartar. A fine dead white enamel.

Obs. For white enamel, the articles must be perfectly free from foreign admixture, as this would impart a colour. When well managed, either of the above forms will produce a paste that will rival the OPAL.

Enamel, Yel'low. Superior yellow enamels are less easily produced than those of most other colours; they require very little flux, and that mostly of a metallic nature. The following come highly recommended by experienced artists:—

Prep. 1. From 'frit' or 'flux,' fused with oxide of lead, and a little red oxide of iron.

2. Lead, tin ashes, litharge, antimony, and sand, of each, 1 oz.; nitre, 4 oz.; mix, fuse, and powder; and add the product to 'flax' or 'frit,' q. s.

3. White oxide of antimony, alum, and sal-ammoniac, of each, 1 part; pure carbonate of lead, 1 to 3 parts, or q. s. (all in powder); mix, and expose them to a heat sufficiently high to decompose the sal-ammoniac. *Used* as the last. Very bright coloured.

4. (Wynn.) Red lead, 8 oz.; oxide of antimony, and tin, calcined together, of each, 1 oz.; mix, and add of 'flux' (No. 5), 15 oz.; mix well and fuse.

5. Pure oxide of silver added to the metallic 'fluxes.' The salts of silver are also used, but are more difficult to manage. If a thin film of oxide of silver be spread over the surface of the enamel to be coloured, exposed to a moderate heat, then withdrawn, and the film of reduced silver on the surface removed, the part under will be found tinged of a fine yellow. (Clouet.)

ENCAU'STIC. See PAINTING (Encaustic).

ENE'MA. *Syn.* CLYSTER; EN'EMA (*pl.* ENEM'ATA), L. A medicine, usually liquid (sometimes gaseous), thrown into the rectum or lower bowels.

Clysters usually consist of some weak glutinous or mucilaginous fluid, to which the active ingredients are added; or a decoction or infusion is made of the medicaments, which is then used, either alone, or after the addition of a little gum, starch, or sugar. The proper vehicle for astringent vegetable matter, metallic salts, and the mineral acids, is pure water. Oleaginous and resinous substances are made into emulsions before being employed for enemas. In all cases the fluid is administered warm. The quantity of fluid forming a clyster, for an adult, may vary from ½ to ¾ pint; that for an infant within a month old, should be about 1 fl. oz.; for a child of one year, about 2½ fl. oz.; from one to seven years, from 3 or 4 fl. oz.; and from seven to twelve or fourteen, 6 or 7 fl. oz.; after that age to puberty, ½ pint may be employed.

The quantity or dose of the active ingredients in a clyster should be 4 or 5 times as great as that of the same medicines when taken by the mouth; as it is generally regarded that the susceptibility of the rectum is only ⅓th that of the stomach, and that to exert a like absorbent action it occupies 5 times as long as the latter viscus. The dose, and the interval between its repetition, should, therefore, be proportionately increased. Narcotics, as opium, tobacco, &c., should, however, be given in only twice or thrice the quantity that would be exhibited in the usual manner.

Enemata are usually administered by means of a syringe, bladder, or elastic bag, furnished with a rectum tube; but many ingenious and elegant pieces of mechanism, adapted for self-administration, are made by the instrument makers. Great care should be taken to avoid injuring the coats of the rectum by the use of a rough or improperly shaped pipe, or one that is too long. The extremity of the pipe or tube should also be perfectly smooth and well rounded (rather spherical than pointed), and in using it no force should be employed. A neglect of this point often produces very serious consequences, especially in young children.

Tobacco smoke may be administered by means of a double pair of bellows, supplied with air from a small funnel under which the herb is burning,—and gaseous matter, by connecting the rectum tube with a small gasometer, exerting a trifling pressure on the confined gas.

The number of substances employed in the preparation of enemata is very great. The following are some of them, arranged according to their effects:—

1. (Anodyne and Narcotic.) Opium, henbane, &c., are employed to allay spasms of the bowels, stomach, uterus, bladder, &c.

2. (Aperient or Cathartic.) Aloes, colocynth, senna, various purging salts, gruel, decoction of marshmallows, decoction of linseed, warm water, &c., are commonly employed to promote the peristaltic action of the bowels, or to destroy worms.

3. (Demulcent and Emollient.) Decoction of starch, gum, isinglass, glue, &c., either alone or combined with opium, are used to protect the coats of the intestines, and to allay irritation; and also to restrain diarrhœa, especially when combined with astringents, as logwood, catechu, or oak bark.

4. (Nutrient.) Animal jelly, soups, broths, milks, &c., are frequently used as injections to convey nourishment to the body.

5. (Sedative.) Tobacco infusion or smoke, and tartar emetic (in solution), are employed to relax the powers of the body, to remove spasms, depress the circulation, and to produce syncope.

Enemata or clysters are now very frequently employed in our large towns, especially among the higher classes; but a great prejudice exists among many persons against their use, arising from a fastidious and mistaken delicacy. The introduction of improved apparatus of late years, by which the administration of these remedies is attended with less difficulty and exposure than formerly, has removed much of the repugnance which previously existed.

Clysters are invaluable when it is necessary to evacuate the bowels as speedily as possible, and when the stomach will not bear the administration of a purgative by the mouth, as well as in cases requiring a direct medication of the lower bowels, as in dysentery, colic, &c. As a mere laxative, an injection of tepid water, milk-and-water, or water gruel, will generally be found sufficient. By the addition of 1 or 2 table-spoonfuls of common salt, Epsom salts, salad oil, or molasses, to this laxative enema, it will form an excellent purgative one, which will, in most cases, induce a full discharge. In all cases, the patient should be directed to retain the injection for as long a time as possible, and not to attempt to empty his bowels immediately after the reception of the medicine. "In irritation of the bladder, rectum, or uterus, an anodyne injection or enema often affords much relief. In diseases of the lower bowels, clysters are also of almost indispensable utility, as also in the dislodgment of ascarides seated in the rectum; nor are they less beneficial in those cases of sudden sinking of the powers of life where deglutition is impossible, and yet a prompt stimulating impression is requisite to save the patient; under such circumstances, clysters of some of the diffusible stimuli have proved of the greatest benefit."

The injection of large quantities of liquid matter into the bowels, as well as the constant use of clysters (even of warm water only), is deemed by the highest medical authorities to be injurious, and, occasionally, dangerous. The practice should not, therefore, be allowed to grow into a habit. The bowels continue

accustomed to a stimulant cease to act without one. The same remarks apply to aperients taken by the mouth.

The following formulæ embrace the whole of the enemas (ENEMATA) of the 'British Pharmacopœia,' as well as a few others in common use:—

Enema of Albu'men. *Syn.* ENEMA ALBUMINIS, L. *Prep.* (Ricord.) Infusion of linseed, 12 oz.; whites of 2 or 3 eggs; mix. In chronic diarrhœa, and as a nutrient clyster in debility from stomach diseases. The reason for rejecting the yolks of the eggs is not very obvious, as the preparation is much more effective with them.

Enema of Al'oes. *Syn.* ENEMA ALOÈS (B. P.), L. *Prep.* From aloes, 2 scrup.; carbonate of potassa, 15 grs.; mucilage of starch, ½ pint. In ascarides, atonic amenorrhœa, &c. It should not be employed when irritability of the rectum, bladder, or genitals, exists; nor in piles, or when there is a tendency to prolapsus ani or prolapsus uteri.

Enema, An'odyne. See ENEMA OF OPIUM.

Enema, Antispasmod'ic. *Syn.* ENEMA ANTISPASMODICUM, L. *Prep.* From tincture of assafœtida, 3 fl. drs.; laudanum, 30 to 60 drops; water gruel or barley water, ½ pint. In spasmodic affections of the bowels. (See *below*.)

Enema of Assafœt'ida. *Syn.* FETID CLYSTER, ANTISPASMODIC C.; ENEMA ASSAFŒTIDA (B. P.), E. FŒTIDUM (Ph. E. & D.), L. *Prep.* 1. (B. P.) Assafœtida, 30 grs.; water, 4 oz.; rub together until mixed.

2. (Ph. E.) To cathartic enema (Ph. E.), add of tincture of assafœtida, 2 fl. drs.

3. (Ph. D.) Warm water, 12 fl. oz.; tincture of assafœtida, 2 fl. drs.

4. (St. B. Hosp.) Assafœtida, 2 drs.; yolk of an egg; barley water, 7 fl. oz. Stimulant, antispasmodic, and carminative. An excellent remedy in hysteria, flatulent colic, hooping-cough, infantile convulsions, worms in the lower bowels, &c. See HOOPING-COUGH ENEMA.

Enema, Astrin"gent. *Syn.* ENEMA ASTRINGENS, L. *Prep.* 1. Tincture of catechu, 1 fl. oz.; barley water, 9 fl. oz.

2. Extract of rhatany, 2 drs.; syrup, or made starch, 2 oz.; water, 7 fl. oz.

3. Decoction of galls, oak-bark, pomegranate, or other like astringent substance, 3 or 4 fl. oz.; water or barley water, 6 or 7 fl. oz.

4. (Hosp. F.) Electuary of catechu, 2 drs.; water and lime water, of each, 4½ fl. oz. In diarrhœa, &c., arising from a relaxed condition of the coats of the lower bowels; and in fissures of the anus, &c.

Enema of Cam'phor. *Syn.* ENEMA CAMPHORÆ, L. *Prep.* 1. Camphor liniment, 4 fl. drs.; yolks of 2 eggs; water gruel, 7 fl. oz.

2. Camphor, 1 dr.; rectified spirit, 2 drs.; triturate till dissolved, then add, gradually, of simple syrup, 1 oz.; when thoroughly incorporated, further add of thin gruel, 7 fl. oz. Anodyne, antispasmodic, and diuretic. In difficult or obstructed micturition.

Enema of Cas'tor Oil. *Syn.* ENEMA OLEI RICINI, L. *Prep.* 1. (Hosp. F.) Castor oil and mucilage, of each, 1 oz.; gruel, ½ pint.

2. Castor oil, 1 oz.; liquor potassa, 2 fl. dr.; triturate, and add of honey, 1 oz.; when mixed, further add of hot gruel, ½ pint; and agitate until cool enough to be administered.

Enema, Cathar'tic. *Syn.* PURGATIVE CLYSTER; ENEMA CATHARTICUM (B. P., Ph. E. & D.), E. LAXATIVUM, E. PURGATIVUM, L. These have been already alluded to. By increasing the quantity of the active ingredients, a mild laxative or aperient clyster is converted into an active purgative or cathartic one.

Prep. 1. (Ph. E.) Senna, ½ oz.; boiling water, 16 fl. oz.; infuse an hour, then add of Epsom salts, ½ oz.; sugar, 1 oz.; when dissolved, further add of olive oil, 1 oz.; and mix them by agitation.

2. (Ph. D.) Epsom salts, 1 oz.; olive oil, 1 fl. oz.; mucilage of barley, 16 fl. oz. Same as enema of sulphate of magnesia, B. P., except that in the latter mucilage of starch is substituted for mucilage of barley.

3. (Ph. D. 1826.) Manna, 1 oz.; compound decoction of chamomile, ½ pint; dissolve, and add, of olive oil, 1 oz.; Epsom salts, ½ oz.

4. Compound decoction of mallows, ½ pint; Epsom salts, ¾ oz.; sweet oil, 2 fl. oz.; mix, as above.

Obs. The above are employed in all ordinary cases where the use of an immediate carthartic is indicated.

Enema of Chlo"ride of Lime. *Syn.* ENEMA CHLORIDI CALCIS, E. ANTIPUTRESCENS, L. *Prep.* 1. Chloride of lime, 10 grs.; tepid water, 1 fl. oz.; triturate, then add of barley water, or plain tepid water, 7 fl. oz.

2. (Pereira.) Chloride of lime, 10 to 15 grs., added to a common enema. As a deodoriser, when the alvine evacuations are unusually fetid.

Enema for Col'ic. *Syn.* ENEMA ANTICOLICUM, L. *Prep.* From oil of cajeput or peppermint, 15 drops; dissolved in sweet spirit of nitre, 60 drops; laudanum, 35 drops; infusion of chamomile, ½ pint.

Enema of Col'ocynth. *Syn.* ENEMA COLOCYNTHIDIS (Ph. L.), L. *Prep.* 1. (Ph. L.) Extract of colocynth, ½ dr.; soft soap, 1 oz.; triturate, and add of water, 1 pint.

2. (Ph. L. 1836.) As the last, but using compound extract of colocynth.

3. (Guy's Hosp.) Colocynth pulp, 1 dr.; water, ½ pint; boil so as to strain ½ pint; and add of common salt, ½ oz.; syrup of buckthorn, 1 fl. oz. An efficient enema in colic and obstinate constipation, in the absence of spasms and inflammatory symptoms.

Enema, Com'mon. *Syn.* ENEMA COMMUNE, L. Gruel or b—

but on some extraordinary condition of the air. When a disease is peculiar to a people or nation, and appears to depend on local causes, it is said to be 'ENDEMIC' or 'ENCHORIAL.' Thus, Asiatic cholera may be taken as an example of the first, and the agues of low countries, and the goitre of the Alps, as examples of the other.

EPIGAS'TRIC. In *anatomy*, pertaining to the EPIGAS'TRIUM, or the part of the abdomen over the stomach.

EPILEP'SY. *Syn.* FALLING SICKNESS; EPILEPSIA, MORBUS CADUCUS, L. The popular name of this disease arises from the patient, when attacked by it, suddenly falling to the ground. The other leading symptoms consist of convulsions, stupor, and, generally, frothing at the mouth. It comes on by fits, which after a time go off, leaving a certain amount of lassitude and drowsiness behind. Sometimes certain peculiar symptoms precede the attack. Among these, a sensation of coldness or of a current of cold air from the extremities of the body towards the head (AURA EPILEPTICA), palpitation, flatulency, stupor, and an indescribable cloud or depression, are the most common. The occurrence of these symptoms are not, however, uniform, even in the same patient; but it generally happens that the party falls down suddenly, and without the slightest warning.

Epilepsy is often symptomatic of other affections, as excessive irritation of the primæ viæ from worms, indigestible or noxious food, or poison; or it depends on local injuries, particularly those of the head, accompanied with lodgments of water on the brain, tumours, pressure, &c. Violent affections of the nervous system, sudden frights or fits of passion, violent mental emotions, the sudden suppression of old evacuations, and in childhood difficult teething, are also common causes of sympathetic epilepsy. Occasionally it arises from mobility of the sensorium, induced by plethora, or by excessive debility. In such cases the treatment must be energetically directed to the removal of the exciting cause.

When epilepsy occurs as an idiopathic or primary affection, or cannot be referred to any apparent cause, more especially when the attack commences about the age of puberty, and the fits are frequent, it is generally hereditary, and there is great danger of its terminating either in apoplexy, or lunacy, or imbecility.

The treatment of idiopathic epilepsy is principally directed to the improvement of the general health, and the diminution of nervous irritability by sedatives and tonics. Among the first, camphor, ether, henbane, hemlock, musk, oil of cajeput, opium, and morphia, and, more recently, hydrocyanic acid, have been principally relied on. Among the second, bark, cascarilla, quinine, strychnia, valerian, the sulphate of iron, zinc, and copper, arsenious acid, and nitrate of silver, have each their zealous advocates. The objection against the last preparation is the danger of its disfiguring the patient, by tinging the skin of a permanent dull, leaden hue. In cases accompanied with plethora, a low diet, daily out-of-door exercise, and the frequent use of aperients, with occasional blistering, cupping, and other depletive measures, are indicated; whilst in those marked by inanition and debility, an entirely opposite course must be adopted. When the disease is complicated with syphilis, a mild course of mercury may be given; and when with scrofula, iodine, iodide of potassium, or cod-liver oil, assisted by sea-bathing, will be proper.

Among other methods of treatment may be mentioned the administration of an active emetic or purgative, twice weekly, in the morning, when the stomach is empty. The first has now few supporters; but the second is said to be often productive of great benefit.

During a fit of epilepsy the only thing that can be done for the patient is to prevent the sufferer injuring himself, and to loosen every part of his dress that presses on his head, neck, or chest. When premonitory symptoms occur, a brisk emetic, a large dose of laudanum and ether, a cold plunge or shower bath (when not contra-indicated), or anything else which gives a sudden shock to the system or raises its tone, frequently prevents the accession of the fit.

Epilepsy more frequently attacks children than adults, and boys than girls. "Its returns are (frequently) periodical, and its paroxysms commence more frequently in the night than in the day, being somewhat connected with sleep." It is sometimes counterfeited by street impostors in order to excite the charity of the passers-by.

EPIPAS'TICS. See BLISTER and VESICANT.

EP'ITHEM. *Syn.* EPITHEMA, L. Any external liquid medicine for local application; as an embrocation or lotion. Some writers confine the term to those preparations which are intended to be applied by means of a cloth dipped into them. See LINIMENT, LOTION, &c.

Epithem, Astrin"gent. *Syn.* EPITHEMA ASTRINGENS, L. *Prep.* 1. Powdered ice, 7 dr.; powdered catechu, 1 dr.; mix.

2. (Brera.) Powdered bole and rhatany, of each, 1 oz.; vinegar of roses, q. s. to form a paste. Both are applied to the nostrils and forehead to stop bleeding at the nose.

Epithem, Gly"cerin. *Syn.* EPITHEMA GLYCERINÆ, L. *Prep.* (Mr. Startin.) Glycerin, 1 oz.; rose water and lime water, of each, 3 or 4 fl. oz.; powdered gum tragacanth, q. s. to form a thin mucilage. In scalds, burns, and excoriations.

Epithem, Vesica'ting. *Syn.* EPITHEMA VESICATORIUM, L. *Prep.* 1. (Albert.) Rye or barley meal, made into a paste with vinegar, and 30 to 40 grs. or more of powdered Spanish flies sprinkled over the surface.

2. (Ph. L. 1746.) Spanish flies (in fine powder) and wheat flour, equal parts, made into a paste with vinegar, q. s. As a blister.

Epithem, Vol'atile. *Syn.* EPITHEMA VOLATILE, E. AMMONIÆ, L. *Prep.* (Ph. L. 1764.) Common turpentine and water of ammonia, equal parts. An excellent counter-irritant; either with or without the addition of a little olive oil.

EQUISE'TIC ACID. In *chemistry*, a substance identical with ACONITIC ACID (which *see*).

EQUIV'ALENT. (EQUIVALENCY.) In modern *chemistry*, the equivalent of a body is that weight of it which will exactly replace in a compound 1 atom of hydrogen or 1 atom of either of the other monivalent elements (*see* Table, *below*).

Table of the Elements, arranged according to their Equivalency.

Monivalent.	Divalent.	Trivalent.	Tetrivalent	Pentivalent.	Hexivalent.
Hydrogen	Oxygen	Boron	Carbon	Nitrogen	Sulphur
Fluorine	Barium	Gold	Silicon	Phosphorus	Selenium
Chlorine	Strontium		Tin	Vanadium	Tellurium
Bromine	Calcium		Titaneum	Arsenic	Tungsten
Iodine	Magnesium		Thorinum	Antimony	Molybdenum
Cæsium	Zinc		Niobium	Bismuth	Osmium
Rubidium	Didymium		Tantalum		Iridium
Potassium	Lanthanium		Zirconium		Ruthenium
Sodium	Yttrium		Aluminium		Rhodium
Lithium	Glucinum		Platinum		Chromium
Thallium	Cadmium		Palladium		Manganese
Silver	Mercury		Lead		Iron
	Copper				Cobalt
					Nickel
					Uranium
					Cerium

Monivalent elements are those which replace one atom of hydrogen in chemical combinations in the ratios of their atomic weights.

One atom of a divalent, trivalent, tetrivalent, pentivalent, and hexivalent element replaces respectively, or is equivalent to, two, three, four, five, or six atoms of hydrogen or of any other monivalent element. (For further information on this subject consult the works on chemistry by Fownes, Miller, Kay-Shuttleworth, &c.)

ERB'IUM. According to Prof. Mosander, the substance usually called yttria is a mixture of the oxides of three metals—yttrium, erbium, and terbium, which differ in the character of their salts, and in some other important particulars. The first is a powerful base; the others, very weak ones. The latter are separated with extreme difficulty, and possess no practical importance.

EREMACAU'SIS. Slow burning; decay. This expression was applied by Liebig to the peculiar decomposition which moist organic matter undergoes, when freely exposed to the air, by the oxygen of which it is gradually burned or destroyed, without any sensible elevation of temperature. See PUTREFACTION.

ER'GOT. *Syn.* ERGOT OF RYE, SPURRED RYE, HORNED R., COCKSPUR R., OBSTETRICAL R.; ERGOTA (B. P.), L. The diseased seeds of *Secale cereale* (Linn.), or common rye.

Ergot of rye deteriorates greatly by age, being subject to the attacks of a description of acarus resembling the cheese mite, but much smaller, which destroys the whole of the internal portion of the grain, leaving nothing but the shell, and a considerable quantity of excrementitious matter. To prevent this, the ergot should be well dried, and then placed in bottles or tin canisters, and closely preserved from the air. The addition of a few cloves, or drops of the oil of cloves, or strong acetic acid, or a little camphor, or camphorated spirit of wine, will preserve this substance for years in close vessels. M. Martin proposes to steep the dry ergot in strong mucilage, and then to dry it on a sheet of white iron. This operation he repeats once or oftener, and finally preserves the prepared and thoroughly dried ergot in a well-corked glass flask. ('Jour. de Chimie Méd.') The wholesale druggists generally keep it in well-covered tin canisters or tin boxes.

Ergot of rye is much used to restrain uterine hemorrhage, and to accelerate the contraction of the uterus in protracted labour. It is also much used as an emmenagogue.—*Dose.* To facilitate labour, 20 to 30 grs., either in powder or made into an infusion; repeated at intervals of 20 or 30 minutes until 3 or 4 scruples have been taken. In other cases (leucorrhœa, hæmorrhages, &c.) the *dose* is 5 to 12 grs., three times daily, for a period not longer than a week or ten days at a time. See DECOCTION, EXTRACT, INFUSION, OIL, TINCTURE, &c.

ER'GOTINE. *Syn.* ERGOTINA, L. *Prep.* 1. (Bonjean's.) Powdered ergot is exhausted with cold water, by displacement, and the resulting solution is heated in a water bath to about 200° Fahr., and filtered; the filtered liquor is then evaporated to the consistence of a syrup, and when cold, is treated with rectified spirit, in considerable excess, to precipitate its gummy matter; after repose, the clear portion is decanted, by the heat of a water bath, to the consistence of a soft extract. *Prod.* 15%. According to M. Bonjean, this preparation possesses all the 'hæmostatic' without any of the 'poisonous' qualities of ergot. It has a reddish-brown colour, a bitter taste, and an odour somewhat resembling that of roasted meat. Its aqueous solution is red, limpid, and transparent. *Dose.* 4 to 10 grs., either made into a pill or dissolved in water.

2. (Wigger's.) Powdered ergot is first digested in ether, to remove the fatty matter, and then in boiling alcohol; the alcoholic tincture is evaporated, and the resulting extract treated with water; the undissolved portion, dissolved in hot alcohol and filtered, yields pure ergotine by gentle evaporation. *Prod.* 1½%. It has a brownish-red colour; is resinous, acrid, bitter, insoluble in water and ether, soluble in alcohol, and poisonous. It evolves a peculiar odour when warmed. Its therapeutical action has not been determined. See EXTRACT.

ER'RHINES. *Syn.* ERRHINA, L. Substances applied to the pituitary membrane of the nose, for the purpose of producing an increased discharge of nasal mucus. When they are given to excite sneezing, they are called STERNUTATORIES or PTARMICS. Asarabacca, euphorbium, several of the *labiatæ* (herbæ *vel* flores), sal-ammoniac, powdered sugar, subsulphate of mercury, tobacco, and white hellebore, are the principal substances of this class.

Errhines act as local irritants, and are occasionally employed in chronic affections of the eyes, face, ears and brain; as in amaurosis, ophthalmia, deafness, weak sight, headache, &c.

Errhine, Al'um. *Syn.* ERRHINUM ALUMINIS, L. *Prep.* (Radius.) Alum and Armenian bole, of each, 1 dr.; kino, ½ dr.; red oxide of iron, 2 drs.; (all in powder;) mix and triturate. In bleeding at the nose. A little is snuffed up the nostrils.

Errhine, Hæmostat'ic. *Syn.* ERRHINUM HÆMOSTATICUS, L. *Prep.* From powdered catechu, 1 dr.; opium, 5 grs.; sugar, 2 drs. As the last.

ERUPTIONS (of the Skin). For brevity and convenience, these cutaneous affections may be divided into 5 classes:—

Eruptions, Animal'cular. These are due to the presence of minute parasites (ACARI), which burrow and breed in the scarf-skin, and occasion much local irritation. See ITCH.

Eruptions, Pap'ular. *Syn.* DRY PIMPLES. In these the surface is raised into little elevations or pimples, which sometimes show themselves on the surface, and at others are only appreciable by the touch. They are usually accompanied with a greater or less degree of cutaneous irritation and troublesome itching, in attempting to relieve which they are frequently converted into disagreeable and painful sores and excoriations, which are often difficult to heal.

Treat. In simple cases, where there is not much disarrangement of the general health, these eruptions commonly yield to the occasional use of mild saline aperients, and warm or tepid bathing, or frequent ablution with warm soap and water. Sea-bathing is also a powerful remedy. Stimulants of all kinds should be avoided, and ripe fruit and vegetables should form a prominent part of the diet. Lemonade, made by squeezing a lemon into a tumbler of water, and sweetening the mixture with a little sugar, is one of the best beverages on these occasions. To relieve the itching, brisk friction with a soft flesh-brush may be had recourse to, followed by the use of a lotion formed by adding the juice of a lemon or a wine-glassful of distilled vinegar, to ¾ of a pint or a pint of water, either with or without the addition of a table-spoonful of glycerine. Occasional single pimples, depending on local causes, generally require no particular treatment. See LICHEN, PRURIGO, RED GUM, and TOOTHRASH.

Eruptions, Pus'tular. *Syn* MATTERY PIMPLES. These are distinguished by the pimples (pustules) containing an opaque yellow fluid or matter (pus, lymph). "They are generally developed on a ground of inflamed skin; and the degree of this inflammation of the skin is the basis of their division into two groups, termed technically 'IMPETIGO' and 'ECTHYMA.' The former presents the slighter degree of inflammation, and, sometimes, there is scarcely any redness of the skin; the latter is always accompanied by considerable inflammation and redness." "The little bubbles attain their full size in the course of two or three days, and either dry up without breaking, or more frequently burst and then dry, forming a hard crust, which offers considerable variety of colour, being sometimes yellowish, sometimes brownish, and sometimes almost black." The latter form is popularly known as 'crusted tetter.' In ecthyma the pustules "are generally of the size of a split pea, and surrounded at their base by a broad halo of redness. They are usually separate, not clustered like impetigo, scattered over various parts of the body, and followed either by a hard black crust or by a sore."

Treat. The inflammation and pain may be generally alleviated by the application of a lotion formed of rectified spirit of wine, 1 part; and water, 5 or 6 parts; to which a table-spoonful of distilled vinegar is often added. The crusts or scabs, when they be-

come hard or troublesome, may be removed by a warm fomentation or an emollient poultice; a little simple cerate being afterwards applied to allay irritation. When the constitution is full and inflammatory (as it usually is in impetigo), a depletive treatment may be adopted; when it is low and debilitated (as it usually is in ecthyma), tonics and a more liberal diet, with the free use of lemon juice diluted with water, as a beverage, should be had recourse to. Sea-bathing is also highly useful. See TETTERS.

Eruptions, Sca'ly. *Syn.* DRY TETTER. This is a form of inflammatory condition of the true skin (DERMA), which commonly makes its appearance as a small dull red, salmon-red, or liver-coloured spot, slightly raised above the level of the surrounding skin, constituting a broad, flat, pimple-like prominence, about the size of a split pea. Upon the surface of this prominence the scarf-skin becomes slightly roughened, and after a little while a very distinct but circular scale is produced, which increases in thickness by the addition of fresh layers, and after assuming various colours in different varieties of the disease, ultimately separates and falls off, either leaving a permanently bare surface, or being followed by crops of other like scales, which also fall off, and are replaced in rapid succession. This class of eruptions is more obstinate than any of the other varieties, and often defies medical skill. Each particular form generally requires special treatment. In all, however, endeavours should be made to restore the general health of the body in the manner which existing circumstances may indicate. The red meats, ripe fruit, and antiscorbutic vegetables, should form a large portion of the diet; and sea-bathing, or shower, sulphuretted, or iodiuretted baths, should be taken daily, if possible. Dry friction with a flesh-brush, and daily exercise to perspiration, are also highly recommended. See LEPROSY, PSORIASIS, TETTERS, &c.

Eruptions, Vesic'ular. *Syn.* WATERY PIMPLES. These consist of little vesicles or bladders, filled with a small quantity of a transparent and colourless liquid. They result from a similar action to that which produces ordinary blisters. Inflammation is excited in the sensitive skin by an inward or outward cause, and the inflamed vessels pour out the watery part of the blood, and so raise the scarf-skin from off the sensitive layer, in the form of a small dome, which in some situations is conical, in others a segment of a sphere." They present great variety in point of number and size; some are so minute as to be scarcely discernible without close inspection, whilst others increase to the magnitude of a hen's egg. They are numerous in the inverse ratio of their size; the smaller ones being very abundant, and the larger ones scanty and few.

Treat. This consists chiefly in the due attention to the general principles of health—cleanliness, exercise, food, and raiment, as already pointed out, assisted by such special remedies as the particular case or circumstances may demand. Antiphlogistics or tonics must be had recourse to, according to the condition of the system, and local irritation allayed by the usual means. Simple cases frequently yield to a dose or two of some saline aperient and a change of diet. See ERYSIPELAS, PEMPHIGUS, RUPIA, TETTERS, and SKIN.

ERVALEN'TA. The meal of lentils (*Ervum lens*,—Linn.), variously doctored with other substances. In some cases the article sold under the name does not contain a particle of lentil meal.

Prep. 1. (Paris Ervalenta.) Indian-corn meal (fine), and bean flour, of each, 14 lbs.; salt and sugar, of each, 1 lb.; mix, and pass the compound through a sieve.

2. (Warton's.) Lentil powder, 1 part; durra or Turkey millet flour (*Sorghum vulgare*), 2 parts. Some persons assert that it contains a large quantity of the flour of Indian corn. See REVALENTA and LENTILS.

ERYN'GO. *Syn.* ERYNGIUM, L. The root of the *Eryngium campestre*, a plant common in middle and southern Europe. It is sweet, aromatic, and tonic, and formerly enjoyed much repute in gonorrhœa, suppressed menstruation, and visceral obstructions generally, especially those of the gall-bladder, liver, and uterus. Candied eryngo (ERYNGIUM CONDITUM, ERYNGII RADIX CONDITA), according to Lindley, "has the credit of being a decided aphrodisiac," and has a considerable sale. *Eryngium aquaticum* (bitter snake-weed) and *E. maritimum* (sea eryngo, sea holly) furnish the eryngo of the Ph. U. S. See CANDY.

ERYSIP'ELAS. *Syn.* ST. ANTHONY'S FIRE, THE ROSE. A peculiar form of inflammation, which chiefly attacks the skin, and is generally accompanied or followed by an eruption of a very red colour, sometimes vesicular, and by tumefaction. It commonly attacks the head and face, and is at its height from the third to the sixth day, but the duration and progress of the symptoms are variable. From the eighth to the twelfth day the eruption usually scabs or scales off. Sometimes suppuration occurs, especially of the eyelids and scalp, and during the latter stages of the disease there is, in general, a tendency to debility. In many cases erysipelas is attended by typhoid symptoms, and is then a dangerous and often fatal disease.

Treat. Aperients and diaphoretics, assisted by a cooling diet. When the inflammatory symptoms run high, blistering and cupping are frequently had recourse to. Local irritation may be subdued by milk-and-water, or cooling or evaporating lotions, or by sprinkling starch, hair-powder, or arrow-root, on the part. The tendency to debility in the latter stages should be combated with bark, quinine, or other like tonics. When shiverings, sickness, and delirium, attend the height of the dis-

order, wine, bark, ammonia, and other stimulants, are usually prescribed, and depletion must be avoided. The same treatment is also adopted in the gangrenous forms of the disease, to which doses of opium and calomel are also commonly added. When suppuration and sloughing of the cellular membrane have taken place, it is usual to make incisions to give exit to the discharge, and relieve the tension of the limb. These may be about 1½ inch in length, and from 2 to 4 inches apart, and should be made in the direction of the long dimensions of the limb. Mr. Higginbottom, of Nottingham, applies (freely) lunar caustic to the inflamed skin, and also to the healthy skin, to the extent of an inch or more beyond it. The result, in many cases, is a complete change of action in the part, and a resolution of the disease. Iodine paint is often successfully used in the same way.

Erysipelas is generally symptomatic of a debilitated or bad constitution. It is also a common sequel of surgical operations in crowded and ill-ventilated hospitals, where it often appears to be contagious. In these cases cleanliness, ventilation, and change of air, are the only remedies. We need scarcely add, that this disease should never be tampered with, but the best medical advice sought, whenever it can be procured.

ERYTHORE'TIN. *Syn.* RED RESIN OF RHUBARB. A yellow or reddish-yellow substance, forming one of the three resins found by Schlösberger and Dœpping in rhubarb. It is very soluble in alcohol; less so in ether; with ammonia and potassa it forms soluble compounds of a rich purple colour. See RHUBARB.

ERYTH'RIC ACID. *Prep.* The lichen *Roccella tinctoria* (Canary or herb-archil) is boiled with milk of lime, and the filtered solution precipitated with hydrochloric acid; the dried precipitate is dissolved in warm alcohol, and filtered; as the solution cools, crystals of erythric acid are deposited.

Prep., &c. Feebly acid; colourless; inodorous; scarcely soluble in water; soluble in alcohol and ether; chloride of lime turns its solutions of a blood-red colour.

ERYTH'RINE, AMARYTHRINE, ERYTHRILINE, PSEUDO-ERYTHRINE, and TELERYTHRINE. Substances obtained by Kane and Heeren from *Roccella tinctoria, Parmelia roccella, Lecanara Tartarea,* &c. They are of little practical importance.

ESCHAROT'ICS. *Syn.* ESCHAROTICA, L. Substances that destroy the texture of living organic bodies, with the production of an 'eschar' or 'scab.' Escharotics have been divided into two classes—*mechanical* and *chemical.* Among the former are actual cauteries, as a heated iron, moxas, &c.; among the latter are all those substances commonly known as caustics. Some writers have subdivided chemical escharotics into ERODING ESCHAROTICS, as blue vitriol, red precipitate, burnt alum, &c.; and into CAUSTIC ESCHAROTICS, as lunar caustic, pure potassa, strong sulphuric acid, nitric acid, &c.; but these distinctions possess little practical value. "In cauterising with a heated iron, this should be at a white heat, as, at this temperature, it occasions less pain to the patient, from its causing an immediate death of the parts to which it is applied." "The surrounding surface should be protected by some non-conductor of heat, but not by wet paper or cloth, as the sudden extrication of steam will produce a blistered surface around the burn, and will much increase the pain." (Dr. R. E. Griffith.) See CAUSTIC, SOLUTION, &c.

ES'CULENTS. Substances used for food. The more important esculents are noticed under their respective heads.

ESCU'LIC ACID. A peculiar acid found by M. Bussy in the bark of the horse-chestnut. It is but little known, and has not been applied to any use.

ESPRIT. [Fr.] SPIRIT. This term is commonly applied to alcoholic solutions of the essential oils, and to various odorous and aromatic essences sold by the perfumers and druggists as articles of the toilet. See ESSENCE, SPIRIT, &c.

ES'SENCE. *Syn.* ESSENTIA, L. The active and characteristic portion of a substance, or that on which its most remarkable properties depend. The term has been very loosely applied to various preparations presumed to contain these essential principles or qualities, disencumbered of grosser matter. Modern systematic writers generally restrict its application to the volatile oils obtained from vegetable substances by distillation, or to a strong solution of them in alcohol. In pharmacy and perfumery, the word 'essence' is applied to concentrated preparations that differ vastly from each other. Thus, concentrated effusions, decoctions, liquors, solutions, and tinctures, are frequently called 'essences' by those who vend them; but the term 'fluid extracts' would be more appropriate, if those already mentioned are not deemed sufficiently showy and attractive. We shall here confine ourselves to a brief notice of the principal compound essences, or those that undergo some preparation beyond being merely extracted from vegetables by distillation along with water. The latter will be considered under the article OIL.

The concentrated preparations of the pharmaceutist, termed 'essences,' are mostly prepared by digesting the active ingredient or ingredients in rectified spirit of wine, either with or without the addition of a certain portion of water; or they are extemporaneously formed by dissolving a portion of the essential oil of such substances in the spirit. In this way are made the essences of lavender, musk, ginger, &c. When it is desired only to obtain the aromatic and volatile portion of the ingredients, the latter are usually digested in the spirit for a few days, and then submitted to distillation,

when the alcohol comes over loaded with aromatic essential oil, or other volatile matter. In this way are prepared most of the fragrant essences of the perfumer and druggist, when simple solution of the essential oils in alcohol is not resorted to. In many cases the active principles of the ingredients are partly volatile and partly fixed, or at least do not readily volatilise at the temperature at which alcohol distils over. This is the case, for instance, with the active portion of ergot and Jamaica ginger. In such cases digestion alone should be adopted. When the principle of organic substances, of which it is desired to obtain a concentrated solution, are resinous or oily, or little soluble in weak spirit (which is mostly the case), the strongest rectified spirit of wine should alone be employed. In the preparation of essences without distillation, the method by percolation or displacement is preferable to that of simple maceration and expression, when the nature of the ingredients and other circumstances render it applicable, as it is not only more economical, but a more concentrated solution may thereby be obtained. At the same time, however, the reader should remember, that this mode of operating requires much greater experience and skill to ensure success than the former method. This clumsiness of manipulation is the common cause of the failures which are so frequently met with in the preparation of these articles.

The ingredients for the preparation of essences must undergo the same operations of bruising, powdering, or slicing, as directed under 'TINCTURE,' previous to digestion in the spirit, or other menstruum; and the length of time they should be allowed to infuse, when this method alone is adopted, should not be less than ten days; but this time may be advantageously extended to a fortnight, or even longer. During the whole of this period frequent agitation should be employed, and when the ingredients are so bulky as to absorb the whole of the fluid, the vessel which contains them should be securely fastened by a bung or stopper covered with bladder, and inverted every alternate day. By this means every portion of the ingredients will be equally exposed to the action of the menstruum. In all such cases the method of displacement, or percolation, is preferable. For the essences used as perfumes and for flavouring, not only must the spirit be perfectly tasteless and scentless, but it must be also quite devoid of colour.

The following formulæ embrace most of the essences met with in the shops. Those not found among them may be readily prepared by applying the general directions given above, or by employing the formula given for the preparation of the essence of some similar substance, merely varying the characteristic ingredient. Thus, were it desired to form an essence of ambergris or of myrrh, and no formulæ could be found for these preparations, the tyro would consider in what menstruum the active principles of these substances were most soluble. This, he would immediately see by reference to their properties, is rectified spirit of wine. He would next have to decide on the proper strength of his essence. In this he must be guided, either by the strength of the like preparations of other makers, or by his own judgment of what would be useful, novel, or convenient. Suppose he decided that his essence should represent 1-10th of its weight of the solid ingredient. He would then take 2 oz. of ambergris or myrrh, and 20 oz. of rectified spirit, which he would digest together for 10 days or a fortnight in the manner described above. Had the required preparation been an essence of senna, (for example), he would probably recollect, or might easily ascertain by reference, that the active properties of senna are soluble in both water and weak spirit. Then, to make an essence 4 times as strong as the tincture of the pharmacopœia, 7 oz. of senna, and 1 pint of proof spirit, should be employed, with due digestion, as before.[1] The same applies to other preparations. See CONCENTRATION, DECOCTION, INFUSION, LIQUOR, SPIRIT, TINCTURE, &c.

Essence of Ac'onite. *Syn.* ESSENTIA ACONITI, L. *Prep.* From aconite (herb, dried and powdered), 8 oz.; rectified spirit, 16 oz.; macerate for 4 days at a temperature of 68° Fahr., press, and strain; the marc or residuum is again macerated with (a little) spirit, and pressed as before, so that the weight of the mixed tinctures may amount to double that of the herb.—*Dose.* 3 to 6 drops. See TINCTURE.

Essence of All'spice. *Syn.* ESSENCE OF PIMENTO; ESSENTIA PIMENTÆ, L. *Prep.* From essential oil of pimento or allspice, 1 fl. oz.; strongest rectified spirit of wine, 1 pint; agitate until perfectly united, and the next day decant the clear portion, if there is any sediment. *Used* to make pimento water, and by cooks and confectioners as a 'flavouring.'

Essence of 'Al'monds. *Syn.* ESSENCE OF BITTER ALMONDS, E. OF PEACH KERNELS, E. OF RATAFIA, E. OF NOYEAU, QUINTESSENCE OF N., ALMOND FLAVOUR; ESSENTIA AMYGDALÆ, E. A. AMARÆ, L. *Prep.* 1. From essential oil of almonds, as the last.

2. (Pereira.) Essential oil of almonds, 1 fl. oz.; rectified spirit, 7 fl. oz.

Uses, &c. It is added to wine, cordials, perfumery, pastry, &c., to impart an agreeable nutty flavour or aroma. It is also employed to prepare cherry-laurel, peach-kernel, and bitter-almond water. A large quantity is consumed by the confectioners, and by wine merchants to 'improve' their sherries, and to give Cape wine a sherry flavour. It should be used in very small quantities, as it is very powerful, and, in quantity, poisonous. A few drops are sufficient for several pounds of pastry. The first formula is that used in trade. The second is sometimes used by the druggists, and is occasionally vended under the name of 'CON-

[1] See directions given under TINCTURE.

CENTRATED ESSENCE OF BITTER ALMONDS,' &c. The directions for purifying the almond oil from hydrocyanic acid before dissolving it in the spirit, given in more than one recent book of receipts, are absurd, as in this way the oil loses much of its characteristic odour and flavour, and by keeping gradually becomes nearly destitute of both. See ESSENTIAL OIL.

Essence of Am'bergris. *Syn.* ESSENTIA AMBRÆ-GRISEÆ, E. A. SIMPLEX, TINCTURA A. CONCENTRATA, L. *Prep.* 1. Ambergris (cut very small), 5 drs.; rectified spirit, 1 pint; place them in a strong bottle or tin can, secure the mouth very firmly, and expose it to the heat of the sun, or in an equally warm situation, for 1 or 2 months, frequently shaking it during the time; lastly, decant, and filter through paper.

2. (Guibourt.) Ambergris, 1 dr.; rectified spirit, 3 oz.; digest 10 or 12 days.

3. (Redwood.) Ambergris, 2½ drs.; rectified spirit, 1 pint; macerate for 14 days. Chiefly used as an element in other perfumes. The first is the formula employed by the London houses.

Essence of Ambergris and Musk. *Syn.* CONCENTRATED TINCTURE OF A. AND M.; E. AMBRÆ-GRISEÆ (ODORATA), E. A. ET MOSCHI, E. REGIA, L.; ESSENCE ROYALE, Fr. *Prep.* 1. Ambergris (cut small), ¾ oz.; 1 or 2 fresh-emptied musk-pods (or musk, 12 grs.); rectified spirit, 1 pint; proceed as in No. 1 (*above*).

2. Ambergris, 2½ oz.; bladder musk, ½ oz.; spirit of ambrette (purple sweet sultan), 1 gal.; as last.

3. Ambergris, 2½ oz.; bladder musk, 1 oz.; spirit of ambrette, 1 gal.; as before. The fragrance of the above, especially of the last two, is very powerful, and is much esteemed.

4. Ambergris, ½ oz.; musk and lump sugar, of each, ½ oz.; triturate together in a wedgwood-ware mortar, adding oil of cloves, 20 drops; true balsam of Peru, 30 drops, and enough essence of jasmine or tuberose to convert it into a perfectly smooth paste; then put it into a strong bottle with rectified spirit, 1 quart; observing, before adding the whole of the last, to rinse the mortar out well with it, that nothing may be lost; lastly digest for 6 or 8 weeks, as directed in No. 1 (*above*).

5. Ambergris, 4 drs.; musk, 1½ dr.; sand, 3 oz.; triturate, then add, of oil of cinnamon, 1 dr.; oil of rhodium, ½ dr.; essence of roses and eau fleurs d'orange, of each, ½ pint; rectified spirit, 1½ pint; digest as before (or not less than 14 days), and decant and filter. The last two are very fine, though inferior to Nos. 2 and 3.

6. To the last (No. 5), add civet, 1 dr.; salt of tartar, 3 drs.; and an additional pint of rectified spirit. Inferior to the above, but cheaper.

Obs. Essence of ambergris is used as a perfume, and is added in small quantities to sweet-scented spirits and wines, to improve their flavour and aroma. A very small quantity of any one of them added to lavender water, eau de Cologne, tooth-powder, hair-powder, wash-balls, or a hogshead of claret, communicates a delicious fragrance. See AMBERGRIS and ESSENCE ROYALE (*below*).

Essence d'Ambrette. [Fr.] *Syn.* ESSENCE OF MUSK SEED, SPIRIT OF M. S.; ESPRIT D'AMBRETTE, Fr. *Prep.* 1. Musk seed (ground in a clean pepper-mill), 1¼ lb.; rectified spirit, 3 pints; digest for 3 or 4 weeks in a warm place, and filter.

2. Musk seed, 4 lbs.; rectified spirit, 1 gal.; digest 10 days, add water, 2 quarts, and distil over 1 gal. Very fine.

Essence of Ammoni'acum. *Syn.* CONCENTRATED TINCTURE OF AMMONIACUM; ESSENTIA AMMONIACI, TINCTURA A. CONCENTRATA, L. *Prep.* 1. Ammoniacum (in tears), 1 lb., is bruised in a very cold marble mortar with half its weight of coarse and well-washed siliceous sand or powdered glass, and rectified spirit, ½ pint, gradually added; the trituration is continued until the whole is reduced to a smooth paste, and is then placed in a wide-mouthed bottle, and spirit of wine, 1½ pint, further added; the whole is then digested together for a week with constant agitation, and after sufficient repose to settle, the supernatant transparent liquid is decanted into another bottle for use.

2. Gum ammoniacum, 1 lb., is reduced to a cream with boiling water, ¾ pint; as soon as the mixture has cooled a little, it is placed in a strong bottle, and rectified spirit of wine, 1¼ pint, is cautiously added; the mixture is then corked down close, and the whole macerated for a few days; the bottle is next placed in a moderately warm situation, that the sediment may subside, after which the clearer portion is poured off through flannel into another bottle.

Obs. This preparation is used as a substitute for the gum in substance, for extemporaneously preparing emulsion of ammoniacum, mixture of a., &c. It is represented to possess fully the same amount of medicinal virtue as an equal weight of the solid gum, on which account it has a considerable sale. The product of the first formula, when well managed, is a beautiful pale brownish-coloured, transparent tincture; that of the second is milky and less sightly. The preparation generally sold under the name of 'CONCENTRATED ESSENCE OF AMMONIACUM' (ESSENTIA AMMONIACI CONCENTRATA, L.), and represented as twice as strong as the gum in substance, is generally prepared by the first formula given above for ESSENCE OF AMMONIACUM. A stronger article may be prepared by a similar process, by using 1 lb. of ammoniacum to a pint of the strongest rectified spirit. As, however, a clear liquid at this strength is somewhat difficult to produce, it is very seldom attempted by the druggists; they therefore generally content themselves with sending out the liquid at half the professed strength, leaving the label to confer the additional concentration. See AMMONIACUM.

Essence of Ancho'vies. *Syn.* ESSENTIA CLUPEÆ, L. *Prep.* 1. Anchovies, 1 lb., are 'boned,' reduced to a pulp in a wedgwood-ware or marble mortar, and passed through a clean hair or brass-wire sieve; meanwhile the bones and other portion that will not pass through the sieve are boiled with water, 1 pint, for 15 minutes, and strained; to the strained liquor, salt and flour each, 2½ oz., together with the pulped anchovies, are added, and the whole simmered 3 or 4 minutes, when the vessel is removed from the fire, and as soon as the mixture is cooled a little, strong pickling vinegar, ½ pint, is mixed in; it is then bottled, and the corks tied over with bladder, and either 'waxed' or 'capsuled.' *Product*, 3 lbs. (nearly).

2. Anchovies, 7 lbs.; water, 9 pints; salt and flour, of each, 1 lb. *Product*, 20 lbs.

3. To the last, add of Cayenne pepper, ¼ oz.; the peel of a lemon (grated), and mushroom catsup, 4 oz. Very savoury.

4. From British anchovies (pickled sprats) or young pilchards, along with herring liquor, or the drainings of anchovy barrels.

Use, &c. As a sauce and condiment; when well prepared, it has a fine flavour. That of the shops is usually coloured with Venetian red or Armenian bole. An infusion of cochineal, or a little annotta, would form a more appropriate colouring, and would be perfectly harmless. See ANCHOVY and SAUCE.

Essence of Angel'ica. *Syn.* ESSENTIA ANGELICÆ, L. *Prep.* (Van Mons.) Angelica root (bruised), 1 part; rectified spirit, 8 parts; water, 16 parts; digest, and distil over 6 parts; Stomachic, carminative, and alexipharmic.—*Dose.* 1 to 2 teaspoonfuls.

Essence of An'iseed. *Syn.* ESSENTIA ANISI (B. P.), L.; ESPRIT D'ANISE, Fr. Oil of anise, 1 part; rectified spirit, 4 parts; mix (B. P.). Stimulant, aromatic, and carminative.—*Dose.* 10 to 20 minims. *Used* also to flavour liqueurs, and to make aniseed water. See SPIRIT.

Essence, An'odyne. *Syn.* ESSENTIA ANODYNA, L. *Prep.* 1. Hard aqueous extract of opium (in powder), 1 dr.; powdered cinnamon, ½ dr.; rectified spirit, 1 fl. oz.; digest a week.—*Dose.* 5 to 20 drops.

2. Extract of henbane (recent), 5 drs.; rectified spirit, 2 fl. oz.; as last.—*Dose.* 10 to 30 drops. Narcotic, sedative, and antispasmodic. Both are excellent preparations.

Essence, Antihyster'ic. *Syn.* ESSENTIA ANTIHYSTERICA, L. *Prep.* 1. Cyanuret of potassium, 3 grs.; powdered sugar, 1 dr.; rectified spirit and eau d'orange, of each 4 fl. drs.; agitate together until dissolved.—*Dose.* 10 to 20 drops, in pure water; in hysteria, gastrodynia, &c. See DRAUGHT (Antihysteric).

2. (P. Cod.) Resembles FETID SPIRIT OF AMMONIA (which *see*).

Essence of Ap'ple. *Syn.* SOLUTION OF VALERIANATE OF AMYL; ESSENTIA POMI ODORATA, L. *Prep.* From apple oil (valerianate of oxide of amyl), as ESSENCE OF ALMONDS. *Used* to flavour liqueurs and confectionery.

Essence of Ar'nica. *Syn.* ESSENTIA ARNICÆ, E. A. FLORUM, TINCTURA A. E. CONCENTRATA, L. *Prep.* (Ph. Baden, 1841.) From arnica flowers, as ESSENCE OF ACONITE. It represents half its weight of herb.

Essence, Aromat'ic. *Syn.* ESSENTIA AROMATICA, L. *Prep.* From hay saffron, 1 dr.; and rectified spirit, 6 fl. drs.; digested together; to the filtered tincture is added oil of cinnamon and powdered white sugar, of each, 1 dr.; ether (rect.), 2 fl. drs.; oil of nutmeg and essence of ginger, of each, ½ dr.; after agitation and a few days' repose, the clear portion is decanted into a stoppered phial.—*Dose.* 5 to 15 drops, on sugar or in a glass of wine or weak spirit; in cholera, diarrhœa, spasms, &c.

Essence of Bark. *Syn.* ESSENTIA CINCHONÆ, E. CORTICIS C., L. *Prep.* 1. Resinous extract of yellow bark, 4 drs.; rectified spirit, 1½ fl. oz.; tincture of orange peel, ½ fl. oz.; acetic acid (Ph. L.), 1 fl. dr.; digest a week.

2. Disulphate of quinine, ½ dr.; resinous extract of bark, 2 drs.; rectified spirit, 2 fl. oz.; as before.—*Dose.* 12 drops to a teaspoonful; as a febrifuge and tonic.

Essence of Beef. *Syn.* ESSENCE OF RED MEATS, &c. *Prep.* 1. From lean beef (chopped small), 1 lb.; water, ½ pint; place them in a bottle, which they will only half fill, and agitate them violently for half an hour; then throw the whole on a sieve, and receive the liquid in a jug; next boil the undissolved portion in water, 1 pint, for 20 minutes; strain, mix the decoction with the cold infusion, evaporate the liquid to the consistence of a thin syrup, adding spice, salt, &c., to taste, and pour the essence, whilst boiling hot, into bottles, jars, or (still better) tin cans, which must then be at once hermetically corked, sealed, or soldered up, and stowed away in a cold place. In this state it will keep a long time.

2. (Ellis.) Take of lean beef (sliced), a sufficient quantity to fill the body of a porter bottle; cork it up loosely, and place it in a pot of cold water, attaching the neck, by means of a string, to the handle of the pot; boil for 1½ to 2 hours, then decant the liquid and skim it. Spices, salt, wine, brandy, &c., may be added as before. Highly nutritious and sustaining.

Essence of Ber'gamot. See OIL (Volatile).

Essence, Bit'ter. *Syn.* ESSENTIA AMARA, L. *Prep.* (Ph. Den.) Wormwood, 4 parts; gentian root, bitter orange peel, and blessed thistle, of each, 1 part; rectified spirit, 45 parts; digest a week. Tonic and stomachic.—*Dose.* ½ dr. to 2 drs.

Essence of Calum'ba. *Syn.* ESSENTIA CALUMBÆ, L. See INFUSION OF CALUMBA.

Essence of Cam'phor. *Syn.* CAMPHOR DROPS, LIQUOR OF CAMPHOR, CONCENTRATED ESSENCE OF C., CONCENTRATED SOLUTION OF C., CONC. CAMPHOR JULEP; ESSENTIA CAMPHORÆ, LIQUOR C., L. C. CONCENTRATUS, L. *Prep.* 1. Camphor (clean), 4½ oz.; rectified spirit, 1

gal.; dissolve. This forms the 'ESSENCE OF CAMPHOR' and 'LIQUOR CAMPHORÆ' of the wholesale houses. About ½ fl. dr., added to 7½ fl. drs. of cold distilled water, forms (by agitation) a transparent aqueous solution of camphor, fully equal in strength to the filtered 'MISTURA CAMPHORÆ' (camphor julep) of the Ph. L. The above made with weaker spirit forms the 'spirit of wine and camphor' of the shops.

2. Camphor, 1 oz.; rectified spirit, 10 oz. (by weight); dissolve. This forms the 'CONCENTRATED ESSENCE OF CAMPHOR' of the wholesale druggists. 10 or 12 drops, added to 1 fl. oz. of pure cold water, make a transparent camphor julep, as before. There is a large quantity of these solutions of camphor sold by the London houses, who charge a considerable price for them. They are very convenient for preparing extemporaneous camphor julep or camphor mixture in dispensing.

3. (Fordred.) Tincture of camphor, 13 fl. drs.; tincture of myrrh, ½ fl. dr.; rectified spirit, 18½ fl. drs.; mix. 1 fl. dr., added to 4 fl. oz. of water, forms camphor julep. It has been proposed to bleach the tincture of myrrh with animal charcoal, but this interferes with its proper action.

4. (Homœopathic.) See CHOLERA REMEDIES, Nos. 6 & 7, page 335.

5. (Houlton.) Spirit of camphor (Ph. L.), 1 fl. oz.; proof spirit, 7 fl. oz. 1 fl. dr., to 3 fl. oz. of water, forms 'CAMPHOR JULEP.'

6. (Redwood.) Camphor, 1 dr.; rectified spirit, 2½ oz.; dissolve, and add of water, ½ oz.

7. (Swediaur.) Powdered camphor, 1 dr.; water saturated with carbonic acid gas, 12 fl. oz.; dissolve. 1 part of this solution, added to 4 parts of water, forms 'CAMPHOR MIXTURE.' See CAMPHOR.

Essence of Cap'sicum. See ESSENCE OF CAYENNE.

Essence of Car'away. *Syn.* ESSENTIA CARUI, L. *Prep.* From oil of caraway as ESSENCE OF ALMONDS. Its applications and uses are similar. An inferior kind is prepared by macerating the seeds in proof spirit.

Essence of Car'damoms. *Syn.* ESSENTIA CARDAMOMI, E. C. CONCENTRATA, L. *Prep.* From lesser cardamom seeds (ground in a pepper mill), 5½ lbs.; rectified spirit of wine, 1 gal.; digest for a fortnight, press, and filter.

Obs. This preparation is very convenient for flavouring cordials, pastry, &c., and is very powerful. In the laboratory, it is frequently substituted for powdered cardamoms in making compound extract of colocynth, and has the advantage of adding no inert matter to the preparation, whilst it imparts the characteristic odour of the seeds in a remarkable degree. When used in this way, it is not added to the extract until it is nearly cold and about to be taken from the pan. The testæ or shells of the seed should be separated from the kernels, as the former are quite inert, and if used occasion a loss of spirit for no purpose.

Essence of Cascaril'la. *Syn.* ESSENTIA CASCARILLÆ, L. *Prep.* 1. Cascarilla (bruised), 12 oz.; proof spirit, 1 pint; proceed either by digestion or percolation. The product is 8 times the strength of the infusion of cascarilla (Ph. L.).

2. See INFUSION (Concentrated).

Essence of Cas'sia. *Syn.* ESSENTIA CASSIÆ, L. *Prep.* From oil of cassia, as essence of allspice or almonds.

Essence of Cayenne'. *Syn.* ESSENCE OF CAYENNE PEPPER, E. OF CAPSICUM, CONCENTRATED E. OF C.; ESSENTIA CAPSICI, TINCTURA CAPSICI CONCENTRATA, L. *Prep.* 1. Capsicum (recent dried pods, bruised), 3 lbs.; rectified spirit, 1 gal.; digest 14 days, press, and filter. Some persons prepare it by the method of displacement.

2. Capsicum, ¼ lb.; proof spirit, 1 pint; digest, as before. Weaker than No. 1.

3. (Kitchener's.) Cayenne pepper, 1 oz.; brandy, 1 pint; digest, &c., as before.

Obs. The product of the first formula is a transparent, dark-coloured liquid, having an intensely burning taste. One drop is sufficient to deprive a person of the power of speech for several seconds; and a few drops will impart the rich pungency of cayenne to a large quantity of soup, sauce, or any other article. It forms the 'ESSENCE OF CAYENNE' and the 'CONC. ESS. OF CAYENNE PEPPER' of the London houses. It is principally used as a 'flavouring,' and to make SOLUBLE CAYENNE PEPPER; also in dispensing. It is fully 8 times as strong as the 'TINCTURA CAPSICI' (Ph. L.). The product of the third formula is used exclusively for culinary purposes. The pods or fruit of *Capsicum annuum* (capsicum, chilly), *C. baccatum* (bird pepper), and *C. fructescens* (Guinea pods, red pepper), are indiscriminately used for this preparation, but the first are those preferred for medicinal purposes; the others have similar properties, but are more pungent and acrimonious; hence the preference given to them in the preparation of cayenne pepper. See PEPPER.

Essence of Ce'drat. See OIL (Volatile).

Essence of Cel'ery. *Syn.* ESSENCE OF CELERY SEED; ESSENTIA APII, ESS. A. SEMINIS, L. *Prep.* 1. From celery seed (bruised or ground), 4½ oz.; proof spirit, 1 pint; digest a fortnight, and strain.

2. (Concentrated.) Celery seed, 7 oz.; rectified spirit, 1 pint; digest as before. Very fine. Both are used for flavouring.

Essence, Cephal'ic. See HEADACHE ESSENCE.

Essence of Cham'omile. *Syn.* CHAMOMILE DROPS; ESSENTIA ANTHEMIDIS, E. CHAMÆMELI, E. C. ALBA, L. *Prep.* 1. From essential oil of chamomile, as essence of allspice. Stomachic and stimulant.—*Dose.* 5 to 30 drops; ½ fl. oz., shaken with about 1 pint of pure water, forms an excellent extemporaneous chamomile water.

2. Gentian root (sliced or bruised), 1 lb.;

dried orange peel, ½ lb.; proof spirit, 1 gal.; essential oil of chamomile, 3½ fl. oz.; macerate a week. Slightly coloured. Some persons use ½ lb. of quassia wood, instead of the gentian and orange peel. Both the above are stomachic and tonic, and are favourite remedies in loss of appetite, dyspepsia, &c.—*Dose.* As the last, on sugar, or in a wine-glassful of wine or beer.

Essence of Chiret'ta. See INFUSION (Concentrated).

Essence of Cin'namon. *Syn.* ESSENTIA CINNAMOMI, SPIRITUS C. CONCENTRATUS, L. *Prep.* 1. From oil of cinnamon, as ESSENCE OF ALLSPICE OR ALMONDS.

2. Cinnamon, 5 oz.; rectified spirit, ¾ pint; water, ¼ pint; digest a week, and strain. Inferior to the last. Essence of cassia is commonly sold for it.

Essence of Civ'et. *Syn.* ESSENTIA ZIBETHI, L. *Prep.* 1. Civet (cut small), 1 oz.; rectified spirit, 1 pint; as ESSENCE OF MUSK.

2. Instead of rectified spirit use spirit of ambrette. Both are used in perfumery; chiefly in combination with other substances.

Essence of Cloves. *Syn.* ESSENTIA CARYOPHILLI, L. *Prep.* 1. (White.) From oil of cloves, as ESSENCE OF ALLSPICE. *Used* as a 'flavouring.'

2. (Coloured.) Cloves (bruised), 3½ oz.; proof spirit, ¾ pint; water, ¼ pint; digest a week, and strain. Inferior to the last. It is 8 times as strong as INFUSION OF CLOVES (Ph. L.). Chiefly used in dispensing.

Essence of Cof'fee. See COFFEE.

Essence of Co'gnac. (kōne'-yăk). *Syn.* BRANDY ESSENCE. *Prep.* From brandy oil, 2 fl. oz.; rectified spirit, 18 fl. oz. For flavouring malt spirit to imitate brandy. See OIL.

Essence of Cologne. *Syn.* CONCENTRATED EAU DE COLOGNE; ESSENTIA COLONIENSIS, AQUA C. CONCENTRATA, L. *Prep.* 1. By taking 8 times the quantity of the ingredients ordered for COLOGNE WATER, and using the strongest rectified spirit.

2. Oils of lemon and cedrat, of each, 2 drs.; oil of rosemary, 1 dr.; oil of bergamotte, 1 oz.; spirit of neroli, 2 fl. oz.; purest rectified spirit, 5 fl. oz.—*Used* as a condensed perfume.

Essence of Colts'foot. *Prep.* 1. (Ryan,) Balsam of tolu, 1 oz.; rectified spirit and compound tincture of benzoin, of each, 3 oz.; dissolve, and in a few days decant the clear portion.

2. (Paris.) Equal parts of balsam of tolu and compound tincture of benzoin, with double the quantity of rectified spirit.

3. Tincture of tolu, 5 fl. oz.; compound tincture of benzoin, 3 fl. oz.; powdered sugar (quite dry), 1 oz.; hay saffron, 1 dr.; digest a week, with frequent agitation.

Obs. Pectoral and stimulant. A quack remedy for consumption and most other diseases of the lungs, but unless assisted by occasional aperients, and in the absence of fever, it is more likely to kill than cure in these complaints. The last is the best formula.

Essence of Cu'bebs. *Syn.* CONCENTRATED ESSENCE OF CUBEBS; ESSENTIA CUBEBÆ, E. C. CONCENTRATA, L. *Prep.* 1. Cubebs (bruised, or preferably ground in a pepper mill), ½ lb.; rectified spirit, 1 pint; digest 14 days, press, and filter.

2. (Wholesale.) Cubebs, 4½ lbs.; rectified spirit, 1 gal. This essence has a very large sale, and if carefully prepared from a good sample of the drug, is a most excellent preparation. Every fl. oz. represents 2½ drs. of cubebs.—*Dose.* 1 to 3 drs.

Essence of Cubebs (Oleo-resinous). *Prep.* (Dublanc.) Oleo-resinous extract of cubebs, 1 oz.; rectified spirit, 3 oz.; dissolve. A very active and concentrated form of administering cubebs, which must not be confounded with the preceding preparation, which is the one always meant when 'Essence of Cubebs' is ordered.—*Dose.* ½ dr. to 1 dr.

Essence of Dill. *Syn.* DILL DROPS; ESSENTIA ANETHI, L. *Prep.* 1. From oil of dill, as ESSENCE OF ALLSPICE.

2. Oil of dill, extract of dill, and salt of tartar, of each, ½ oz.; rectified spirit, 1 pint; digest, and strain. Both the above are aromatic and anti-flatulent. The first is commonly used as an adjunct to other medicines, especially to purgatives for children. The second is a popular tonic and stomachic in the flatulent colic, dyspepsia, &c., of women and children.—*Dose.* A few drops, on sugar.

Essence of Er'got. See LIQUOR OF ERGOT OF RYE.

Essence of Ergot (Ethereal). *Syn.* ESSENTIA ERGOTÆ ETHEREA, E. SECALIS CORNUTI E., L. *Prep.* 1. (Mr. Lever.). Ergot (powdered), 2 oz.; rectified sulphuric ether, 2 fl. oz.; digest a week, express the tincture, filter, and abandon the liquid to spontaneous evaporation; lastly, dissolve the residuum in ether, 1 fl. oz. This is an expensive and troublesome formula. The following modification of it is both simpler and less expensive.

2. Ergot (ground), 8 oz.; ether, 16 fl. oz.; prepare a tincture as before, and by a gentle heat distil off the ether in a retort connected with a well-cooled refrigerator, until 15 fl. oz. shall have passed over; continue the evaporation at a reduced heat until the remainder of the ether has passed off; lastly, dissolve the residuum, as soon as cold, in ether, 4 fl. oz.

Obs. Each fl. oz. represents 2 oz. of ergot.—*Dose.* 10 to 30 drops as a parturifacient, taken on sugar; 3 to 5 drops as a hæmostatic and emmenagogue, in hæmorrhages, floodings, &c. It possesses all the acrid, narcotic principle of the ergot, but less of the hæmostatic principle than the ordinary essence, whilst it is much more costly.

Essence of Fen'nel. *Syn.* ESSENCE OF SWEET FENNEL; ESSENTIA FŒNICULI, L. *Prep.* From

oil of fennel (*Fœniculum dulce*), as ESSENCE OF ALLSPICE.

Essence of Gen'tian. See INFUSION OF GENTIAN (Concentrated).

Essence of Gin'ger. *Syn.* CONCENTRATED TINCTURE OF GINGER, ESSENTIA ZINGIBERIS, TINCTURA Z. CONCENTRATA, L. *Prep.* 1. Unbleached Jamaica ginger (bruised), 5 oz.; rectified spirit, 1 pint; digest a fortnight, press, and filter.

2. (Oxley's 'CONCENTRATED ESSENCE OF JAMAICA GINGER.') The same as the preceding. with the addition of a very small quantity of essence of cayenne. The above possess only about 4 times the strength of tincture of ginger (Ph. L.); and though vended in the shops as essence of ginger, scarcely deserve the name.

3. As No. 1 (next article, *below*), but using double the quantity of spirit. Very fine.

4. (Kitchener's.) Ginger (grated), 3 oz.; yellow peel of lemon (fresh), 2 oz.; brandy, 1½ pint; digest 10 days. For culinary purposes, &c. See *below*.

Essence of Ginger (Concentrated). *Syn.* ESSENTIA ZINGIBERIS CONCENTRATA. *Prep.* 1. Jamaica ginger (best unbleached, in coarse powder) and siliceous sand, equal parts, are sprinkled with rectified spirit of wine, q. s. to perfectly moisten them, and after 24 hours the mass is placed in a 'percolator,' and after returning the first runnings 2 or 3 times, the receiver is changed, and more rectified spirit poured on gradually, and at intervals, as required, until as much essence is obtained as there has been ginger employed.

Obs. The quality of the product of the above formula is excellent, but the process is somewhat difficult to manage. The mass remaining in the percolator is treated with fresh spirit until exhausted, and the tincture so obtained is employed, instead of spirit, for making more essence with fresh ginger. The last portion of spirit in the waste mass may be obtained by adding a little water. Coarsely powdered charcoal is frequently used instead of sand, in which case the product has less colour; at the same time, however, a little of the flavour is lost.

2. (Wholesale.)—*a*. Best unbleached Jamaica ginger (as last), 12 lbs.; rectified spirit, 2½ galls., are digested together for 14 days, and the expressed and strained tincture reduced by distillation, in a steam or water bath, to exactly 1 gal.; it is next cooled, and transferred as quickly as possible into stoppered bottles, and the next day filtered.

Obs. The product of the last formula is a most beautiful article, of immense strength, and the richest flavour. The assertion made by a recent writer on pharmacy, that 'the product is very strong, but has lost some of the flavour of the ginger,' is evidently made in ignorance of the preparation. "We were the first to introduce and publish this formula, and have employed it for years on the most extensive scale, and can conscientiously asser that, for inexpensiveness, and the quality o the essence produced by it, it is unequalled b any other. The process, though apparentl complicated is, in reality, easily performed The spirit distilled over contains none of the fragrant or aromatic principles of the ginger on the contrary, the little flavour it has re ceived (apparently from a species of etherea oil) is rather disagreeable than otherwise, and is better got rid of than retained in the essence. The spirit is used with advantage for preparing the common tincture of ginger, and several other articles. The cause of failure when this process is adopted is careless or awkward manipulation. When possible, hydraulic pressure should be employed to express the tincture.' 2 oz. of this essence are regarded as equivalent to 3 oz. of the finest ginger, being fully twenty times as strong as the 'TINCTURE OF GINGER' (Ph. L.). A single drop, swallowed, will almost produce suffocation." Cooley.

b. From ginger (as last), 24 lbs.; rectified spirit, 6 galls.; make a tincture, as before, and reduce it by distillation to 1 gal.; then cool as quickly as possible out of contact with the air and add, of the strongest rectified spirit of wine, 1 gal.; lastly, filter, if required. Quality resembles No. 2, *a* (nearly). "We are in the habit of applying the method developed in the last two formulæ to the preparation of the essences of several other substances, the active principles of which are not volatile at a low temperature." Cooley.

Essence of Grape. *Prep.* From grape oil, as ESSENCE OF ALMONDS. It is used to flavour brandy and wines. See OIL (Volatile).

Essence of Guaiac'um. *Syn.* FLUID EXTRACT OF GUAIACUM; ESSENTIA GUAIACI, EXTRACTUM GUAIACI FLUIDUM. L. *Prep.* Recent guaiacum shavings, from which the dust has been sifted, 3 cwt., are exhausted by coction in water, as in the preparation of an extract, using as little of that fluid as is absolutely necessary; the decoction is evaporated to exactly 1¾ gal.; it is next stirred until cold, to prevent the deposit of resinous matter, when it is put into a bottle, and spirit of wine, 5 pints, is added; the whole is then repeatedly agitated for a week, after which it is allowed to settle for 7 or 8 days, and the clear portion is decanted into another bottle.

Obs. This preparation is frequently substituted for guaiacum shavings in the preparation of compound decoction of sarsaparilla. 1 pint of this essence is considered equivalent to 19 lbs. of guaiacum in substance. See DECOCTION OF SARSAPARILLA (Comp.).

Esssence for the Handkerchief. See ESSENTIA ODORATA, &c.

Essence for the Headache. *Syn.* CEPHALIC ESSENCE, EMBROCATION OF AMMONIA, DR. HAWKINS' EMBROCATION, WARD'S E., WARD'S ESSENCE FOR THE HEADACHE; EMBROCATIO AMMONIÆ. [illegible]

PHALICA, L. *Prep.* 1. Oil of lavender (Mitcham), 1 dr.; camphor, 1 oz.; liquor of ammonia, 4 oz.; rectified spirit, 1 pint; dissolve. Very fragrant and powerful.

2. (Beasley.) Spirit of camphor, 2 lbs.; strong water of ammonia, 4 oz.; essence of lemon, ½ oz.

3. (Redwood.) Camphor and liquor of ammonia, of each, 2 oz.; oil of lavender, 4 drs.; rectified spirit, 14 oz. Very fragrant. Stimulant and rubefacient. *Used* as a counter-irritant lotion in local pains, as headache, earache, colic, &c. Compound camphor liniment is usually sold for it. See LINIMENT.

Essence of Henbane. *Syn.* ESSENTIA HYOSCYAMI, L. See ESSENCE (Anodyne), No. 2.

Essence of Hop. *Syn.* ESSENTIA LUPULI, E. HUMULI, TINCTURA LUPULI CONCENTRATA, L. *Prep.* 1. New hops (rubbed small), 26½ oz.; proof spirit, 1 quart; digest 24 hours, then distil over (quickly) 1 pint, and set the distillate (*spiritus lupuli*) aside in a corked bottle; to the residuum add water, 1 pint; boil 15 minutes, cool, express the liquor, strain, and evaporate it as quickly as possible to dryness by the heat of a water bath, powder the residuum, and add it to the distilled spirit; digest a week, and filter.

2. Lupulinic grains (yellow powder or lupulin of the strobiles), 5 oz.; rectified spirit, 1 pint; digest 10 days; express, and filter. Both the above are powerfully bitter, and loaded with the aroma of the hop. They are fully 8 times as strong as the 'TINCTURA LUPULI' of the Ph. L. A few drops added to a glassful of ale or beer render it agreeably bitter and stomachic.

3. (BREWER'S E. OF HOPS.) Several noxious preparations under the name of extract of hops are sold by the brewer's druggist. They are mostly semi-fluid extracts of quassia, gentian, and like powerful bitters. Of three of these articles which we have examined, one (for PALE ALE) consisted of the mixed extracts of quassia and chamomile; another was a preparation of picric acid; whilst a third ('strongly recommended for PORTER') consisted of about equal parts of the extracts of bitter aloes, cocculus indicus, and wormwood. A few years ago one of these vile compounds was publicly advertised, and 'warranted' as being equal to 100 times its weight in hops (¼ oz. to 5½ lbs.).

Essence of Jargonelle Pear. *Syn.* PEAR ESSENCE, ESPRIT DE JARGONELLE, &c. *Prep.* From pear oil (acetate of oxide of amyl), as ESSENCE OF ALMONDS. This is now largely employed to flavour confectionery and liqueurs, See AMYL and OIL (Volatile).

Essence of Jas'mine. See SPIRIT and OIL (Volatile).

Essence of Jes'samine. See SPIRIT and OIL.

Essence of Jon'quil. See SPIRIT and OIL.

Essence of Lav'ender. *Syn.* ESSENTIA LAVANDULÆ (ODORATA), L. *Prep.* 1. Oil of lavender (Mitcham), 2 oz.; rectified spirit (strongest), 1 pint.

2. As the strongest *Eau de lavende.* See SPIRIT.

Essence of Lavender (Red). See SPIRIT and TINCTURE.

Essence of Lem'on. *Syn.* ESSENTIA LIMONIS, L. *Prep.* 1. See OIL (Volatile).

2. (W. Procter.) Fresh oil of lemons, 1 fl. oz.; deodorised alcohol (strongest flavourless rectified), 8 fl. oz.; exterior yellow rind of lemons (fresh, ½ oz.; digest 48 hours, and filter. *Used* for flavouring mixtures, pastry, &c.

3. From oil of lemons, as ESSENCE OF ALLSPICE. *Used* as the last.

Essence of Lemon Peel. *Syn.* ESSENCE OF LEMON RIND, QUINTESSENCE OF L. P.; ESSENTIA CORTICIS LIMONIS, L. *Prep.* 1. Yellow peel of fresh lemons, ½ lb.; spirit of wine, 1 pint; digest for a week, press, and filter. Very fragrant.

2. Yellow peel of fresh lemons, 1 lb.; boiling water, ½ gal.; infuse 1 hour, express the liquor, boil down to ½ pint, cool, and add oil of lemon ½ oz., dissolved in spirit of wine, 1½ pint; mix, and filter. *Used* as the preceding.

Essence of Lov'age. *Syn.* ESSENTIA LEVISTICI, L. *Prep.* (Ph. Wurt.) Lovage root (levisticum officinale), 2 oz.; lovage seeds, 1 oz.; rectified spirit, 10 oz.; digest a week, and filter. Aromatic, stomachic, and diaphoretic. —*Dose.* ½ dr. to 1 dr.; in dyspepsia, dropsies, &c.

Essence, Madden's. Concentrated infusion of roses.

Essence of Malt. See COLOURING.

Essence of Mint. *Syn.* ESSENCE OF SPEARMINT; ESSENTIA MENTHÆ, E. M. SPICATÆ, E. M. VIRIDIS, L. *Prep.* As ESSENCE OF PEPPERMINT.

Essence of Musk. *Syn.* ESSENTIA MOSCHI, TINCTURA M. CONCENTRATA, L. *Prep.* 1. Grain musk, 2 oz., and boiling water, 1 pint, are digested together in a close vessel until cold, when rectified spirit of wine, 7 pints, is added; the vessel (preferably a tin bottle) being corked close, and tied over with bladder, the whole is digested, with frequent agitation, for 2 months, in the sunshine (in summer), or in an equally warm situation in winter. At the end of the time the essence is decanted and filtered.

2. Grain musk, ¼ oz.; rectified spirit of wine, 2 pints; essence of ambergris, 1 fl. oz.; digest as before.

3. Musk (from the bladder, rubbed very small), 5 oz.; civet, 1 oz.; essence of ambergris, 1 pint; spirit of ambrette, 1 gal.; as before.

Obs. All the preceding formulæ yield superior essences, but the product of the last is of the very finest quality, and such as is seldom sold, except by the most celebrated houses, when it fetches a very high price. It is powerfully and deliciously odorous, and has received the approval of royalty itself, both in

these kingdoms and on the continent. The second formula also produces a very fine article, but less choice than that just referred to. The digestion should be long continued, and on no account less than 3 weeks, as otherwise much fragrant matter is left undissolved. The addition of 1 fl. dr. of either liquor of ammonia or liquor of potassa (the first is best) to each pint of the essence, vastly increases its fragrance. The essence of musk of the wholesale London druggists is generally made by merely digesting the freshly emptied musk pods in rectified spirit. Sometimes a little (a very little) grain musk is added. See ESSENCE ROYALE and ESSENCE OF AMBERGRIS.

4. (Guibourt.) Musk, 1 part; proof spirit, 12 parts; digest a fortnight, or longer. *Used* in dispensing, &c.

Essence of Musk Seed. See ESSENCE D'AMBRETTE.

Essence of Mus'tard. *Syn.* ESSENTIA SINAPIS, L. *Prep.* (Whitehead's.) Black mustard seed (bruised), and camphor, of each, 2 oz.; oil of rosemary, 3 drs.; balsam of tolu, 1 dr.; annatto, ½ dr.; digest a week, and filter.

Essence of Myr'tle. *Syn.* ESSENCE OF MYRTLE BLOSSOMS; ESSENCE DE MYRTE, ESPRIT DE M., Fr. *Prep.* Myrtle tops (in blossom), 2½ lbs.; proof spirit, 9 pints; digest 3 days, then distil 1 gal. A pleasant perfume. See OIL (Volatile).

Essence of Nero'li. *Syn.* ESSENCE DE FLEURS D'ORANGES, ESPRIT DE F. D'O., Fr. *Prep.* 1. Neroli, 3 drs.; rectified spirit of wine, 1 pint; mix. A delicious perfume.

2. Oil of orange, 2 drs.; orris root (bruised), ½ oz.; ambergris, 10 grs.; neroli, 35 drops; spirits of wine, 1 pint; digest 14 days, and filter. Very fragrant, but less 'chaste' than the last.

Essence of Nut'meg. *Syn.* ESSENTIA MYRISTICÆ, E. M. MOSCHATÆ, E. NUCIS M., L. *Prep.* From essential oil of nutmeg, as ESSENCE OF ALLSPICE. *Used* as a flavouring or zest by cooks, liqueuristes, and confectioners.

Essence, Odontal'gic. See TOOTHACHE ESSENCE.

Essence d'Œillets. [Fr.] *Prep.* From cinnamon, 3 oz.; cloves, 1½ oz.; (both well bruised;) rectified spirit, 1 quart; digest for a week. Oil of cloves and spirit of cloves also bear this name in some places.

Essence of O'pium. See ANODYNE ESSENCE, No. 1. BLACK DROP and ROUSSEAU'S LAUDANUM have also been sometimes so called.

Essence of O'range. *Syn.* ESSENTIA AURANTII, L. *Prep.* As ESSENCE OF LEMON.

Essence of Orange Peel. *Syn.* ESSENTIA CORTICIS AURANTII, L. *Prep.* 1. (Golden.) Fresh yellow rind of orange, 4 oz.; rectified spirit and water, of each, ½ pint; digest for a week, press, filter, and add of sherry wine, 1 quart. A pleasant liqueur.

2. (Saccharated.) See OLEO-SACCHARUM.

Essence d'Orient. [Fr.] A pearly looking substance, found at the base of the scales of the blay or bleak, a small fish of the genus *cyprinus*.

Prep. The scales are scraped from the fish into a tub containing water, and after agitation and repose the fluid is poured off, and its place supplied with fresh water, and this in its turn, after agitation and repose, is also poured off. This part of the operation is repeated till the 'essence' and scales are perfectly freed from impurities, when the whole is thrown on a sieve, which retains the latter, but allows the former to flow through. After repose for a short time, the essence is obtained as a deposit at the bottom of the vessel.

Obs. Essence d'Orient has a bluish-white and pearly aspect, and is employed to cover the interior of glass bubbles and beads, in imitation of pearls and mother-of-pearl. Its tendency to putrefaction, while in the moist state, may be obviated by the addition of a little liquor of ammonia.

Essence of Patch'ouli. *Syn.* ESSENCE DE PATCHOULIE, ESPRIT DE POUCHÂ PÂT, Fr. *Prep.* 1. Indian patchouli (leaves or foliaceous tops), 2½ lbs.; rectified spirit, 9 pints; digest for a week; add, of water, 1 gal.; oil of lavender (Mitcham), 3 drs.; common salt, 2 lbs.; agitate well together, distil over (rapidly) 1 gallon, and add of essence of musk, 3½ fl. drs. A very fashionable perfume. Essence of patchouli, thus prepared, has been largely used, both at court and by the nobility generally.

2. Patchouli, 3 oz.; rectified spirit, 1 pint; digest a week, press, and filter. A still commoner kind is made with proof spirit.

Essence of Pear. *Syn.* ESSENCE OF JARGONELLE.

Essence of Pen'nyroyal. See ESSENTIA PULEGII, E. MENTHÆ P., L. *Prep.* From pennyroyal (*Mentha pulegium*), as ESSENCE OF PEPPERMINT. Stimulant, carminative, and emmenagogue. *Used* in dispensing, especially to make extemporaneous pennyroyal water.

Essence of Pep'permint. *Syn.* ESSENTIA MENTHÆ PIPERITÆ (B. P.) L. *Prep.* 1. (B. P.) Oil of peppermint, 1 part; rectified spirit, 4 parts. Mix.—*Dose.* 10 to 20 minims.

2. To the last add of herb peppermint, parsley leaves, or spinach leaves (preferably one of the first two), ½ oz., and digest for a week, or until sufficiently coloured. Sap green (10 or 12 grs., rubbed up with a teaspoonful of hot water) is also used for the same purpose. A delicate light green.

3. (Ph. U. S.) Oil of peppermint, 2 fl. oz.; rectified spirit, 16 fl. oz.

Obs. Essence of peppermint is not conceived to be good by the ignorant, unless it has a pale-greenish tint, which they take as a proof of its being genuine. The most harmless way of tinging it is that indicated above. A little green mint or parsley will, indeed, be found to improve the flavour. These additions are quite harmless. The practice of using cupreous salts, adopted by some lazy and unprincipled makers, is unpardonable, and admits

of no excuse, even a lame one, as not the least advantage, either of convenience, cost, or appearance, results from such a practice, while the colouring matter, though small in quantity, is nevertheless sufficient to impart a noxious quality to the liquid. This fraud may be detected by the addition of liquor of ammonia in excess, which will strike a bluish or greenish-blue colour when copper is present.

Essence of peppermint (like that of most of the other aromatic oils) is cordial, stimulant, and stomachic. A few drops (10 to 30) on sugar, or mixed with a little water or wine, is an excellent remedy in flatulence, colic, nausea, sickness, &c. It is also extensively used as a flavouring ingredient by cooks, confectioners, and druggists. A few drops, well agitated with half a pint of cold water, form an excellent extemporaneous peppermint water.

The formulæ 1 and 2, generally the latter, are those employed by the respectable portion of the London trade. The various published receipts for this and similar essences, ordering the essential oil in a larger proportion than that directed above, are never adopted in practice, and their products (often impossible combinations) exist only in the imaginations of the writers.

Essence of Pimen'to. See ESSENCE OF ALLSPICE.

Essence of Pine-apple. From pine-apple oil (butyric ether, butyrate of ethyl), as ESSENCE OF ALMONDS. It forms a delicious flavouring for liqueurs, confectionery, rum, &c. See ETHER and OIL (Volatile).

Essence of Quas'sia. *Syn.* ESSENTIA QUASSIÆ, L. *Prep.* 1. From quassia (sliced), 1½ oz.; proof spirit, 1 pint; digest 10 days, and filter. ½ fl. dr. added to 7½ fl. drs. of water, forms the infusion of quassia of the Ph. L.—*Dose.* ½ dr., in water or wine, an hour before a meal, as a stomachic tonic, in dyspepsia, loss of appetite, &c., particularly when complicated with gout; 1 to 2 drs., three or four times daily, as a febrifuge and antiseptic, in intermittents, putrid fevers, &c.

2. (BREWER'S.)—*a.* From powdered quassia (sprinkled with a little rum) and "foots" (coarse moist sugar or sugar bottoms), equal parts, reduced to the consistence of a semi-fluid extract by the addition of a few spoonfuls of water. For ale.

b. From powdered quassia, 1 part; burnt sugar colouring, 2 parts; well stirred together. For porter and stout. Both are used by fraudulent brewers as substitutes for hops.

Essence of Quin'ine. *Syn* ESSENTIA QUINÆ, L. *Prep.* From disulphate of quinine, 1½ oz.; rectified spirit, ½ pint; digest with warmth, gradually dropping in a little dilute sulphuric acid (avoiding excess), and employing constant agitation, until the whole is dissolved. 1 fl. dr., added to 7 fl. drs. of proof spirit, forms the 'TINCTURE OF QUININE' (Ph. L.). Every fl. dr. contains 8 grs. of disulphate of quinine, or about 10 grs. of the neutral sulphate. If more sulphuric acid is added than is sufficient to dissolve the salt (*i. e.* convert it into a neutral sulphate), the solution is apt to deposit part of it on keeping, owing to the gradual formation of ether, by the action of the excess of acid on the alcohol.

Essence of Rat'afia. The same as Essence of Almonds. So called from being used to flavour ratifias, noyeau, and other liqueurs.

Essence of Rhu'barb. *Syn.* ESSENTIA RHEI, L. *Prep.* From rhubarb (in powder) and siliceous sand, of each, 5 oz.; proof spirit, 1 pint; by the method of displacement. Every fl. oz. represents the active virtues of 2 drs. of rhubarb.

Essence of Rondele'tia. *Prep.* 1. Essence (oil) of bergamotte, essence (oil) of lemon, and oil of cloves, of each, 1 dr.; otto of roses, 10 drops; rectified spirit, 1 pint.

2. To the last add, of oil of lavender, 1 dr.; neroli, 15 drops. A very fashionable and agreeable perfume.

Essence of Ro'ses. *Syn.* ESSENTIA ROSÆ (ODORATA), L. *Prep.* 1. Attar of roses (genuine), 2 drs.; alcohol, 1 pint; agitate frequently until they unite.

2. Attar of roses, 1 oz.; rectified spirit, 1 gal.; mix in a close vessel, and assist the solution by placing it in a bath of hot water. (See ESSENCE OF MUSK.) As soon as the spirit gets warm, take it from the water and shake it till quite cold; the next day filter. —*Obs.* Unless the spirit of wine is of more than the common strength, it will not retain the whole of the otto in solution in very cold weather.

3. To each pint of either of the preceding, add, of oil of bergamotte, 30 drops; neroli and essence of musk, of each, 20 drops.

4. Petals of roses, 3 lbs., digest in spirit of wine, 5 quarts, for 24 hours; distil to dryness in a water bath; digest the distilled spirit on 2 lbs. of fresh rose petals, as before, and repeat the whole process of maceration and distillation a third, fourth, fifth, and sixth time, or oftener, the last time only drawing over 1 gal., which is the essence. Each of the above is very superior. The last has a peculiar delicacy of flavour, when the spirit used to make it is pure.

Essence of Roses (Red). *Syn.* ESSENTIA ROSÆ (RUBRÆ), TINCTURA E. CONCENTRATA, L. *Prep.* From rose leaves, 1 lb.; proof spirit, 1 gal.; digest for 14 days, press, strain, add concentrated acetic acid, 2½ fl. drs.; mix well, and the next day filter. *Used* to make extemporaneous SYRUP and HONEY OF ROSES, &c. Smells, colours, and tastes, strongly of the flower. CONCENTRATED INFUSION OF ROSES is sold under the same name.

Essence of Rose'mary. *Syn.* ESSENTIA ROSEMARINI, L. *Prep.* From oil of rosemary, as ESSENCE OF ALLSPICE. *Used* as a perfume; also to make extemporaneous rosemary water.

Essence Royale. [Fr.] *Prep.* 1. (Soubeiran.) Ambergris, 40 grs.; musk, 20 grs.; civet and carbonate of potassa, of each 10 grs.; oil of cinnamon, 6 drops; oil of rhodium and otto of roses, of each, 4 drops; rectified spirit of wine, 4 fl. oz. (say ¼ pint); macerate for 10 days or longer. Antispasmodic and aphrodisiac. A few drops on sugar, or in syrup of capillaire.

2. See ESSENCE OF AMBERGRIS.

Essence of Sarsaparil'la. *Syn.* CONCENTRATED ESSENCE OF SARSAPARILLA; ESSENTIA SARSÆ; E. SARSAPARILLÆ, L. *Prep.* 1. Sarsaparilla root (best red Jamaica), 2¾ lbs., is carefully decorticated, the bark reduced to coarse powder, and digested for a week or 10 days in sherry, ¾ pint, and rectified spirit, ¼ pint, with frequent agitation; after which the essence is expressed, and in a week the clear portion is decanted from the sediment. A very elegant preparation. ½ fl. dr., added to 7 fl. drs. of water, forms 1 fl. oz. of a solution of equal strength to decoction of sarsaparilla of the Ph. L. Every fl. oz. represents the active principles of 2 oz. (= 2 oz. 85 grs., avoir.) of sarsaparilla root. In other words, it is twice as strong as the root, and 16 times as strong as the decoction.

2. Alcoholic extract of sarsaparilla, 7 oz.; sherry, ¾ pint; rectified spirit, ¼ pint; dissolve, and filter. Strength as the last.

3. (Beral.) Alcoholic extract, 4 oz.; sherry wine, 1 pint; dissolve and filter. About 3 fl. drs., added to water, 1 pint, form an extemporaneous decoction.

4. (Guibourt.) Alcoholic extract, 4 oz.; white wine, 1 lb. Strength the same as Nos. 1 and 2 (nearly).

5. (Hening.) Sarsaparilla (bruised, 10 oz.; distilled water, 6 pints; macerate at a temperature of 120° Fahr. for six hours, and strain; repeat with the same quantity of fresh water; mix the liquors, and evaporate in china vessels at 160° Fahr. If reduced to 10 fl. oz. (or to 9 fl. oz., with 1 fl. oz. of rectified spirit added), 1 fl. dr., mixed with 7 fl. drs. of water, will be equal to the decoction of the usual strength. If reduced to 5 fl. oz., 1 fl. dr. will be equal to 2 fl. oz. of the decoction.

6. The bark separated from sarsaparilla root, 2¾ lbs., is exhausted with water as last; the liquid is evaporated, as quickly as possible, in a water bath, to 16 fl. oz., and when cold, mixed with rectified spirit, 4 fl. oz. Strength same as No. 1.

7. The infusion in No. 6 is evaporated to 10½ fl. oz., and when cold mixed with sherry, ¼ pint; in a week the clear portion is decanted from the sediment. Strength same as No. 1.

Obs. The formulæ No. 1, 2, 6, and 7, have each in turns been extensively employed by us in the laboratory, with the most satisfactory results. See LIQUOR OF SARSAPARILLA.

Essence of Sarsaparilla (Compound). *Syn.* ESSENTIA SARSAPARILLÆ COMPOSITA, E. SARSÆ C., L. *Prep.* 1. One pint of No. 1, 2, 6, or 7 (*above*), is triturated with the extract prepared from mezereon bark, 3½ oz., and extract of liquorice, 4 oz.; when mixed, it is returned to the bottle, and essence of guaiacum, 1½ fl. dr., and oil of sassafras, 20 drops, are added; the whole is then well agitated for at least 15 minutes, and after a week's repose the clear portion is decanted, as before. ½ fl. dr., with 7½ fl. drs. of water, forms extemporaneous compound decoction of sarsaparilla.

2. (Cadet.) Sarsaparilla (bruised), 8 oz.; hot water, q. s.; exhaust the root by successive macerations; unite the liquors, and evaporate to 10 fl. oz.; strain, and add, when cold, of alcohol (·842) and tinctures of guaiacum and mezereon, of each, 4 fl. drs.; white wine, 1 fl. oz.; oil of sassafras, 12 drops; extract of liquorice, 2 drs.; agitate, and after repose decant as before. This is nearly 8 times as strong as 'DEC. SARSÆ CO.,'—Ph. L. The first is the best formula. See LIQUOR OF SARSAPARILLA (Compound).

Essence of Sa"vory Spices. *Prep.* 1. Black pepper, 4 oz.; powdered turmeric, 3 drs.; coriander seeds, 1½ dr. (all ground and genuine); oil of pimento, 1½ fl. dr.; oils of nutmeg, cloves, cassia and caraway, of each, ½ dr.; rectified spirit, 1 pint; digest, with agitation, for a fortnight. Very fine.

2. Black pepper, 3 oz.; allspice, 1½ oz.; nutmegs and burnt sugar, of each, ½ oz.; cloves, cassia, coriander, and caraway seeds, of each 1 dr. (all bruised or ground); rectified spirit, 1 pint; digest, with agitation, as before, for 14 days, press, and filter. Used as a flavouring. When made with proof spirit or brandy, and only ½ the above weight of spice, it is called 'TINCTURE OF SAVORY SPICES.'

Essence of Sen'na. See LIQUOR and INFUSION (Concentrated).

Essence of Smoke. See WESTPHALIAN ESSENCE.

Essence of Soap. *Syn.* SPIRIT OF SOAP, SHAVING FLUID; ESPRIT DE SAVON, ESSENCE DE SAVON, ESSENCE ROYALE POUR FAIRE LA BARBE, Fr.; ESSENTIA SAPONIS, TINCTURA SAPONIS CONCENTRATA, L. *Prep.* 1. Castile soap (in shavings), 4 oz.; proof spirit, 1 pint; dissolve, and add a little perfume.

2. Venetian soap, ¾ lb.; salt of tartar, 1 oz.; benzoin, ½ oz.; spirit of wine, 1 gal.

3. Best soft soap, ½ lb.; boiling water, 1 pint; dissolve, cool, and add, oils of cinnamon (cassia), verbena, and neroli, of each, 6 drops; dissolved in rectified spirit, 1 pint; mix well, and if not perfectly transparent, add a little more strong spirit, or filter through blotting paper.

Obs. This alcoholic solution of soap is chiefly used for shaving, and is very convenient in travelling, as a good lather may be instantly produced without the trouble of employing a soap-box. Instead of the above perfumes, 15 drops of essence of musk or ambergris, or 30 drops of any of the perfumed spirits, or 3 drops of attar of roses, or 6 drops of any of the aromatic essential oils, may be added, when a cor-

responding name is given to the preparation, as esprit de savon, de la rose, &c.

4. (P. Cod.) White soap, 3 oz.; carbonate of potassa, 1 dr.; proof spirit, 12 oz.; dissolve. *Used* medicinally. They are all used as frictions, &c.

5. (CAMPHORATED,—Guibourt.) White soap, 3 parts; camphor, 1 part; spirit of rosemary, 16 parts; dissolve. A variety of opodeldoc. *Used* as an embrocation in rheumatic pains, sore throat, &c.

Essence of Soup Herbs. *Syn.* SPIRIT OF SOUP HERBS, CONC. TINCTURE OF S. H., &c. *Prep.* (Kitchener's.) Lemon thyme, winter savory, sweet marjoram, and sweet bazil, of each 1 oz.; lemon peel (grated), and eschalots, of each, ½ oz.; bruised celery seed, ¼ oz.; proof spirit or brandy, 1 pint; digest for 10 days or a fortnight. A superior flavouring essence for soups, gravies, &c. See ESSENCE OF SAVOURY SPICES.

Essence of Spear'mint. See ESSENCE OF MINT.

Essence of Sprats. *Syn.* ESSENCE OF BRITISH ANCHOVIES. From pickled sprats (British anchovies), as ESSENCE OF ANCHOVIES, for which it is commonly sold.

Essence of Spruce. *Syn.* FLUID EXTRACT OF SPRUCE; ESSENTIA ABIETIS, EXTRACTUM A. FLUIDUM, L. *Prep.* A decoction of the young tops of the black spruce-fir (*Abies nigra*), evaporated to the consistence of a thick syrup. *Used* to make spruce beer, &c.

Essence, Toothache. *Syn.* ESSENTIA ODONTALGIA, L. *Prep.* 1. Acetate of morphia, ½ dr.; tincture of pellitory of Spain (made with rectified spirit), 2 fl. oz.; acetic acid (glacial), 4 fl. drs.; dissolve, and add of oil of cloves, 6 fl. dr.

2. (Redwood.) Pellitory, ½ lb.; extract of belladonna, 2 drs.; rectified spirit, 1 pint; digest 14 days, strain, and add, of hyponitrous ether, 1 oz.; oil of wine, ½ oz.; oil of cloves, 2 drs. See DROPS (Odontalgic).

Essence of Tu"berose. *Prep.* The flowers are stratified with sheep's or cotton wool, impregnated with the purest oil of ben or of olives, in an earthen vessel, closely covered, and kept for 12 hours in a water bath; the flowers are then removed, and fresh ones substituted, and this is repeated until the oil (HUILE AU TUBEROSE) is sufficiently scented. The wool or cotton is then mixed with the purest spirit of wine, and distilled in a water bath; or it is first digested in a warm situation, and in a well-closed vessel, for several days, during the whole of which time frequent agitation is had recourse to. A similar plan is followed for the preparation of essences of jasmine, violets, and other like flowers. See SPIRIT.

Essence of Tur'tle. *Syn.* ESSENCE OF GREEN TURTLE. *Prep.* From essence of anchovies and shallot wine, of each, 3 oz.; basil wine, ½ pint; mushroom ketchup, ½ pint; the juice of 2 lemons; the yellow peel of 1 lemon; curry powder, ¼ oz.; digest for a week. *Used* to impart the flavour of turtle to soups and gravies.

Essence of Tyre. See HAIR DYE.

Essence of Vanil'la. *Syn.* ESSENTIA VANILLÆ, TINCTURE V. CONCENTRATA, L. *Prep.* 1. Vanilla (cut small), 2 oz.; rectified spirit, 1 pint, digest a fortnight.

2. (Wholesale.) Vanilla, 2 lbs.; rectified spirit, 1 gal.; proceed as for ESSENCE OF MUSK. Very superior.

3. Vanilla (best), ¾ lb.; spirit of ambrette, 1 quart; cloves, 30 grs.; grain musk, 7 grs.; as last. Much esteemed. It is chiefly used as a perfume and for flavouring.

Essence of Verbe'na. *Syn.* ESSENCE OF LEMON-GRASS, E. OF CITRONELLE; ESSENTIA VERBENÆ, L. *Prep.* 1. From oil of lemon grass or verbenæ (*Andropogon citratum*), as ESSENCE OF ALLSPICE.

2. To the last add, of essences of ambergris and bergamotte (oil), of each, 1 fl. dr.; neroli, ½ fl. dr.

3. To No. 1 add, of oils of lavender and bergamotte, of each, ½ dr.; essence of vanilla, 2 fl. drs. A powerful and refreshing perfume.

Essence of Vi'olet. *Syn.* ESSENTIA VIOLÆ, L.; ESSENCES DES VIOLETTES, Fr. See ESSENCE OF TUBEROSE and SPIRIT.

Essence of Vittie Vayr. *Syn.* ESSENCE OF VETIVER; ESSENCE DE VITTIE VAYR DOUBLE, Fr. *Prep.* 1. Vittie vayr or cuscus (the root of *Andropogon muricatus*, cut small and bruised), 3 lbs.; proof spirit, 9 pints; digest a week, add of water, 5 pints, and the next day distil over 1 gal. of essence.

2. To the last, before distillation, add, of otto of roses, ½ dr.; eau de melisse (spirit of balm), ½ pint; and proceed as before. *Used* as a perfume. In 1831 it was much employed in Paris as a prophylactic of cholera.

Essence, Volatile (Acetic). *Syn.* PUNGENT ACETIC ESSENCE; ESSENTIA VOLATILIS ACETICA, L. Aromatic vinegar.

Essence, Volatile (Ammoniacal). *Syn.* PUNGENT AMMONIACAL ESSENCE, AROMATIC AMMONIACAL E.; ESSENTIA VOLATILIS, E. V. AMMONIACALIS, E. V. AROMATICA, &c., L. *Prep.* 1. Oil of cinnamon, 6 drops; otto of roses, 12 drops; oil of cloves, 1 fl. dr.; essence of bergamotte, 2 fl. drs.; oil of lavender (Mitcham), 4 fl. drs.; essence of musk, 5 fl. drs.; liquor of ammonia (strongest), 1 pint; mix in a cold place, and shake the bottle until the whole is combined.

2. Essence of violets and oil of cinnamon, of each, 12 drops; neroli, essence of jasmine, and otto of roses, of each ½ dr.; oil of lavender, 1 dr.; essence royale and essence (oil) of bergamotte, of each, 2½ drs.; liquor of ammonia (strongest), 1 pint; as the last.

3. Oils of lemon and bergamotte, of each, 5 fl. drs.; oil of lavender, 1½ fl. dr.; otto of roses, 1 fl. dr.; oils of cassia neroli, cloves, and cedrat, of each, ½ fl. dr.; oil of sandal wood, 15 drops; liquor of ammonia (strongest), 1 pint.

4. Essence of bergamotte, 6 fl. drs.; oil of lavender, 4 fl. drs.; oil of cloves, 3 fl. drs.; oil of cassia, 1½ fl. dr.; oil of verbena (lemon grass), 1 fl. dr.; otto of roses, 30 drops; liquor of ammonia, 18 fl. oz.

5. (Redwood.) Oil of bergamotte, 3 oz.; essence of lemons, 2 oz.; oil of lavender, 6 drs.; essence of jasmine, 4 drs.; oil of sassafras, 3 drs.; oil of neroli, 2 drs.; otto of roses, 1½ dr.; oil of origanum and essence of ambergris, of each, 1 dr.; musk, 20 grs.; macerate for a week, and decant the clear portion. It is added to the strongest liquor of ammonia in proportion of 1½ oz. to the pint.

Obs. The above are used to fill smelling-bottles. They are all very fragrant and refreshing.

Essence, Ward's. See HEADACHE ESSENCE.

Essence of Water-fen'nel. *Syn.* ESSENTIA PHELLANDRI AQUATICI, E. FŒNICULIS A., L. *Prep.* (Cottereau.) Water-fennel seeds (fine-leaved water-hemlock, bruised), 1 oz.; proof spirit, 4 fl. oz.; digest. Narcotic and pectoral. —*Dose.* 5 to 25 drops, combined with bark; in phthisis, &c.

Essence, Westphalian. ESSENCE OF SMOKE, E. OF WOOD-SMOKE, CAMBRIAN ESSENCE, SMOKING FLUID; ESSENTIA FULIGINIS, &c., L. *Prep.* 1. Crude or empyreumatic pyroligneous acid, 1 pint; sugar colouring, 2 oz.; dissolve, and in a week decant the clear portion.

2. Tar, 3 drs.; sugar colouring, 2 oz.; hot crude pyroligneous acid, 1 pint; agitate constantly for 1 hour, and after repose decant the clear portion.

3. Acetic acid (Ph. L.), 1 pint; creasote, 5 drs.; mix. White.

4. Barbadoes tar, ¼ oz.; burnt sugar and common salt, of each, 1 oz.; strong pickling vinegar, ½ pint; port or elder wine, ½ pint; digest as before. Inferior to the preceding. *Used* to impart a smoky flavour to meat, fish, &c., by brushing it over them, or adding a little to the brine in which they are pickled.

Essence of Worm'wood. *Syn.* ESSENTIA AMARA, E. ABSINTHII, L. *Prep.* 1. Extract of wormwood, 4 oz.; oil of wormwood, 1 oz.; rectified spirit, 1 pint; digest a week, and filter. Tonic, stomachic, and vermifuge.—*Dose.* 10 drops to a teaspoonful.

2. (Van Mons.) Tincture of wormwood, 1 pint; salt of wormwood, 5 drs.; extract of wormwood, 1 dr.; digest as before.—*Dose.* ½ to 1½ fl. dr.

Fla"vouring Essences. *Syn.* CULINARY ESSENCES, SPICE E., ESSENCES FOR THE TABLE, &c. Those used by cooks, confectioners, liqueurists, &c., are all made by either dissolving 1 fl. oz. of the essential oil of the particular substance in 1 pint of rectified spirit, or by digesting 4 to 6 oz. of the bruised spice, or 5 to 10 oz. of the dried herb, in a like quantity (1 pint) of spirit. The first method is preferable, from being the least troublesome, and yielding the finest product. They are commonly labelled 'CONCENTRATED ESSENCE OF ——.' An inferior article, vended under the names of 'ESSENCES OF CULINARY HERBS,' 'CULINARY TINCTURES,' 'TINCTURES FOR KITCHEN USE,' &c., are prepared from half the above quantity of oil or spice, infused in a pint of proof spirit or British brandy. The principal compounds of this class are the essences of allspice, caraway, cardamoms, cassia, cayenne, celery seed, cinnamon, cloves, coriander seed, fennel, garlic, ginger, lemon peel, mace, marjoram, nutmegs, orange peel, peppermint, spearmint, sweet basil, and the like. The whole of these are employed to flavour soups, gravies, sweetmeats, pastry, wines, mulled wines, liqueurs, &c.

Essences, Flower. Those for which separate formulæ are not given in this work, may most of them be made from the essential oil of the flowers and rectified spirit, as the last; or by digesting the flowers (crushed or bruised), 3 to 5 lbs., in proof spirit, 2 galls., for a few days, and then drawing over, by distillation, 1 gal. For the essences of those flowers which are not strongly odorous, the spirit thus obtained is distilled from a like quantity of flowers, a second, and a third time, or even oftener. The essences of other organic substances, whose fragrant principles are volatile, may be prepared in the same manner. A small quantity of some other odorous essence is frequently added to the product, to enrich or modify the fragrance. See FLOWERS and ESSENCES BY INFUSION.

Essences, Fra'grant. See FLOWER ESSENCES (*above*), ESSENTIA ODORATA, PERFUMERY, &c.

Essences, Fruit. See ESSENCES OF APPLE, PINE-APPLE, JARGONELLE, &c.

Essences by Infu'sion. This term, among perfumers, is commonly applied to those essences, eaux, and esprits, which are prepared by digesting the ingredients in the spirit used as the vehicle for the aroma, in opposition to those obtained by 'distillation,' or by 'contact,' or 'pressure.' Thus, the ESSENCES OF AMBERGRIS, MUSK, and VANILLA, are of this class.

Essences, Vi'nous. *Syn.* ESSENTIA VINOSA, L. These are prepared in a similar way to the wines (VINA) of the pharmacopœia, by using 8 times the usual quantity of ingredients, and the very strongest sherry wine. 1 fl. dr., added to 7 fl. drs. of wine or water (properly the first only), forms an extemporaneous imitation of the officinal VINA MEDICATA. Some of the above are largely used in dispensing, and by travellers. See LIQUOR and WINE.

Essentia Bi'na. See COLOURING.

Essentia Odora'ta. *Prep.* 1. Oil of lavender, 1 dr.; oils of cloves, cassia, and bergamot, of each, ½ dr.; neroli, 20 drops; essence royale, 2 fl. drs.; rectified spirit, ½ pint; mix.

2. (Redwood.) English oil of lavender, 48 drops; oil of cloves, 32 drops; oil of orange peel, 16 drops; oil of bergamotte and sweet spirit of nitre, of each, 8 drops; oil of yellow sandal-wood, neroli, and otto of roses, of each, 2 drops; oil of cinnamon, 1 drop; rectified

spirit, and essence of ambergris and musk, of each, 1 oz.; honey water, 8 oz.; mix. *Used* as a perfume for the handkerchief, &c. The last form seems unnecessarily complicated and minute.

Essentia Odorif'era. *Prep.* 1. Grain musk and balsam of Peru, of each, 10 grs.; civet, 4 grs.; oil of cloves, 5 drops; oil of rhodium, 3 drops; salt of tartar (dried by a dull-red heat and cooled), ½ dr.; rectified spirit (strongest), 2½ fl. oz.; macerate for 14 days, and pour off the clear.

2. Oil of rhodium and balsam of Peru, of each, ½ dr.; oil of cloves, 1 dr.; spirit of ammonia, 2 fl. drs.; essence of civet and vanilla, of each, 2 fl. oz.; essence of musk, 5 fl. oz.; neroli, oils of lavender, verbena, and cassia, of each, 6 drops. As last. Both are very pleasant, durable, and powerful perfumes for personal use.

ESSENTIAL OIL. See OIL (Volatile).

ESSENTIAL SALT OF BARK. See BARK and EXTRACT.

ESSENTIAL SALT OF LEMONS. *Syn.* SALT OF LEMONS; SAL LIMONUM, L. The preparation sold under this name is made by mixing cream of tartar (bitartrate of potassa) with twice its weight of salt of sorrel (quadroxalate of potassa), both in fine powder. It is used to remove fruit stains, &c., from linen, by rubbing a little of it on the part moistened with warm water. It is poisonous, if swallowed in quantity.

ETCH'ING. A species of engraving, in which the design is formed on the plate by the action of an acid, or some other fluid, instead of being cut out by the graver.

Proc. In the ORDINARY PROCESS OF ETCHING the plate is covered with 'etching ground' (an acid-resisting varnish), and the design is scratched on the metal through the ground, by means of a pointed tool of steel called the 'etching needle' or 'point.' A border of wax is then placed round the plate, and the 'biting' fluid poured on, and allowed to remain till the 'lights' or finest portions of the design are sufficiently 'bitten in.' The etching fluid is then poured off, the plate washed, and the light parts 'stopped out' with Brunswick black or other varnish; the solvent is again poured on, and allowed to remain until the finest portion of the exposed lines are sufficiently deep, when the acid is again poured off, and the whole process is repeated till the very darkest lines or shadows are sufficiently 'bitten in.' The plate is then cleaned, and is ready to be printed from. Occasionally the etched design receives a few finishing touches with the 'graver.'

There are several varieties of etching, of which the following are the principal:—ETCHING WITH A SOFT GROUND, when a coating of lard or tallow is employed, and the design is drawn on a piece of paper, laid evenly on the ground, by which means the fatty matter adheres to the paper, on the parts pressed on by the point or pencil, and the copper beneath becomes exposed, and is then acted on by the acid. The effect resembles that of chalk or pencil drawings.—STIPPLING, or executing the design in dots instead of lines.—AQUATINTA or AQUATINT, a mode of etching on copper for producing an effect resembling a drawing in Indian ink. It is performed by sifting powdered asphaltum or lac resin on the plate, previously slightly greased, and, after shaking off the loose powder, gently heating it over a chaffing dish; on cooling, the lights are covered with turpentine varnish coloured with lampblack, by means of a hair pencil, and a rim of wax being placed round the plate, a mixture of 'aquafortis' and water is poured on it, and allowed to remain for 5 or 6 minutes, when it is poured off, the plate dried, and recourse had to the pencil as before. The process of 'stopping' and 'etching' is repeated again and again, until the darkest shades are produced. Sometimes, instead of using asphaltum, an alcoholic solution of shellac or gum mastic is poured over the plate, placed in a slanting direction; this varnish forms a film, which, on drying, leaves innumerable cracks or minute fissures through which the acid acts on the plate. The fineness or coarseness of the grain depends entirely upon the condition of the powdered asphaltum, or on the quantity of matter dissolved in the spirit employed to form the ground.

The fluids employed for 'biting in' the designs vary considerably, almost every artist having his own receipt. Aquafortis, more or less diluted, is, however, generally employed for COPPER, and this, with the addition of pyroligneous acid, for etching on STEEL; but any fluid that rapidly dissolves the metal may be used for the purpose. The 'etching ground' may be formed of any substance capable of resisting the action of the etching fluid, and which is, at the same time, sufficiently soft to allow of the free use of the needle or point, and sufficiently solid to prevent an injury to the design during the 'scratching in.'

In ETCHING ON GLASS, the ground is laid on, and the design 'scratched in' in the usual way, when liquid hydrofluoric acid is applied, or the glass is exposed to the action of hydrofluoric acid gas. The former renders the surface of the etching transparent, the latter opaque. A simple modification of the process is to wet the design with sulphuric acid, and then to sprinkle on some finely pulverised fluor spar (fluoride of calcium), by which means hydrofluoric acid is set free and attacks the glass. This method may be very easily applied to the graduation of glass vessels, thermometer tubes, &c.

A RAPID METHOD OF ETCHING ON IRON OR STEEL, capable of very general application, is as follows:—"The metal is warmed until it is capable of melting a piece of bees' wax, or 'etching ground,' which is then carefully

rubbed over it, so as to form a thin and even coating; when cold, the design is 'scratched in' in the common way; a little powdered iodine is then sprinkled on the exposed parts, and at the same time a few drops of water are added, and the two worked into a liquid paste with a camel-hair pencil. The paste is then moved about over the intended etching, for a period varying from one to five minutes, according to the depth of the lines required to be produced. Afterwards the whole is removed, and reapplied, &c., as with the usual etching fluids. The same etching-paste, by being kept for a few days, again acquires the property of dissolving iron, and may be used again and again; but independently of this, the iodide of iron formed during the process, if rapidly evaporated to dryness in a clean iron vessel by a moderate heat, and placed in stoppered bottles, will sell for more than the original cost of the iodine. To travellers and amateurs who amuse themselves with the delightful art of etching, iodine, from its portability and convenience, will, doubtless, prove invaluable. We have adopted it with considerable success, and have found it especially useful in marking surgical instruments, razors, and other edge tools. We published this method many years ago. Several parties have since availed themselves of our suggestions and formulæ, but without the slightest acknowledgment of the source from which they obtained them." (A. J. Cooley.)

Etching, Electro-. This mode of etching, which is in many respects superior to the ordinary mode, is based upon the destructive action of certain 'anions' during 'electrolysis.'[1] If two plates of copper be connected with the opposite ends of a voltaic battery,[2] and placed in a vessel containing very dilute sulphuric acid, the plate connected with the copper of the battery will be attacked by the anion oxygen which is released during the decomposition of the acid. This destructive action can be localised at pleasure by covering certain parts of the plate with a protecting stratum of varnish, ordinary 'etching ground' for instance. In the practice of electro-etching, the drawing is 'scratched in' in the usual way through an ordinary ground; a stout wire is then soldered to the plate, and this, as well as the back of the plate, is coated with sealing-wax varnish. Thus prepared, the plate is placed in a suitable 'decomposition cell' opposite a plate of somewhat similar size, and the two are connected respectively with the copper and zinc of a 'Daniell's cell,' or the silver and zinc of a 'Smee's cell.'[2] After about ten minutes the plate is removed, washed, and dried; and when the 'fine work' has been stopped out with Brunswick black, it is returned for another space of ten minutes. By alternately exposing the plate to the action of the decomposing fluid, and 'stopping out' parts of the work, the required gradation in tints is obtained. The exact duration of the various exposures, as well as their number, must, of course, be regulated by circumstances. See ETCHING FLUIDS (*below*).

Etching Fluids. 1. (For COPPER.)—*a.* From 'aquafortis,' 2½ fl. oz.; water, 5 fl. oz.; mix.

b. To the last add of verdigris, 1 oz.; water, 2½ fl. oz.; dissolve. For light touches.

c. (EAU FORTE,—Callot and Piranesi.) Alum, sal-ammoniac, sea salt, and verdigris, of each, 4 oz.; vinegar (pyroligneous acid), 8 fl. oz.; water, 16 fl. oz.; mix, dissolve, boil for 1 or 2 minutes in a glazed or stoneware vessel, cool, and decant the clear portion. *Used* as the last.

d. Water acidulated with sulphuric acid. *Used* in the process of electro-etching.

2. (For STEEL.)—*a.* From iodine, 1 oz.; iron filings or wire, ½ dr.; water, 4 fl. oz. It must be kept in a stoppered bottle, until required for use.

b. From iodine, 3 drs.; iodide of potassium, 1 dr.; proof spirit, 1 fl. oz.; water, 2 fl. oz. As the last.

c. (Mr. Turrel.) Pyroligneous acid, 4 fl. oz.; alcohol (rectified spirit), 1 fl. oz.; mix; and add of nitric acid or double aquafortis (sp. gr. 1·28), 1 fl. oz.

d. From hydrochloric acid, 5 parts; water, 95 parts; mix, and add the liquid to a solution of chlorate of potassa, 1 part, in water, 50 parts.

e. A solution of common salt. *Used* in the process of electro-etching.

Etching Ground. *Syn.* ETCHING VARNISH. *Prep.* 1. Bees' wax, 5 parts; linseed oil, 1 part; melted together.

2. (Callot's HARD VARNISH, FLORENTINE V., FLORENCE V.) From linseed oil and mastic, equal parts, melted together.

3. (Callot's SOFT VARNISH.) From linseed oil, 4 oz.; gum benzoin and white wax, of each, ½ oz.; boil to two thirds.

4. (Lawrence.) White wax, 2 oz.; black pitch and Burgundy pitch, of each, ½ oz.; melt, add by degrees, of powdered asphaltum, 2 oz.; and boil together, until a piece, when thoroughly cold, will break by being bent double 2 or 3 times between the fingers; next pour it into warm water, make it into small balls, and place each of them in a piece of taffety for use.

Obs. The preceding compositions are applied to the surface of the plates, previously made sufficiently warm to melt them easily, their even diffusion being promoted by dabbing them with a wad of cotton. Those that are white are then generally blackened on the surface by skilfully passing them over the smoky flame of one or more candles, by which the marks of the etching point on the bright metal are rendered the more visible.

ETHER. *Syn.* OXIDE OF ETHYL. Described under ETHYL, OXIDE OF. Several

[1] See ELECTROLYSIS and ELECTROTYPE, *pages* 428 and 429.

[2] See VOLTAIC ELECTRICITY.

substances are known under the name of ethers besides the true ethers, or salts of ethyl, and are given below.

Ether of Canthar'ides. *Syn.* ÆTHER CANTHARIDALIS, L. *Prep.* (Œttinger.) From powdered cantharides, 1 part; ether, 2 parts; digested together for 3 or 4 days, and the tincture expressed. *Used* as a vesicant, &c.

Ether, Chlo"ric. This name was applied by Dr. T. Thomson to the CHLORIDE OF OLEFIANT GAS, or 'DUTCH LIQUID;' and afterwards, by Guthrie and Silliman, to CHLOROFORM, which they took for an alcoholic solution of chloride of olefiant gas. It now forms one of the synonyms of chloroform. The medicinal 'CHLORIC ETHER' of the shops is a solution of chloroform, 1 part, in rectified spirit, 8 parts; of which the *dose* is 20 or 30 drops, in water, as an antispasmodic and anodyne. See CHLOROFORM.

Ether, Chlorinet'ted. Formed by the action of dry chlorine on pure ether. When the action is long continued, a heavy, oily product (BICHLORINETTED ETHER), smelling like fennel, is formed. By the still further action of chlorine, aided by sunlight, a white, crystalline substance (PENTACHLORINETTED ETHER), a compound resembling sesquichloride of carbon, is obtained.

Ether, Cu"preous. *Syn.* TINCTURA CUPRI CHLORIDI ÆTHEREA, L. *Prep.* (Van Mons.) Sulphate of copper, 6 parts, and chloride of barium, 5 parts, are triturated together, and the mixture digested in ether, 3 or 4 parts, until all the chloride of copper is dissolved.—*Dose.* 2 to 5 drops; in epilepsy, &c.

Ether, Methy'lic. *Syn.* OXIDE OF METHYL, WOOD-ETHER, METHYL-ETHER; ÆTHER METHYLICUS, L. *Prep.* From wood-spirit, 1 part; concentrated sulphuric acid, 4 parts; mix in a retort, apply heat, pass the evolved gas (methylic ether) through a little strong solution of potassa, and then collect it over mercury. See METHYL.

Ether, Spirits of Nitrous. See SPIRITS.

Ether, Washed. *Syn.* ÆTHER LOTUS, L. Ordinary ether, agitated first with 2 or 3 times its volume of distilled water, and a few grains of carbonate of potassa, or a few drops of milk of lime; and after decantation, again agitated with a like quantity of water only. *Used* for inhalations. For other purposes the washed ether is afterwards digested on chloride of calcium, to deprive it of retained water.

E'THERIN. *Syn.* CAMPHOR OF OIL OF WINE. A volatile, white, crystalline substance, deposited by light oil of wine when left in a cold situation for some time. It is isomeric with etherole, and received its name from the assumption of its being the base of the ethereal compounds. According to this hypothesis, ether is a hydrate of etherin. Etherin forms brilliant prisms and plates; is tasteless; soluble in alcohol and ether; fuses at 230° Fahr., and boils at 500° Fahr.; and is a little lighter than water. The crystals are purified by pressure between the folds of bibulous paper, solution in ether, and evaporation.

E'THEROLE. The yellowish, oily liquid, forming the residual portion of light oil of wine, after it has deposited its etherin. It is lighter than water; is freely soluble in both alcohol and ether; and has a rather high boiling-point. See ETHERIN and OIL OF WINE.

ETHION'IC AC'ID. *Prep.* An alcoholic solution of the crystals of sulphate of carbyle is diluted with water, the whole neutralised with carbonate of baryta, the filtered liquid evaporated by a very gentle heat to a small bulk, and a large quantity of alcohol added; the precipitate (ethionate of baryta) is treated (cautiously) with dilute sulphuric acid (avoiding excess), by which the baryta is withdrawn, and ethionic acid left in solution.

Prop., &c. Ethionic acid closely resembles sulphovinic acid. It is decomposed by heat. Its salts (ethionates), however, differ completely from the sulphovinates. They are all soluble in water, and are said to be anhydrous. The ethionates of ammonia, potassa, and soda, crystallise readily; those of lead, baryta, lime, and the other earths, are uncrystallisable. See ISETHIONIC ACID, and *below*.

ETHION'IC ANHYDRIDE. *Prep.* Pure and dry olefiant gas is passed over anhydrous sulphuric acid ('sulphuric anhydride') contained in a U-shaped tube.

Prop., &c. When thus produced, it is in white, milky crystals, which speedily deliquesce in the air, giving rise to ethionic acid. It is similar in appearance, and probably identical with, 'sulphate of carbyle,' which results from the absorption of the vapour of anhydrous sulphuric acid by absolute alcohol.

E'THIOPS. *Syn.* ÆTHIOPS, L. A name given by the older chemists to several black powders, on account of their colour, and still occasionally employed in medical works.

Ethiops, Graphi'tic. *Syn.* ETHIOPS OF PLUMBAGO; ÆTHIOPS GRAPHITICUS, L. From plumbago, 2 parts; quicksilver, 1 part; triturated together until the globules disappear.—*Dose.* 5 to 10 grs.; in herpes, and some other obstinate skin diseases.

Ethiops, Martial. Black oxide of iron, prepared by keeping iron filings under water, and occasionally shaking them. It is washed with water, dried as quickly as possible, and preserved from the air, to prevent further oxidation. Formerly much esteemed as a tonic.

Ethiops, Min'eral. *Syn.* ETHIOPS MINERAL; ÆTHIOPS MINERALIS, HYDRARGYRI SULPHURETUM CUM SULPHURE, L. Black sulphuret of mercury, with excess of sulphur.

(Tyson's.) Oxide of mercury (prepared by decomposing calomel with an equivalent proportion of liquor of potassa to which a little liquor of ammonia has been added) and flowers of sulphur, equal parts, triturated together. This is recommended as an efficient

substitute for the old and uncertain preparation commonly sold under the name of *Ethiops mineral*. It is, however, of more than double the usual strength, and should therefore be taken in proportionate doses. See MERCURY (Sulphuret).

Ethiops, Veg'etable. *Syn.* ÆTHIOPS VEGETABILIS, PULVIS QUERCÛS MARINÆ, L. Bladder wrack (*Fucus vesiculosus*), burned in a close vessel till it becomes black and friable. *Used* in bronchocele, scrofula, &c. Like burnt sponge, it owes its virtues to the presence of a very minute quantity of iodine.—*Dose.* 20 grs. to 1 dr., or more, made into an electuary with honey or sugar.

E'THYL. C_2H_5. *Syn.* ETHYLE. The hydrocarbon assumed to be the radical of the ether-compounds (ethyl-series). A body containing carbon and hydrogen in the proportions indicated by the formula of ethyl, $2(C_2H_5)$, has been obtained by exposing dry iodide of ethyl in sealed tubes for several hours to the action of finely divided zinc, at a temperature of from 320° to 338° Fahr. In this reaction the iodine of the iodide of ethyl combines with the zinc, and the hydrocarbon supposed to be ethyl is set free. On opening the sealed tubes and allowing the gas (which is a mixture of the 'ethyl' and certain secondary products) to pass into a freezing mixture, the temperature of which is kept below —9° Fahr., the 'ethyl' condenses to a colourless, mobile liquid. Hitherto no compound ether has been produced from the 'ethyl' thus prepared.

According to the beautiful theory of Liebig, ethyl is a 'salt-basyle,' forming 'haloid salts' with chlorine, iodine, and bromine; its oxide is ether, and the hydrate of this oxide alcohol. The compound ethers may be compared with ordinary salts in which the metal is replaced by the radical ethyl.

Ethyl, Oxide of. $(C_2H_5)_2O$. *Syn.* ETHER, SULPHURIC ETHER, ÆTHER (B. P.), ÆTHER SULPHURICUS (Ph. E. D. & U. S.), Æ. RECTIFICATUS, Æ. VITRIOLICUS, Æ. SPIRITUS VITRIOLI DULCIS, L. A colourless, highly volatile, fragrant, inflammable liquid, obtained by distilling a mixture of sulphuric acid and alcohol. It was not known before the 13th century.

Prep. There are two methods employed for the preparation of ether. The one is by mixing the whole of the ingredients at once, and immediately subjecting them to distillation at a proper temperature; the other is by adding the alcohol in a slender streamlet to the acid, previously heated to the etherifying point. The former, though less economical, is the one more generally employed.

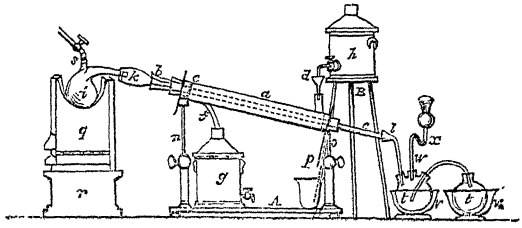
1. Rectified spirit, 3 lbs.; sulphuric acid, 2 lbs.; carbonate of potassa (previously ignited), 1 oz.; pour 2 lbs. of the spirit into a glass retort, add the acid, and place the vessel on a sand bath, so that the liquor may boil as quickly as possible, and the ether, as it forms, pass over into a well-cooled receiver; continue the distillation until a heavier fluid begins to pass over, then lower the heat, add the remainder of the spirit, and distil as before; mix the distilled liquors together, pour off the supernatant portion, add the carbonate of potassa, and agitate occasionally for one hour; finally, distil the ether from a large retort, and keep it in a well-stoppered bottle. Sp. gr. ·750.

2. The strongest oil of vitriol, 3 parts, are mixed with alcohol, q. s. (about 2 parts at ·830) to reduce its sp. gr. to 1·780; an object which may be easily obtained by distilling off some of the ether, if required. The still or retort is then connected with a vessel full of alcohol, of at least 90%, by means of a small syphon tube, furnished with a stop-cock; the longer limb of which should be of glass, and so arranged that it just dips into the mixture of acid and alcohol. Heat is next applied, and the contents of the still raised to the boiling-point as rapidly as possible, and as soon as full ebullition commences the stop-cock of the syphon is cautiously turned, so as to allow the alcohol to flow down in such a manner as to keep the boiling liquid exactly at the same level; or, in other words to supply a quantity of alcohol exactly equal to that of the liquid which distils over. By careful manipulation the whole of the alcohol which enters the retort passes over as ether and water, and this decomposition proceeds for some time, and would continue for an unlimited period, did not the sulphuric acid ultimately become too weak to form ether, from the gradual absorption of the superfluous water contained in the alcohol. Were it convenient or practicable to use absolute alcohol, a given weight of sulphuric acid, of the proper strength would maintain the power of producing ether for an indefinite period. In practice, the quantity of alcohol that may thus be etherified is twice or thrice as much as by the common process, while neither sulphurous acid, sulphovinic acid, nor sweet oil of wine, is generated and the residual liquid of the distillation continues limpid, and has only a pale-brown colour. This is termed the 'continuous,' or 'Boullay's' method. (This process is similar to that given in the B. P.)

3. Alcohol of 90%, five parts, are mixed with oil of vitriol, 9 parts, in a vessel of copper or iron immersed in cold water; the mixture is next introduced into a still or retort, and raised to a state of ebullition as rapidly as possible, as before. A fresh quantity of alcohol, equal in bulk to the liquid distilled over, is then added to the liquid in the still, and distillation again had recourse to. As much concentrated alcoholic solution of potassa as will give it a perceptible alkaline reaction is next added to the distilled liquor, which is then rectified by the heat of a water bath, as long as the ether which distils over has the sp. gr. ·720 to ·725 at 80° Fahr. Instead of the potassa, a little milk of lime may be used, along with its own bulk of water. By allowing the product to stand for some days over chloride of calcium or quicklime, and again rectifying it along with one

of these substances, perfectly pure ether may be obtained.

Obs. The mixture of alcohol with sulphuric acid requires some caution. It is best done by



a. Condenser tube.
b, *c*. Glass tube.
d. Funnel by which cold water runs in from the water bottle *h*
e. Pipe by which water escapes through *f* into the bottle *g*.
i. Retort.
k Adapter, connecting the retort with the condenser.
l. Adapter, connecting the condenser with the bottles *t*, *t*.
A. Wooden tressel, with movable arms *n*, *o*, for supporting and adjusting the heights of the condenser.
B. Wooden stool for supporting the water bottle.
q. Furnace.
r Support for the furnace.
p. Gutter for carrying off water that overflows the funnel *d*, and preventing its escape along the pipe *c*.
s. Leg of syphon connected with bottle containing alcohol.
t, *t* Glass globes, placed in the basins *v*, *v*, and surrounded with pounded ice or ice-cold water.
w. Safety tube, containing a little mercury at *x*.

introducing the alcohol into a suitable vessel, and imparting to it a rapid whirling motion, by which a considerable conical cavity is formed in the centre, and into which the acid may be gradually poured with perfect safety. The mixed fluids should be brought to a state of rapid ebullition, as quickly as possible, as without this precaution much of the alcohol distils over before the liquor acquires the proper temperature for etherification. On the small scale, a tubulated retort, connected with a Liebig's condensing tube, and two globular receivers surrounded with a freezing mixture, or ice-cold water, may be employed as the distillatory apparatus. The second receiver should be connected with the first one by means of a bent glass tube, reaching nearly to the bottom of the former; and the whole of the joints should be securely luted, as soon as the expanded air has been allowed to escape. We have employed the following convenient little apparatus for the preparation of small quantities of ether, and it will be found very suitable for the distillation of most other highly volatile liquids, and particularly for boiling mixtures of alcohol and organic acids. By connecting the neck of a flask or digester containing volatile fluids with the lower instead of the upper end of the refrigerator, ebullition may be carried on without loss, as the vapour will be condensed, and run back into the vessel from which it has distilled.

For the rectification of ether, a water bath is employed along with the above simple refrigerator, and the receivers surrounded by ice or a freezing mixture.

Chem. comp., &c. Ether is generally regarded as the oxide of ethyl, and alcohol as the hydrate of this base. This view is borne out by analysis, which proves that ether differs from alcohol by the elements of water. Recent experiments have also shown that the relation existing between the two compounds is—if alcohol be expressed by the formula C_2H_6O, the true formula of ether will be $(C_2H_5)_2O$. We cannot describe these experiments here, but we may remark that ether cannot be made to combine with water directly, nor can alcohol be converted into ether by the abstraction of water, pure and simple, without the aid of other substances.

The compound ethers may be compared to ordinary salts in which the metal is replaced by a radical termed ethyl, having the formula C_2H_5. This view is, of course, in accordance with the theory which regards ether as the oxide of ethyl.

According to theory, 1 equivalent, or 46 parts of absolute alcohol, should produce 1 eq., or 37 parts, of pure ether; but in practice, the greatest product obtained by operating according to Boullay's method, which produces more ether than any other, does not exceed 33½ parts for the preceding quantity of alcohol, or 71·5%. A mixture of 9 parts of oil of vitriol, and 5 parts of alcohol of 90%, ceases to produce ether after 31 parts of such alcohol have been added.

The most economical method of etherification is that known as the continuous ether process, or the process of Boullay. When this is adopted, the retort or flask should be fitted with a sound cork, perforated by an aperture to receive a thermometer, and the application of the heat, and the flow of alcohol, should be so managed, that a temperature of 300° Fahr. and a state of rapid and violent ebullition (points of essential importance) are maintained.

Prop., Uses, &c. Pure ether is a colourless,

transparent, and very limpid fluid, having a penetrating and agreeable smell, and a burning, sweetish taste; its evaporation produces the sensation of extreme cold; when prevented, a sensation of heat is experienced. Its specific gravity varies between ·712 and ·724. If it contains water it begins to crystallise in brilliant white plates when cooled to —24° Fahr., and become a white crystalline mass at —46° or —47° Fahr.; but if absolutely pure, ether cannot be solidified by any degree of cold that can be produced, it remaining fluid when placed in contact with solid carbonic acid, at a temperature of about —148° Fahr. Boils at 96° or 97° Fahr.; is very combustible; is soluble in about 10 parts of distilled water, and mixes with alcohol in all proportions. It abstracts corrosive sublimate, terchloride of gold, sesquichloride of iron, and many of the alkaloids, from their watery solutions, and is hence invaluable in analysis and pharmacy. It readily dissolves the volatile and fixed oils, and most fatty matters, as well as sulphur and phosphorus in small quantities. By exposure to light and air it absorbs oxygen, and water and acetic acid are gradually formed. It is decomposed by exposure to a high temperature. Its evaporation occasions intense cold. The greatest degree of cold yet produced (—166° Fahr.) has resulted from the admixture of ether with solid carbonic acid. Ether is powerfully stimulant, narcotic, and antispasmodic, and externally refrigerant, if allowed to evaporate, or stimulant and counter-irritant if its evaporation is prevented, and is used in various diseases. Applied to the forehead by means of the fingers or a strip of linen, it generally relieves simple cases of nervous headache. In *pharmacy*, it is largely employed in the preparation of tinctures, alkaloids, spirits, &c.; and in *chemistry* is invaluable in organic analyses. Its principal commercial application is as a solvent for pyroxyline, in the manufacture of collodion. It is also employed as a solvent of resins, India rubber, &c., in the preparation of varnishes, and for several other useful purposes.—*Dose.* 20 drops to 2 fl. drs.; in water or wine. Excessive doses of ether produce intoxication resembling that from alcohol, and require similar antidotes. Shortly before the discovery of chloroform, it was found that when the vapour of ether was inhaled it gradually produced insensibility to pain. It was therefore employed as an anæsthetic in surgical operations. Having been found less efficient than chloroform, and more troublesome to administer, its use for this purpose has been abandoned.

Tests. Ether may be recognised by its volatility, odour, taste, sparing solubility in water, admixture with alcohol in all proportions, great inflammability (burning with a yellowish-white flame), and its power of dissolving fats and resins. Its further identification can only be effected by ultimate analysis.

Pur. The ether of the shops, generally, contains alcohol, water, or acetic acid, and sometimes all of them. Its usual specific gravity fluctuates between ·733 and ·765. Exposed to the air, it volatilises entirely. It turns litmus paper red; sometimes very slightly, and occasionally even not at all. ½ fl. oz. mixes completely with ½ pint of water. Pure ether should, however, be neutral to test-paper, although seldom so. When shaken in a minim measure with half its volume of concentrated solution of chloride of calcium, its volume should not lessen. 10 fluid ounces of water should only dissolve 1 fluid ounce of ether, and remain transparent.

Preserv. Ether rapidly evaporates at common temperatures when kept in corked bottles, and even in bottles secured with ground-glass stoppers and tightly tied over with bladder and leather; it also becomes sour by age. To prevent this waste, the stoppers should fit accurately, and the bottles should be placed in as cool a situation as possible. Bottles furnished with ground-glass caps, as well as stoppers, are frequently employed. (See *engr.*) Dewar's 'ether phial' is formed on a similar principle. We have seen bottles of ether accurately stoppered, tied over with bladder, and thickly coated with wax, which have yet become quite empty by a voyage to the tropics, though they still appeared to be as closely secured as when they were first filled.

Caution. The vapour of ether is very inflammable, and when mixed with atmospheric air, it forms a violently explosive mixture. The density of this vapour is 2·586, that of air being 1; hence it rapidly sinks, and frequently accumulates in the lower parts of buildings, especially cellars which are badly ventilated, in the same way as water does. The only remedy is thorough ventilation. Many serious accidents have arisen from this cause, for no sooner is a light carried into an apartment where such vapour is present, than an explosion takes place.

Ethyl, Acetate of. $C_2H_5C_2H_3O_2$. *Syn.* ACETATE OF OXIDE OF ETHYL, ACETIC ETHER, PYROLIGNEOUS ETHER; ÆTHER ACETICUS, L. A compound discovered by the Count de Lauraguais in 1759.

Prep. 1. Acetate of potassa, 3 parts (or an equiv. quant. of acetate of soda), alcohol (85%), 3 parts, oil of vitriol (strongest), 2 parts, are mixed together and distilled, by the heat of a sand bath, from a glass or earthenware retort into a well-cooled receiver; the distillate is agitated with a little water to remove undecomposed alcohol, and then digested first with a little chalk, to remove acidity, and afterwards with fused chloride of calcium, to absorb water; it is, lastly, rectified by a gentle heat.

2. Rectified spirit (sp. gr. ·84), 50 parts, acetic acid (sp. gr. 1·075), 33 parts, are mixed together, and oil of vitriol (strongest), 10 parts,

added; the distillation is continued until 65 parts have passed over, and the distillate, after digestion for some hours on a little dry carbonate of potassium, is rectified as before, the first 50 parts only being kept for use.

Prop., &c. Acetic ether is colourless, and bears a considerable resemblance to ordinary ether, but it has a much more agreeable and refreshing odour. It boils at 165° Fahr.; has a sp. gr. of ·89 at 60° Fahr.; dissolves in about 7 parts of water; and mixes in all proportions with alcohol and ether. It is decomposed by alkalies and the strong acids.

Acetic ether is diaphoretic, stimulant, antispasmodic, and narcotic.—*Dose.* ½ to 2 fl. drs.; in similar cases to those in which sulphuric ether is employed, and especially in nervous and putrid fevers, spasmodic vomitings, and diseases of the bowels and stomach, arising from debility, and not of an inflammatory character. Its principal consumption is in the manufacture of British brandy.

Ethyl, Benzoate of. $C_2H_5C_7H_5O_2$. *Syn.* BENZOIC ETHER, BENZOATE OF ETHER, B. OF OXIDE OF ETHYL; ÆTHER BENZOICUS, L. *Prep.* Alcohol (sp. gr. ·830), 4 parts, benzoic acid (cryst.), 2 parts, concentrated hydrochloric acid, 1 part, are distilled together; as soon as the product turns milky when mixed with water, the receiver is changed, and the liquid that distils over collected; to this liquid water is added, and the supernatant ether is decanted, and boiled with water and a little oxide of lead (to separate benzoic acid); it is, lastly, freed from water by allowing it to stand over chloride of calcium.

Prop., &c. A colourless, oily liquid, slightly heavier than water, and possessing an aromatic odour and taste. It boils at 410° Fahr., and is miscible with alcohol and ether.

Ethyl, Bro'mide of. C_2H_5Br. *Syn.* ÆTHER HYDROBROMICUS, L. A volatile, ethereal liquid, discovered by Serullas.

Prep. Bromine, 8 parts; alcohol, 32 parts; dissolve, place the mixture in a retort, add of phosphorus, 1 part, and distil by a gentle heat as soon as the liquid becomes cold. The ether is separated from the distillate by the addition of water.

Prop., &c. A very volatile liquid, with a penetrating taste and smell; boiling at 105° Fahr., and heavier than water.

Ethyl, Bu'tyrate of. $C_2H_5C_4H_7O_2$. *Syn.* BUTYRIC ETHER, PINE-APPLE OIL; ÆTHER BUTYRICUS, L. *Prep.* By passing hydrochloric acid gas into an alcoholic solution of butyric acid, and purifying the product from free acid. Commercially, from crude butyric acid saponified with caustic potassa or baryta, and the resulting soap distilled along with alcohol and acid of vitriol.

Uses. Crude butyric ether forms the 'pine-apple oil' of commerce, and when largely diluted with rectified spirit, the 'pine-apple essence' so much employed as a flavouring substance by confectioners, liqueuristes, &c. It imparts a delicious flavour to sweetmeats, rum, arrack, punch, &c. The Germans add it to common rum, to form the flavouring for their 'pine-apple ale.'

Ethyl, Carbonate of. $(C_2H_5)_2CO_3$. *Syn.* CARBONIC ETHER, CARBONATE OF OXIDE OF ETHYL; ÆTHER CARBONICUS, L. *Prep.* Fragments of potassium are added to oxalic ether, gently warmed, as long as bubbles of gas are formed; the excess of metal is removed from the semi-solid mass, some water added, and the whole distilled. The carbonic ether floats on the surface of the liquid in the receiver, and is collected, dried by contact with chloride of calcium, and rectified along with some potassium or sodium, till it ceases to yield acetate of potassa when acted on by caustic potassa.

Prop., &c. Colourless, limpid, and aromatic; tastes pungent and burning; boils at 259° to 260° Fahr. It greatly resembles oxalic ether. It is decomposed by alkalies.

Ethyl, Chlo'ride of. C_2H_5Cl. *Syn.* LIGHT HYDROCHLORIC E., CHLORIDE OF ETHYL; ÆTHER HYDROCHLORICUS, L. A highly volatile compound, formed of ethyl and chlorine.

Prep. Rectified spirit of wine is saturated with dry hydrochloric acid gas, in the cold, and the product is distilled in a retort connected with a Woolfe's apparatus, the first bottle of which should be two thirds filled with tepid water (70° to 75° Fahr.), and the remainder surrounded with a mixture of ice and salt. To render it perfectly anhydrous, it must be digested on a few fragments of fused chloride of calcium.

A mixture of oil of vitriol, 3 parts, and alcohol, 2 parts, is poured upon common salt (dried), 4 parts; and the whole distilled as before.

Prop., &c. This ether has a sweetish taste; is soluble in about 15 parts of water, and miscible in all proportions with alcohol; boils at 54° Fahr.; burns with a flame edged with green; is neutral to test-paper; and does not affect a solution of nitrate of silver. Sp. gr. ·921, at 32° Fahr.—*Dose.* 10 to 30 drops, as an antispasmodic and a powerful diffusible stimulant. Owing to its extreme volatility, it can only be taken dissolved in spirit.

Ethyl, Cy'anide of. C_2H_5CN. *Syn.* ÆTHER HYDROCYANICUS, L. *Prep.* Cyanide of potassium and sulphovinate of baryta, equal parts, are mixed and distilled in a glass retort by a moderate heat. The product separates into two strata; the lighter one is impure hydrocyanic ether; this is decanted and agitated with 4 or 5 times its bulk of water at 120° to 140° Fahr., and the operation is repeated with about 2 parts of water; the ether is again decanted, and placed in contact with chloride of calcium for 24 hours, and then rectified.

Prop., &c. It boils at 190° Fahr. Sp. gr. ·788. In its therapeutical effects it resembles hydrocyanic acid, but is less active. Its odour is, however, more penetrating and offensive.—*Dose.* 2 to 6 drops, in mucilage or emulsion;

ercise favours the preservation of the general health, by calling into direct action the majority of the organs of the body; and it also acts powerfully on the skin, by stimulating its functions, increasing its temperature, awakening its tone, and subjecting it to a current of atmosphere favorable to its respiratory offices. But to be beneficial in the highest degree, exercise must be accompanied by feelings of present interest and enjoyment. The mind must direct and go with it; to ensure its full benefits, the "soul must be present."

"During convalescence, properly regulated exertion is highly serviceable; but it should never be carried so far as to produce exhaustion, and should be pursued for some time in doors, before it be attempted in the open air; the latter, at first, should always take place in a carriage, that can be opened or closed at will; the patient may then attempt short walks in the open air; but, in all cases, it is of importance that he is not unduly fatigued, as, otherwise, injury instead of benefit will be the result. One of the most serious errors, committed with regard to exertion, is that of permitting a convalescent to sit up too frequently, or for too long a time, under the mistaken notion of giving him strength. A patient should never be allowed to sit up longer than is agreeable to his feelings, and never so long as to produce a sense of fatigue." (Dr. R. E. Griffith.)

EXPAN'SION. All substances, solid, liquid, and gaseous, when chemical change does not take place, expand by heat, and contract by cold. In some of them this property occurs in a greater degree than in others, but is constant for the same substance under the same circumstances. The chemist avails himself of this property in the construction of his thermometer; the wheelwright, in fixing on the tire of his wheels; the engineer, in restoring to the perpendicular the leaning walls of buildings; &c.

This expansion by heat is of great importance in the manufactures, as allowance has to be made of it in every purpose where metals are employed.

The following is a list of the expansion of the chief metals, &c., when heated from 32° to 212 Fahr, or from 0° to 100° Cent:—

Substance.	*Expansion.* In bulk.	In length.
Glass	1 in 384	1 in 1150
Platinum	1 „ 377	1 „ 1311
Steel	1 „ 309	1 „ 926
Iron	1 „ 282	1 „ 846
Gold	1 „ 227	1 „ 682
Copper	1 „ 194	1 „ 582
Brass	1 „ 179	1 „ 536
Silver	1 „ 175	1 „ 524
Tin	1 „ 172	1 „ 516
Lead	1 „ 117	1 „ 351
Zinc	1 „ 113	1 „ 340

Of the liquids, they expand as follows, when heated from 0° to 100° Cent., or from 32° to 212° Fahr:—

Mercury	1 in 55 in bulk
Water	1 „ 21 „ „

Gases practically all expand alike; that is to say, for every degree Fahrenheit a gas expands $\frac{1}{491}$ of its bulk at 32°, and for every degree Centigrade $\frac{1}{273}$ of their volume at 0° C.

An example will show the importance of this. Suppose an iron bar, connecting two sides of a building, and of a length of about 85 feet. The increase in length by heat of this bar would make it 1 inch longer in summer than in winter; and it would, if no allowance be made, pull or thrust the walls to this extent each year.

EXPEC'TORANTS. *Syn.* EXPECTORANTIA, L. Medicines that promote the secretion of the trachial and bronchial mucus. According to Dr. Good, true expectorants are "those medicines which rather promote the separation of the viscid phlegm with which the bronchiæ are loaded, than simply inviscate and dilute it; though these are also treated as expectorants by many writers." Ammoniacum, antimonials, assafœtida, the balsams of Peru and tolu, benzoic acid, benzoin; the fumes of vinegar, tar, and several of the volatile oils; garlic, ipecacuanha, the oleo-resins, squills, tartarised antimony, and the smoke of tobacco and stramonium, are among the principal substances commonly called expectorants. Tartarised antimony, squills, chlorine, and ammoniacal gases, have also been used (diluted) to provoke the coughing and favour the expulsion of foreign bodies from the air-passages; and also to favour the expectoration of mucus, pus, and membranous concretions, when the local irritation is not sufficiently great. (Schwilgue.) Expectorants are commonly employed in pulmonary complaints and affections of the air-tubes, attended by a vitiated state of the mucus, or an imperfect performance of the natural functions of the secretory vessels. "Of all classes of the materia medica, none are more uncertain in their action than expectorants." (Pereira.) The act of ejecting matter from the chest is called EXPECTORATION.

EXPER'IMENTS are acts or operations intended to develop some unknown fact, principle, or effect; or to establish or demonstrate it, when discovered. Similar operations, performed merely for amusement, are also often, though incorrectly, called by this name. In rational experiments these two objects are combined. To experimental research is due the present high state of advancement and usefulness of the various sciences most intimately connected with our happiness and well-being. The danger of taking things for granted has been thus pleasantly and instructively pointed out by Archbishop Whateley:—"It was objected to the system of

nicus, when first brought forward, that if the earth turned on its axis, as he represented, a stone dropped from the summit of a tower would not fall at the foot of it, but at a great distance to the west; in the same manner as a stone dropped from the masthead of a ship in full sail does not fall at the foot of the mast, but towards the stern. To this it was answered, that a stone, being a part of the earth, obeys the same laws, and moves with it; whereas it is no part of the ship, of which, consequently, its motion is independent. The solution was admitted by some, but opposed by others; and the controversy went on with spirit; nor was it till one hundred years after the death of Copernicus that, the experiment being tried, it was ascertained that the stone, thus dropped from the head of the mast, *does* fall at the foot of it."

EXPORTATION. (EXPORTATION ON DRAWBACK.) By law, a certain allowance, or drawback of duty, is payable on certain articles, when exported from any part of the United Kingdom, either as merchandise or ship stores. Thus:—

SUGAR, refined in the United Kingdom, from 4*s.* to 6*s.* per cwt., according to quality.

TOBACCO, manufactured in the United Kingdom, 3*s.* 3*d.* per lb. The full drawback is only allowed on normal tobacco, which contains 13 per cent. of moisture. If the moisture exceeds 13 per cent., a proportionate reduction is made in the drawback; if it is found less than 13 per cent., a proportionate increase is granted.

SNUFF is entitled to drawback at 3*s.* 3*d.* per lb., subject, however, to an increase, if the moisture is less than 13 per cent., and the inorganic matter not over 18 per cent., and to a decrease, if the moisture in organic matter exceeds these per-centages.

BEER. The amount of this drawback is proportional to the quantity of malt or sugar used in the brewing of the beer, and is nearly equivalent to the duty originally paid on such malt or sugar. It is computed according to the following scale:—For every barrel, or 36 gallons of beer, the original gravity of which was not less than 1040°; a drawback of 4*s.* 3*d.*, and for every additional 5 degrees, from 1040° to 1125° inclusive, a further sum of 6*d.* per barrel.

SOLIDIFIED WORTS, made by a licensed brewer, from malt or sugar, or malt and sugar, a drawback of 2*s.* $10\frac{6}{10}$*d.* per 28 lbs.

MALT. Under certain restrictions, a drawback of the duty charged, after deducting $7\frac{1}{2}$ per cent. of the measured quantity.

SPIRITS, from 10*s.* to 10*s.* 3*d.* per proof gallon.

In all cases samples are taken by the Custom House officer, and forwarded to the Inland Revenue laboratory, where they are examined previous to the payment of the drawback.

EXPRES'SION. In the *useful arts*, the mechanical operation by which a fluid contained in the pores or cells of a solid is pressed out or expelled. Many of the fluid substances employed in pharmacy and chemistry are obtained by expression. Thus, the unctuous vegetable oils, as those of almonds, linseed, &c., are procured by submitting these substances to powerful pressure between iron plates, which are either made warm, or the bruised seeds are previously exposed in bags to the steam of boiling water. The juices of fresh vegetables are also obtained by expression. The substances are first bruised in a marble mortar, or, on the large scale, in a mill, and immediately submitted to the press, to prevent them passing into a state of fermentation, which would injure the quality of the product. Fruits which contain highly flavoured or fragrant seeds, or which have rinds containing essential oil, are generally deprived of them before being sent to the press. The subacid fruits are also allowed to lay together for some days before pressing them, as the quantity and quality of the product is thereby increased. The fluid matter absorbed by the ingredients employed in the preparation of tinctures, infusions, decoctions, extracts, &c., is generally obtained by powerful pressure. Expression is also frequently had recourse to for the purpose of obtaining solids in a state of purity, as in the expulsion of oleine from stearine, water from bicarbonate of soda, &c. On the small scale, the common screw-press, or one of like construction, is usually employed; but the power thus obtained is insufficient to expel the whole of a fluid diffused through the pores of a solid. Hence has arisen the use of the hydraulic press, which is now almost alone employed on the large scale. In all these cases the substances are placed in bags made of haircloth, or coarse canvas, previously to their being submitted to pressure. For tinctures and like pharmaceuticals, a small screw-press (TINCTURE PRESS) made of 'galvanised' or tinned iron, and varying in capacity from 1 quart to several gallons, is employed.

EXSICCA'TION. See DESICCATION.

EX'TRACT. *Syn.* EXTRACTUM, L. Among *chemists*, this term is understood to apply to the residuum of the evaporation of aqueous decoctions or infusions of vegetable matter. In *medicine* and *pharmacy*, it has a less definite signification, being applied to various preparations obtained by evaporating the expressed juices, or the decoctions, infusions, or tinctures of vegetable substances, until a mass, of a solid or semi-solid consistence, is formed. Extracts vary in their nature and composition with the substances from which they are prepared, and the fluids employed as solvents. When water is employed as the menstruum, the products (AQUEOUS EXTRACTS, WATERY E.; EXTRACTA AQUOSA, E. SIMPLICIORA, L.) usually consist of gum, starch, sugar, albumen, extractive, and saline and other matter, along with the peculiar principles on which the medicinal virtue of the vegetable depends. When spirit

is employed as the solvent, the products (ALCOHOLIC EXTRACTS; EXTRACTA ALCOHOLICA, L.) contain most of the substances above enumerated, except the gum and starch, together with several other substances which are soluble in spirit, but which are either wholly or nearly insoluble in water; as resins, essential oils, and the proximate principles of vegetables. These preparations, with scarcely an exception, are considerably more powerful than the aqueous extracts of the same vegetables. In some cases proof spirit or under-proof spirit is employed, when the extracts (SPIRITUOUS EXTRACTS; EXTRACTA SPIRITUOSA, L.) generally possess properties between those of the above. In other cases, dilute acetic acid or acidulated water is employed as the menstruum, when the products (ACETIC EXTRACTS; EXTRACTA ACETICA, L.) possess much greater activity than when prepared with water; and would in many cases prove fatal, if exhibited in doses as large as those of the aqueous extracts. Still more active extracts are obtained by a combination of the last two menstrua. According to Ferrari, plants treated with rectified spirit of wine, mixed with $\frac{1}{36}$th part of acetic acid, yield extracts of remarkable activity. On the Continent, ether is sometimes used as the menstruum for the active principles of certain substances, as cantharides, cubebs, worm-seed, &c. (ETHEREAL EXTRACTS; EXTRACTA ETHEREA, L.). The term 'simple extract' is applied to an extract prepared from a single plant or vegetable substance, and the term 'compound extract' to one prepared from two or more of such substances. The FLUID EXTRACTS (EXTRACTA FLUIDA, L.) of modern pharmacy are those which are only evaporated to the consistence of a thin syrup, and then mixed with 1-10th to 1-8th of their volume of rectified spirit.

Prep. The preparation of medicinal extracts may be conveniently considered under two divisions, viz.—1. The production of a solution of the soluble portion of the substances operated on; and, 2. The reduction of this solution by evaporation to the consistence of an extract.

I. PREPARATION OF SOLUTIONS:—The preliminary operations in the manufacture of extracts are similar to those employed in the preparation of DECOCTIONS, INFUSIONS, and TINCTURES. The proper quantity of the ingredients being taken, the whole is well bruised or reduced to coarse powder, or otherwise divided by slicing with a knife, that every portion may be fully exposed to the solvent action of the fluid. In some few cases (as with gentian, &c.) the 'slicing,' or reduction to fragments, is often conveniently deferred until the action of the menstruum shall have so far softened the ingredients as to render them of easy division by the knife. Those substances (as sarsaparilla, chamomiles, &c.) whose medicinal principles reside in the cortical portion, or which are of easy solubility, are commonly subjected to the action of the menstruum without being subjected to any particular preparation.

In the preparation of AQUEOUS EXTRACTS, the ingredients are treated with water until all the soluble matter that it is desirable to obtain is dissolved out. There are several methods of effecting this object, depending upon the nature of the substances acted on. In some cases, maceration in cold water is resorted to; in others, percolation with that fluid in a 'displacement apparatus.' More generally, however, boiling water is poured on the substance, and is digested on it for some time, as in the preparation of infusions; or the substance is exhausted by boiling it in water, as in the preparation of decoctions. After the ebullition or infusion has continued a sufficient time, the heat is removed, and the liquid portion drawn off. The ingredients are then pressed to extract the remaining liquid; or they are washed or 'sparged' with hot water, which expels it by displacement. According to the usual practice in the majority of cases, a second quantity of water is poured on after the first has been thoroughly drained off, and the infusion or decoction is repeated a second and even a third time, or until the ingredients are perfectly exhausted of their soluble portion. The liquor or liquors thus obtained being allowed to repose for 15 or 20 minutes, for the purpose of depositing the sand or other gritty and heavy matter that is mechanically mixed with them, are carefully decanted from the sediment, and, after being run through a fine hair-sieve, or flannel bag, are ready for concentration. In some instances, however, this method proves insufficient to render the liquid clear. In such cases, the solution may generally be rendered transparent by clarification with a little white of egg, removing the scum as it rises, straining the liquid through flannel, as before; or the liquid may be filtered through a bag made of fine 'Welsh flannel,' or of 'tweeled cotton cloth' (Canton flannel), both of which should be soaked in clean water for at least an hour before use. In the small way, filters of linen or paper are sometimes employed; but as all media sufficiently fine to render vegetable solutions transparent soon choke up, this filtration is objectionable, from the length of time it occupies. In some houses, the aqueous infusion or decoction is allowed to repose for 24 hours, and then decanted and evaporated; but such a plan is objectionable, as, however smooth and glossy extracts so prepared may appear, their medicinal virtues are lessened by the lengthened exposure to the atmosphere.

When about one half of an aqueous solution has evaporated, it is often advantageous to repass it through a flannel or horsehair strainer, to remove the flocculi that generally form by the action of the heat and air. This is especially necessary with vegetable solutions prepared without boiling, and should

adopted whenever a smooth and sightly extract is desired.

II. REDUCTION OF SOLUTIONS:—The reduction of the solution to the proper consistence is effected by evaporation. The mode in which this is performed varies for different extracts. The London College directs that, "unless otherwise ordered, the evaporation should be conducted as quickly as possible, in a broad, shallow pan, placed in a water bath, until a proper consistence is acquired for forming pills; stirring assiduously with a spatula towards the end of the operation." The Dublin College orders that "all simple (aqueous) extracts (EXTRACTA SIMPLICIORA), unless otherwise ordered, are to be prepared by boiling the vegetable matter in 8 times its weight of water, till the liquid is reduced to one half; the liquor is then to be expressed, and, after a short time allowed for defecation, to be decanted, filtered, and evaporated in a steam or water bath, until it begins to thicken, and then finally inspissated by a reduced heat, with continual stirring, until a consistence for forming pills be attained." The instructions of the Edinburgh College are similar, with the one important exception, however, of ordering the evaporation to be conducted in a water bath saturated with chloride of sodium.

Though the water bath has the sanction of the London College, it is ill adapted for the purpose to which it is here ordered to be applied, as, from its low evaporative power, the advantages which are derived from its equable temperature are vastly overbalanced by the lengthened exposure of the solution in a heated state to the action of the atmosphere. It has been shown that a vegetable extract so prepared is inferior in quality to a similar one formed by rapid evaporation in a shallow pan over a naked fire, or placed in a sand bath, provided proper care is taken, and assiduous stirring is adopted during the whole time of the exposure to heat. In practice, however, the use of a naked fire is perfectly inadmissible, as the least neglect on the part of the operator would probably lead to the incineration of the whole. These objections are obviated by the addition of the $\frac{1}{5}$th part of salt to the water of the bath, which raises its boiling-point to 218$\frac{1}{2}$° Fahr., when the temperature of the contained extract is fully 212°; the remaining 6° being lost by the interposition of the substance of the evaporating vessel.

ON THE LARGE SCALE, the evaporation of infusions or decoctions for extracts is usually conducted in very wide, shallow, copper or tinned-copper pans, having steam-tight jackets of cast iron, and heated by steam 'playing' between the two.

The rapid deterioration which vegetable juices and solutions undergo by exposure to the air, especially at high temperatures, has led to the introduction of apparatus, by which they may be concentrated without contact with the atmosphere, and at a less degree of heat than is required for that purpose in open vessels. Such is the method, commonly called 'Barry's process,' in which the air is removed from certain air-tight refrigerators by the introduction of steam, which is then condensed by the application of cold, by which means a partial vacuum is obtained. Another process for attenuating the atmosphere over the surface of fluids during evaporation is by the action of an air-pump. This plan was introduced by Howard, and is commonly applied to the concentration of syrups in the sugar refineries. Extracts obtained by either of these methods are said to be prepared 'in vacuo,' and are found in practice to be immensely superior to the common extracts of the shops, and consequently require to be exhibited in proportionably small doses.

Obs. When water, acidulated with acetic acid, is employed in the preparation of extracts, the vegetable substances are usually macerated in it, in the cold, or the dilute acid is sprinkled over the bruised plant in the fresh or recent state, and the whole is then submitted to strong pressure, to expel the juice, which is strained and evaporated in the usual way, but preferably in a well-tinned or plated-copper pan.

ALCOHOLIC and SPIRITUOUS EXTRACTS are prepared by evaporating a filtered concentrated tincture of the ingredients in any suitable vessel, by which the volatilized spirit may be saved. In general, rectified spirit is used as the menstruum; but in some cases proof spirit is employed; and, in others, the substances are first digested in proof spirit, and afterwards in water, and the mixed tincture and infusion evaporated in the usual manner.

ETHEREAL EXTRACTS are obtained in a similar manner to alcoholic ones; but being merely prepared in small quantities at a time, the process may be conveniently performed in glass vessels. When it is required to boil either of the above fluids (alcoholic or ethereal), or any other volatile liquid on the ingredients, a vessel fitted with a long tube, or a Liebig's condenser reversed, as noticed under ether, may be used to prevent any loss of the menstruum.

The INSPISSATED VEGETABLE JUICES (JUICES, E.; SUCCI, L.) of the British Pharmacopœia are obtained by expressing the juices from the fresh plants, and preserving them by the addition of spirit. "By thus preserving the juice of the plant its properties are not impaired by the action of the air during the time necessary to dry the leaf for tincture, nor by the action of both air and heat during the time necessary to evaporate the juice to the consistence of an extract."—Squire. The directions of the Edinburgh College for preparing their inspissated juices (SUCCI SPISSATI, L.) are—"Beat the fresh substance, and press it strongly through a canvas bag, in order to obtain the juice; which, being put into a wide, shallow vessel, and

heated by means of boiling water saturated with sea-salt, is to be reduced to the consistence of honey. The mass, when cold, is to be put into glazed earthen vessels, and moistened with strong alcohol." By operating in this way a considerable portion of the activity of narcotic vegetables is lost. Some of their juices, as that of aconite, are impaired in so short a time as scarcely to compensate for the trouble of preparing them. This deterioration does not, however, take place in any remarkable degree, if the expressed juice from the recent vegetable be evaporated by exposing it in a thin stratum to a current of very dry air, as adopted by Mr. Squire. This may be managed by putting the juice into small, flat trays or dishes, placed on shelves in a suitably arranged apparatus, alternated with similar vessels of concentrated sulphuric acid; or by causing a current of very dry air, at the common temperature of the atmosphere, to pass over them. It has been shown that 10 grs. of extract, thus prepared, were more than equal to 20 grs. prepared *in vacuo*; and to more than 60 grs., and, in some cases, 90 grs., of those prepared by the common process of boiling down the juice to an extract.

The concluding portion of the process of extract-making, technically termed 'finishing-off,' requires the most scrupulous attention. As the evaporation advances, the heat should be lessened, and as soon as the extract acquires the consistence of thick treacle it should be removed altogether, and the remainder of fluid matter evaporated by the heat retained by the copper pan, the escape of vapour being promoted by assiduous and laborious stirring with a suitably shaped wooden spatula. This part of the process should be continued until a proper consistence is attained and the extract is nearly cold. When high-pressure steam or a chloride of calcium bath is employed, care must be taken to withdraw the heat before stirring the semi-liquid mass; as, if an extract having a temperature of about the boiling-point of water, or even a few degrees below it, is agitated, it becomes full of bubbles, and appears rough and puffy, and this appearance cannot be removed by subsequent stirring, or by any method but redissolving it in water and re-evaporation. This is especially the case with the extracts of sarsaparilla (simple and compound), gentian, liquorice, and most others of a similar class. A good laboratory man knows from experience the proper time for the removal of the heat, but unpractised persons often fail in this particular. In such cases, should the heat retained by the evaporating pan, and by the extract, prove insufficient to complete the process, a little more may be cautiously applied. Without assiduous and laborious stirring in the way described, a very smooth and glossy extract cannot be produced. To promote this artificial appearance, some persons add 3% or 4% each of olive oil and gum arabic, dissolved in water, with about 1% or 2% of spirit of wine.

The consistence of the ordinary extracts of the shops is the same as that of electuaries and confections, and is described in the Ph. E. as equal to that "of thick honey." The instructions of the Ph. L. and D., to evaporate the mass "until it acquires a consistence proper for making pills," except in 2 or 3 cases (as *Ext. Colocynth. Comp.*, &c.), is not adopted, and, indeed, would be found inconvenient in practice. Extracts evaporated to such a consistence are commonly termed 'pilular extracts;' and when evaporated so that they are quite dry, and brittle when cold, they are called 'hard extracts' (EXTRACTA DURA, L.).

Pres. Extracts should be put into pots as soon as taken from the pan, and, after being carefully and securely tied over with bladder, should be 'stored' in a dry situation. The London College orders "a small quantity of rectified spirit to be sprinkled upon all the softer extracts, to prevent them becoming mouldy." A better way is to employ a little spirit, holding in solution a few drops of oil of cloves, or a still less quantity of creasote. This should be added to them the last thing before removing them from the evaporating pan, and when they are nearly cold. The same object is effected by moistening the inside of the bladder (used to tie them over) with a few drops of oil of cloves or creasote. Hard extracts should be kept in bladders or gut skins, placed in stone pots, and well covered over. With care, extracts prepared from recent vegetable substances may be preserved twelve months, or from season to season; and those from dry ingredients, or such as are less inclined to spoil, for perhaps double that time; but beyond these periods their virtues cannot be relied on, and they should consequently be discarded, if remaining unused or unsold.

Pur., &c. The quality of an extract cannot be ascertained by mere inspection, nor is it readily discovered by chemical tests. A knowledge of these facts has induced the mercenary and fraudulent manufacturer to employ damaged and inferior drugs in their preparation, alike regardless of the welfare of the patient and the credit of the practitioner. A common practice with some manufacturers is, not only to pick out the least expensive variety of every drug for the preparation of their extracts, but the most inferior and often damaged and worthless portion of this already inferior article. The production of a smooth, bright, and glossy extract is all that is usually attempted by these individuals, and all that is sought after by the mass of purchasers, who mistake the simulation of the mere external signs of good quality for its actual existence. It is a fact, which we can verify from extensive experience in the laboratory, and from years of practical observation on this point, that extracts faithfully prepared from good materials do not possess the sightly and pl[illegible]

appearance or those commonly vended by the wholesale druggists. On comparing the extracts prepared by different metropolitan houses, we have found that those which have exhibited a remarkably bright and glossy appearance have been uniformly inferior, and sometimes nearly inert; whilst others, with a less prepossessing appearance, have been generally of good quality. These facts are well established by reference to the extracts of those houses and institutions that are remarkable for the superior quality of their preparations, and by comparing them with the common extracts of the shops supplied by the wholesale trade.

A good extract should be—1. Free from grit, and wholly soluble in 20 parts of the menstruum employed in its preparation, forming a nearly clear solution.—2. It should have a uniform texture and colour, and be of a proper consistence.—3. If a narcotic or active extract, it may be exhibited in proper doses, and its effects watched. Its activity may also be tested on any small animal.—4. An assay for the proximate vegetable principle (alkaloid, &c.) contained in the plant from which it has been prepared may be made. The extracts prepared from the expressed juices of plants, without straining off the coagulated albumen, are, of course, exceptions to the first test. Unfortunately, these tests are not always easily performed, and the last two are inapplicable to those extracts that exercise no very marked physiological action, unless when taken in repeated doses, long continued. This want of a ready means of accurately testing the qualities of extracts has enabled the fraudulent manufacturer to sell inferior articles with impunity, and often without the least fear or danger of detection.

In general, an extract more than six months old contains only half the activity of a similar one newly made. When more than twelve months old they should be rejected as worthless, and the stock renewed.

Uses, &c. The extracts of the shops are generally acknowledged to be the most varying, imperfect, and uncertain class of medicines belonging to modern pharmacy. They are mostly used in the same cases as the plants from which they are prepared, but in smaller doses.

Concluding remarks. In the preparation of extracts the great desiderata to be aimed at are—to suit the menstrua and the methods of manipulating to the peculiar characteristics of the active constituents of the vegetable substances operated on. The pharmaceutist should always bear in mind that a perfect extract should be a concentrated, solid mass, representing, as near as possible, in medicinal efficacy, the materials from which it has been prepared, and capable of being redissolved, so as to form a solution closely resembling that from which it has been derived. An extract possessing equal strength to the whole mass of the ingredients from which it has been prepared is almost next to an impossibility, however desirable such a degree of perfection may be. The medicinal properties of all solutions of vegetable matter are injured by being reduced to the solid state; and this deterioration, more or less, takes place, whether the solvent be water, acetic acid, proof spirit, or alcohol. The volatile portions (the essential oils, the aroma, &c.) are nearly or wholly dissipated; and though these do not always form the principal or active ingredients of the vegetables from which extracts are prepared, yet they generally exercise a modifying and controlling influence over the other ingredients, which considerably alters their therapeutical action. The loss of aroma may often be a trifling deficiency, but in the extracts of aconite, henbane, hemlock, belladonna, and other narcotic plants, this is not the case. In these cases it is well known that the inert preparations are wholly deficient of the odour of the recent plant, and that in proportion as the odour is developed, so is their activity preserved. The powerful smell of the recently expressed juice of hemlock, with the scarcely perceptible odour of the extract (EXTRACTUM CONII, Ph. L.), offers an excellent example of this fact. The dose of the one often reaches 20 or 30 gr., whilst that of the other seldom exceeds 5 or 10 drops, or a portion equivalent in dry ingredients to considerably less than $\frac{1}{4}$ gr.

When extracts are ordered in prescriptions, those of the 'Pharmacopœia' should be alone employed by the dispenser, as the substitution of others for them would not only be violating faith with the prescriber, but might also produce consequences alike injurious to the dispenser and the patient. Many medical gentlemen prefer extracts prepared by particular processes or persons, but such intention is always indicated in their prescriptions.

Extract of Ac'onite. *Syn.* EXTRACT OF WOLFSBANE, E. OF MONKSHOOD, INSPISSATED JUICE OF ACONITE; EXTRACTUM ACONITI (B. P., Ph. L. E. & U. S.), SUCCUS SPISSATUS ACONITI (Ph. D. 1826). L. *Prep.* 1. (B. P.) Take 112 lbs. of the fresh leaves and flowering tops, bruise them, press out the juice, heat it gradually to 130° F., and separate the green matter by a calico filter. Heat the strained liquor to 200° F. to coagulate albumen, and again filter. Evaporate the filtrate by a water bath to the consistence of a thin syrup; then add to it the green colouring matter previously separated, and stirring the whole together assiduously, evaporate at a temperature not exceeding 140° F. to a pill consistence.—*Dose.* 1 to 2 grs.

2. (Ph. L.) Take of fresh leaves of aconite, 1 lb.; bruise them in a stone mortar, express the juice, and evaporate it, unstrained, to a proper consistence. The formulæ of the Ph. D. & U. S. are similar.

3. (Ph. E.) Beat the fresh leaves of aconite to a pulp, and express the juice, then subject

the residuum to percolation with rectified spirit until the latter passes through without being materially coloured; unite the expressed juice and the percolated tincture, filter, distil off the spirit, and evaporate in a vapour or a water bath to a proper consistence. Stronger than the preceding.

Obs. A variable and uncertain preparation. Numbness and tingling follow its application to the limbs or tongue when it is of good quality.—*Product.* 1 cwt. of fresh leaves yield between 5 lbs. and 6 lbs. of extract.—*Prop.* Anodyne, sudorific, and narcotic; very poisonous.—*Dose.* ½ gr. to 2 grs., made into a pill with liquorice powder; once or twice a day, in neuralgic pains, chronic rheumatism, glandular swellings, &c., gradually and cautiously increased to 5 or 6 grs.

4. (Alcoholic; E. A. ALCOHOLICUM, L.)—*a.* (P. Cod.) Aconite (in coarse powder), 1 lb.; proof spirit, 3½ lbs. (say 2½ pints); proceed by the method of displacement, and when all the spirit has penetrated the powdered mass, keep this covered with distilled water, until the liquid begins to cause a precipitate in falling into that which has previously passed through; next distil the spirit from the tincture, and evaporate the residuum to the proper consistence.

b. (Ph. U. S.) Aconite 1 lb.; spirit sp. gr. ·935 (=13 u. p.), 1 quart, or q. s.; as last.

c. (Ph. Baden.) From the tincture prepared with rectified spirit, and by either maceration or displacement. Stronger than the last two.

d. (Ph. Bor.) The juice is expressed from the fresh herb, which is then sprinkled with about ⅛ of its weight of water, and again pressed; the mixed and strained liquid is evaporated in a vapour bath at 122° to 140° Fahr., to about one half; to this, as soon as cold, an equal weight of spirit (sp. gr. ·900) is added, and after frequent agitation for 24 hours, the whole is filtered, with pressure; the marc is treated with fresh spirit (equal to about 1-4th that first used) and again pressed; the mixed liquors are next filtered, and are, lastly, evaporated, as before, to the proper consistence.

Obs. Resembles the simple extract, but is much more powerful. It has been exhibited internally in the form of pills, and used externally, combined with ointment or spread on simple plaster.—*Dose.* ½ to ⅛ gr. every three hours.

5. (Ammoniated; E. A. AMMONIATUM, L. —Dr. Turnbull.) Extract of aconite, 1 dr.; liquor of ammonia (strongest), 10 or 12 drops; mix.

6. (Dried; E. A. SICCUM, L.—P. Cod.) The expressed juice, strained through a sieve or coarse linen, is at once, without depuration, exposed in earthen dishes, in layers of about 2 lines deep, in a stove or current of dry air, to a temperature ranging between 95° and 104° Fahr., until reduced to dryness. The dried extract is to be packed in bottles.

7. (Saccharated; E. A. SACCHARATUM, L.) From extract of aconite (Ph. Bor.), 4 oz.; sugar of milk (in powder), 1 oz.; mix, and dry the mass in a warm place, adding sugar of milk, q. s. to make the whole equal in weight that of the extract used (4 oz.). An excellent preparation, which keeps well. The other NARCOTIC EXTRACTS, as those of BELLADONNA, HEMLOCK, HENBANE, &c., are to be treated in a similar manner. See ACONITE, and *below*.

Extract of Aconite Root. *Syn.* EXTRACTUM ACONITI RADICIS ALCOHOLICUM, L. *Prep.* (Dr. Fleming; Dr. Turnbull.) From a tincture of the root made with rectified spirit. It is said to be 12 times as strong as the extract of the leaves.

Extract of Ag'aric. *Syn.* EXTRACTUM AGARICI, L. *Prep.* (P. Cod.) From the infusion of white agaric (*Polyporus officinalis*) prepared with cold water. Purgative.—*Dose.* 1 to 4 grs.

Extract of Alcorno'co. *Syn.* EXTRACTUM ALCORNOCÆ, L. *Prep.* From a decoction of alcornoco bark (South American). Astringent and tonic.—*Dose.* 5 to 20 grs.; in phthisis &c.

Extract of Al'oes. *Syn.* PURIFIED ALOES WASHED A.; EXTRACTUM ALOËS BARBADENSIS (B. P.), EXTRACTUM ALOËS (Ph. L.), E. A AQUOSUM (Ph. D.), L. *Prep.* 1. (B. P. Barbadoes aloes, in small pieces, 1 lb.; treate with 1 gal. of boiling water for 12 hours, an the clear liquid evaporated.—*Dose.* 1 to 3 grs B. P. 2 to 6 grs.

2. (B. P.) Socotrine aloes, 1 lb., treate with 1 gal. of boiling water for 12 hours, an the clear liquid evaporated to dryness.

3. (Ph. D.) Aloes (hepatic), 4 oz.; wate 1 quart; boil till dissolved; when cold, decan the clear liquid, and evaporate as before.

4. (Ph. Bor. 1847.) By macerating pow dered aloes in cold water for 48 hours, wit frequent agitation, and then evaporating i a water bath at a temperature not exceedin 150° to 165° Fahr., until a pilular consisten is attained.

Obs. The second is the form commo adopted in the laboratory. When made wit the juice of borage, burgloss, &c., it forms th old 'ALOES INSUCCATA.'—*Dose.* 5 to 15 gr See ALOES and EXTRACT OF BARBADO ALOES.

Extract of Anem'one. See EXTRACT PASQUE FLOWER.

Extract of Angel'ica. *Syn.* EXTRACTU ANGELICÆ, L. *Prep.* 1. (Ph. Baden.) Fro a tincture of the root, prepared with spir sp. gr. ·944 (=21½ u. p.).

2. (Ph. Bor.) Angelica root and rectifi spirit, of each, 2 parts; water, 9 parts; dige strain, and evaporate. Inferior to the pr ceding.

3. (Dr. Moir.) Angelica root, 2 lbs.; re tified spirit, 1 gal.; make a tincture;

'marc' add proof spirit, 1 gal., and repeat the digestion; filter the two tinctures separately, mix, distil off the spirit, and evaporate. Balsamic, stomachic, and tonic.—*Dose.* 10 to 20 grs. The last is the most balsamic and agreeable.

Extract of Ap'ples. *Syn.* CHALYBEATED E. OF A.; EXTRACTUM FERRI POMATUM, L. *Prep.* (Ph. Bor.) Crab-apples (unripe), 6 lbs.; peel them and reduce them to a pulp; add iron wire (in small coils), 1 lb.; digest in a vapour bath for about a week, express, strain, decant, and evaporate in a porcelain vessel, with constant stirring, to the consistence of a soft extract; dissolve the residuum in water, 4 parts, strain and evaporate as before.—*Dose.* 5 to 10 grs.; as a chalybeate tonic. The formula of the Ph. Baden is nearly similar.

Extract of Ar'nica. *Syn.* EXTRACT OF ARNICA FLOWERS; EXTRACTUM ARNICÆ FLORUM, L. *Prep.* 1. (P. Cod.) From the dried flowers, as ALCOHOLIC EXTRACT OF ACONITE—P. Cod.

2. (Ph. Græca, 1837.) From a tincture of the flowers, prepared with rectified spirit, 3 parts, and water, 5 parts.—*Dose.* 2 to 6 grs.; as a stimulant in various diseases accompanied with debility, deficient nervous sensibility, paralysis, dropsies, diarrhœa, amenorrhœa, dysentery, &c.

Extract of Arnica-Root. *Syn.* EXTRACT OF ARNICA; EXTRACTUM ARNICÆ RADICIS, L. *Prep.* 1. (Ph. Baden.) As EXTRACT OF ANGELICA—Ph. Baden.

2. (Ph. Græca.) From tincture of the root, prepared as No. 2 (*above*). The form of the Hamburg Codex is nearly similar.—*Dose, &c.* As the last.

Extract of Art'ichoke. *Syn.* EXTRACTUM CYNARÆ, L. *Prep.* From the fresh leaves of the artichoke, as EXTRACT OF ACONITE—Ph. L. —*Dose.* 3 to 6 grs., twice or thrice daily; in rheumatism, &c.

Extract of Aspar'agus. *Syn.* EXTRACTUM ASPARAGI, L. *Prep.* 1. (Soubeiran.) From the expressed juice of the shoots, clarified and evaporated by a gentle heat.

2. From the juice of the roots, as No. 1. Both are diuretic.—*Dose.* 15 grs. to ½ dr., or more.

Extract of Bael. *Syn.* EXTRACTUM BELÆ LIQUIDUM, L. B. P. Bael, 1; distilled water, 15; rectified spirit, ⅓; macerate for 12 hours in 5 of the water, pour off the liquid, repeat the operation twice for 1 hour; press, filter, and evaporate to 1, including the spirit. A fluid ounce is equal to a solid ounce.—*Dose.* 1 to 2 drs.

Extract of Bark. See EXTRACT OF CINCHONA.

Extract of Belladon'na. *Syn.* EXTRACT OF DEADLY NIGHTSHADE, INSPISSATED JUICE OF BELLADONNA; EXTRACTUM BELLADONNÆ (B. P., Ph. L. E. & D.), SUCCUS SPISSATUS BELLADONNÆ, L. *Prep.* 1. (B. P.) Take 112 lbs. of fresh leaves and tender branches, bruise in a stone mortar or other suitable apparatus, and press out the juice, heat it gradually to 130° F., separate the green colouring matter by a calico filter, heat the strained liquor to 200° F. to coagulate the albumen, and again filter; evaporate the filtrate by a water bath to the consistence of a thin syrup, then add to it the green colouring matter previously separated, and, stirring the whole together assiduously, continue the evaporation at a temperature not exceeding 140°, until the extract is of a suitable consistence for forming pills.—*Dose.* ¼ to ½ gr., gradually increased to 1 or 2 grs.

2. (Ph. E.) Express the juice from the bruised fresh plant, sprinkle the 'marc' with water, and again apply pressure; mix the expressed liquids, filter them, and evaporate the filtered liquor in a vapour bath to the consistence of an extract.

3. (Ph. D.) From the leaves, collected when the plant begins to flower. The expressed juice is allowed to stand for 24 hours, and the clear portion is decanted; the sediment is placed on a calico filter, washed with an equal bulk of cold water, and the filtrate mixed with the expressed juice. The mixed liquid is next heated in a water bath, to coagulate its albumen, and after being skimmed, and filtered through flannel whilst hot, the washed sediment is added, and the whole evaporated, as before.

4. (Ph. U. S.) The expressed juice is heated to the boiling-point, filtered and evaporated (see *below*).

Obs. The P. Cod. directs this extract to be made by two different formulæ. The product of the one resembles that of the Ph. L.; that of the other, that of the Ph. E. That of the Ph. L., from retaining the fecula, is the weakest preparation. *Dose.*—½ gr. to 1 gr., gradually increased to 3 or 4 grs.; as an anodyne in neuralgia, tic-douloureux, &c.; as an antispasmodic to relieve rigidity and spasms, in various affections of the uterus, rectum, urethra, bladder, &c., and in hooping-cough; in various maladies of the eyes; and as a resolvent and discutient in several glandular diseases. It has been highly recommended as a preservative against scarlet fever. It is most frequently employed externally, under the form of a plaster, ointment, or lotion. It is poisonous.

5. (Alcoholic; E. B. ALCOHOLICUM, L.)—*a.* (P. Cod.) AS ALCOHOLIC EXTRACT OF ACONITE—P. Cod.

b. (Ph. U. S.) As the last (nearly), using spirit of ·935 (= about 13 u. p.).

c. (Moir.) The expressed juice is coagulated by heat, cautiously applied, and filtered; the filtrate is reduced to the consistence of a syrup, and mixed with an equal volume of nearly anhydrous alcohol (say of 90%); the clear portion is lastly evaporated, as before.

Obs. The above is much more powerful than the common extract, and is chiefly used in external applications. See BELLADONNA, and *below*.

2. (Mr. Houlton.) From the expressed juice by spontaneous evaporation. A better plan is to expose it to heated air. Antihysteric, emmenagogue, and vermifuge.—*Dose.* 5 to 20 grs.

Extract of Cincho'na. *Syn.* EXTRACT OF BARK. Three simple extracts, prepared respectively from YELLOW, PALE, and RED CINCHONA, are given in Ph. L.:—*Prep.* 1. (From CALISAYA or YELLOW BARK:—EXTRACT OF CINCHONA, E. OF YELLOW C., E. OF HEART-LEAVED C.; EXTRACTUM CINCHONÆ, L.) — *a.* EXTRACTUM CINCHONÆ FLAVÆ LIQUIDUM (B. P.). Yellow cinchona bark in coarse powder, 16; distilled water, a sufficiency; rectified spirit, 1; macerate the bark in 40 of water for twenty-four hours, then pack in a percolator, and add water until 240 have passed through, or until the bark is exhausted; evaporate the liquor to 20, at a temperature not exceeding 160°; then filter, and continue the evaporation to 3, or until the sp. gr. of the liquid is 1·200; when cold, add the spirit gradually, constantly stirring. Sp. gr. 1·100.—*Dose.* 10 to 30 minims.

b. (Ph. L.) Yellow cinchona (coarsely bruised), 3 lbs.; distilled water (temperate), 4 pints; macerate for 24 hours (constantly stirring), and strain through linen; what remains, again macerate in water, 1 quart, for 24 hours, and strain; evaporate the mixed liquids to a proper consistence.

Obs. The aqueous extracts of cinchona bark possess little medicinal virtue, owing to the insolubility of the alkaloids (quinine, cinchonine, &c.) in water, and also from the rapid oxidation of their extractive matter, when exposed in solution to the joint action of heat and atmospheric oxygen.—*Dose.* 5 grs. to ½ dr., in mixtures, faintly acidulated with sulphuric acid. Cinchona bark yields from 24% to 30% of aqueous extract.

2. (From PALE BARK:—EXTRACT OF PALE CINCHONA, E. OF PALE BARK, E. OF LANCE-LEAVED B.; EXTRACTUM CINCHONÆ PALLIDÆ, L.)—*a.* (Ph. L.) From pale bark, as EXTRACT OF CINCHONA—Ph. L. (*above*).

b. (Ph. L. 1836.) From the decoction.

Obs. This forms the EXTRACT OF BARK of the shops. The red and yellow cinchona barks are scarcely ever used for making extracts. Their richness in quinine leads to their almost exclusive employment for the manufacture of that alkaloid, by which their value is greatly enhanced. As far as our knowledge extends, no other extract of bark than this is either employed or asked for.

3. (From RED BARK:—EXTRACT OF RED CINCHONA, E. OF RED BARK, E. OF OBLONG-LEAVED B.; EXTRACTUM CINCHONÆ RUBRÆ, L.)—*a.* (Ph. L.) From red bark, as EXTRACT OF CINCHONA—Ph. L. (*above*).

b. (Ph. L. 1836.) From the decoction.

Obs. These extracts are ordered to be kept in two states, the one (SOFT EXTRACT OF CINCHONA; EXTRACTUM CINCHONÆ MOLLE) for making pills, &c.; the other (HARD EXTRACT OF CINCHONA; EXTRACTUM CINCHONÆ DURUM) for powdering.—The *dose*, &c., of all the above are the same.

4. (Dry:—ESSENTIAL SALT OF BARK; EXTRACTUM CINCHONÆ SICCUM, L.)—*a.* (P. Cod.) From an aqueous infusion of pale bark (prepared by displacement with water at a temperature not above 77° Fahr.), evaporated to the consistence of a thick syrup, and then spread thinly and uniformly on earthenware dishes, or sheets of glass, and dried in a stove, by a very gentle heat. It is separated from the plates with a knife, and preserved in well-closed phials. Prior to spreading it out on the plates, about 4% or 5% of thick mucilage is commonly added.

b. (Ph. Bor.) As the above (nearly).

c. (Ph. Hann. 1831.) Similar to the above; but the liquid, when it acquires the consistence of treacle, is diluted with water, and again evaporated to a like consistence; and this dilution and evaporation is repeated until, on the addition of water, it forms a clear solution. —*Dose.* 5 to 25 grs. The product of the last formula is nearly inert, and that of the others possesses little activity.

5. (Fluid:—EXTRACTUM CINCHONÆ FLUIDUM, L.)—*a.* See LIQUOR OF CINCHONA.

b. (Dr. Neligan.) From yellow bark, as FLUID EXTRACT OF BUCHU.

6. (Resinous:—ALCOHOLIC EXTRACT OF BARK; EXTRACTUM CINCHONÆ ALCOHOLICUM, E. CINCHONÆ, L.)—*a.* (Ph. E.) From any variety of cinchona bark (in powder), 4 oz.; proof spirit, 24 fl. oz.; prepare a tincture by displacement, distil off most of the spirit, and evaporate the residuum to the consistence of an extract. This is the only EXTRACTUM CINCHONÆ of the Edinburgh College.

b. (Ph. U. S.) Peruvian bark, 1 lb.; rectified spirit, 4 pints; make 4 pints of tincture by displacement; add water to the mass in the percolator, digest, and obtain 6 pints of infusion; distil off the spirit from the tincture, and evaporate the infusion to the consistence of syrup, then mix the two, and complete the evaporation. More active than the aqueous extract.—*Dose.* 5 to 20 grs.

c. (Ellis.) Yellow bark, 2 lbs.; hydrochloric acid, 4 fl. drs.; water, 1 gal.; boil, strain, and repeat the decoction with fresh water and acid; mix the decoctions, filter, and agitate it with fresh-slaked lime, 2½ oz.; filter or decant; dry the residuum, and exhaust it with hot alcohol, q. s.; lastly, evaporate the alcoholic tincture to a pilular consistence.—*Dose.* 1 to 5 grs. Some persons have proposed to call this 'ESSENTIAL SALT OF BARK.'

7. (Vinous:—EXTRACTUM CINCHONÆ VINOSUM, L.—Ph. Hesse.) Peruvian bark (in powder), 1 part; white wine (sherry), 8 parts; digest 3 days, express, filter, and evaporate.

Extract of Coc'culus. *Syn.* EXTRACT OF COCCULUS INDICUS, BLACK EXTRACT, EXTRACT (Brewer's), BEER STRENGTHENER, HARD MUL-

TUM; EXTRACTUM COCCULI, E. C. INDICI, L. *Prep.* From *cocculus indicus*, by decoction. It is kept in two states—one having the consistence of thick treacle; the other, that of a pilular extract. The first is 'put up' in bladders; the last is made into ½-lb. rolls, like lead plaster or roll-chocolate. It is narcotic and poisonous, and is employed by fraudulent brewers and publicans to give a false strength to their liquors. See COCCULUS INDICUS, BEER, &c.

Extract of Col'chicum. *Syn.* EXTRACT OF MEADOW SAFFRON, E. OF THE CORMS OF COLCHICUM; EXTRACTUM COLCHICI (B. P.). *Prep.* 1. (B. P.) The expressed juice of fresh colchicum corms, cleared of deposit, boiled, strained, and evaporated to a proper consisteucy at a temperature of 160° Fahr.—*Dose.* 1 to 2 grs.

2. (Wholesale.) From the decoction of the dried corms. *Prod.* 50% to 55%.

Obs. This extract is given in the usual cases in which colchicum is employed.—*Dose.* 1 to 4 grs., every third or fourth hour. (Thomson.) "A favorite remedy of Dr. Hue, of St. Bartholomew's Hospital, in the early stages of acute rheumatism. The dose is 1 gr. every four hours." (Pereira.)

3. (Acetic; ACETIC EXTRACT OF MEADOW SAFFRON; EXTRACTUM COLCHICI ACETICUM (B. P.)—*a.* (B. P.) Crushed fresh corms, previously peeled, 19; acetic acid, 1; stir together, press, boil, and strain through flannel, and evaporate to a soft extract.—*Dose.* 1 to 2 grs. with an equal weight of liquorice powder.

b. (Wholesale.) Dried corms, 14 lbs.; acetic acid (pyroligneous), 6 pints; distilled water, 5½ galls.; digest for 14 days, express, filter, and evaporate. Product, 2½ to 3 lbs.

Obs. The above extracts are generally prepared from the dried corms, and hence the very uncertain and inferior quality of those commonly met with. They also possess less activity than the pharmacopœial preparations. They rapidly get dry and crumbly, and, unless a little spirit and oil of cloves are added, will scarcely keep a week in warm weather without becoming mouldy.—*Dose.* 1 to 3 grs., two or three times a day. It is much stronger than the common extract, and contains the acetate of colchicine. Sir C. Scudamore prefers the acetic extract prepared by the formula *b* (*above*).

4. (Alcoholic; EXTRACTUM COLCHICI ALCOHOLICUM, L.—P. Cod.). AS EXTRACT OF BOX. More active than even the acetic extract. All the preparations of colchicum are poisonous in large doses.

Extract of Col'ocynth. *Syn.* EXTRACT OF BITTER APPLE; EXTRACTUM COLOCYNTHIDIS (Ph. L. & E.), E. C. SIMPLEX, E. C. MOLLE, L. *Prep.* 1. (Ph. L.) From colocynth pulp (cut in pieces and the seeds removed), by simple maceration in cold water, for 36 hours, frequently pressing it with the hands, and afterwards strongly pressing out the liquor, which must be strained before evaporating it.

2. (Ph. E.) From the decoction. This is the plan adopted at Apothecaries' Hall, and in the laboratory generally. Many houses do not even remove the seeds.

Obs. This extract rapidly gets hard, crumbly, and mouldy, by keeping. For the remedy, see observations on EXTRACT OF COLCHICUM, *above*.—*Dose.* 5 grs. to 20 grs.; as a cathartic. Colocynth pulp yields about 65% of extract.

3. (Alcoholic; EXTRACTUM COLOCYNTHIDIS ALCOHOLICUM, L.)—*a.* (Ph. Baden.) AS EXTRACT OF ANGELICA—Ph. Bad.

b. (P. Cod.) From a tincture prepared with proof spirit. Much more active than the simple extract.—*Dose.* 2 to 7 grs.

4. (Dry; EXTRACTUM COLOCYNTHIDIS SICCUM, L.—Ph. Bor.) As the last, but using spirit of the sp. gr. ·900 (about 16 o. p.), digesting at a tepid heat, evaporating to dryness, and powdering.—*Dose.* 1 to 6 grs.

Extract of Colocynth (Compound). *Syn.* COMPOUND EXTRACT OF BITTER APPLE, CATHARTIC EXTRACT; EXTRACTUM CATHARTICUM, E. COLOCYNTHIDIS COMPOSITUM, B. P. *Prep.* 1. (B. P.) Colocynth free from seeds, 6; extract of Socotrine aloes, 12; scammony, or resin of scammony in powder, 4; hard soap in powder, 3; cardamoms freed from capsules in fine powder, 1; proof spirit, 160. Macerate the colocynth in the spirit for four days, press out the tincture, distil off the spirit, and add to it the extract of aloes, the soap, and the scammony; then evaporate the residue by a water bath to a pilular consistence, adding the cardamoms towards the end of the process.—*Dose.* 2 to 5 grs., with 2 or 3 grs. of extract of hyoscyamus to prevent griping.

2. (Ph. L. 1836.) Colocynth pulp (sliced, without the seeds), 6 oz., proof spirit, 1 gal.; digest with a gentle heat for 4 days, express, strain, and add, of extract of aloes (Ph. L. 1836), 12 oz., powdered scammony, 4 oz., Castile soap (cut small), 3 oz., and evaporate (distil) to a proper consistence; adding, towards the last, powdered cardamoms, 1 oz.

3. (Wholesale.) The formulæ adopted by the wholesale druggists are mere modifications of that of the Ph. L. 1809; water being used instead of spirit as the menstruum, with actual benefit, as we honestly believe, to the quality of the preparation. The following are extensively employed by those who do most in this article, and we can speak highly of the quality of the products obtained by their use.

a. Turkey colocynth, 18 lbs., is boiled in about 20 times its weight of water for five or six hours; to the strained decoction is added hepatic aloes, 40 lbs., which are boiled until dissolved, when the solution is decanted. In the mean time the colocynth is exhausted with a second quantity of water (less than the first), and the strained liquor is added to the undissolved residuum of the aloes, and boiled for a few minutes; after which it is drawn off and mixed with the first decoction of aloes; the

mixed liquors are then allowed to stand until quite cold (commonly until the next day), to deposit the resinous portion. The liquor is next decanted or drawn off, and set evaporating as quickly as possible; as soon as the consistence of treacle is arrived at, the whole is allowed to cool considerably, and moist sugar (clean), 4 lbs., and Castile soap, 10 lbs. (previously melted with a little water), are added; powdered scammony, 6 lbs., is next gradually sifted in, the extract all the time being assiduously stirred by a second person. Lastly, the heat is further moderated, and the stirring continued until a rather harder consistence is acquired than is proper for the extract, when the steam is wholly 'shut off,' or the vessel removed from the heat, and as soon as the whole has become sufficiently cool to prevent any considerable evaporation of the spirit, essence of cardamoms, 2 lbs. (say, 1 quart), is expertly stirred in; and the extract at once (whilst still warm) put into stone jars or pots, and tied or covered over, for store or use. The product is usually labelled 'EXT. COLOCYNTH. COMP. OFF.' It looks well, and smells very aromatic, and is really an excellent preparation.

b. Turkey colocynth, 2¼ lbs.; hepatic aloes, 5½ lbs.; powdered scammony, 1½ lb.; powdered cardamoms, 6 oz. (or essence, ½ pint); Castile soap (genuine), 1 lb. 2 oz.; pale moist sugar, ½ lb.; proceed as last. This produces a beautiful article, and of unquestionable quality, equally effective, and milder in its action than the College preparation. It is labelled and sent out as EXT. COLOCYNTH. COMP. PH. L. (1836).

4. (Ph. L. 1809.) Colocynth, 6 drs. (6 parts); aloes, 1½ oz. (12 parts); scammony, ½ oz. (4 parts); hard soap, 3 drs. (3 parts); cardamoms, 1 dr. (1 part); as No. 3, *a* (nearly).

Qual., &c. Compound extract of colocynth is often adulterated with acrid cathartics to make up for the deficiency or inferiority of its proper ingredients, and foreign matter often becomes mixed with it by the use of impure scammony. The presence of cape aloes may usually be detected by the nauseous odour; chalk (an article frequently present in bad scammony), by placing a little ball of the extract in a glass tube, and pouring over it some dilute hydrochloric or acetic acid, when an effervescence will ensue, if that substance be present; jalap, scammony adulterated with fecula, and other starchy substances, by the filtered decoction of the extract turning blue on the addition of tincture of iodine; gamboge, by the decoction becoming deep red on the addition of liquor of potassa, and by a filtered alcoholic solution of the extract forming a yellow emulsion with water, which becomes transparent and assumes a deep-red colour on the addition of caustic potassa; and further, by this solution (if the alkali is not in excess) giving a yellow precipitate with acids and with acetate of lead, a brown precipitate with sulphate of copper, and a very dark brown one with the salts of iron; also by the ethereal solution of the extract dropped on water yielding an opaque yellow film, soluble in caustic potassa, if it contains gamboge.

Dose. 3 grs. to 15 grs. It is a safe and mild, yet certain, purgative. It may be mixed with calomel without the latter being decomposed. 2½ or 3 grs., mixed with an equal weight of blue pill and taken overnight, forms an excellent aperient in dyspepsia, liver complaints, &c. See ABERNETHY MEDICINES.

Obs. There are few formulæ which have undergone so many alterations in the hands of the College as that for compound extract of colocynth. Before 1809, proof spirit was ordered to be employed as the menstruum, and, omitting the soap, the preparation resembled that of the Ph. L. 1836. In 1809, the College directed water to be used instead of spirit, and added a certain quantity of soap. In the next edition of the Pharmacopœia (1815), the soap was again omitted; but in the edition of 1824, the formula of 1809 was again adopted, substituting, however, proof spirit for the water. These directions were also continued in the edition of 1836. In the last London Pharmacopœia (1851) the formula for this extract is omitted altogether, and in its place a pill (PILULA COLOCYNTHIDIS COMPOSITA) is inserted.

The compound extract of colocynth and the simple and compound extracts of sarsaparilla are in greater demand in the wholesale trade, and are sold in larger quantities at a time, than all the other medicinal extracts put together. As a proof, if it were necessary, that honesty is the best policy, it may be mentioned, that a certain metropolitan druggist, remarkable for the superiority of this preparation, has obtained no inconsiderable fortune by its sale alone; while the host of miserable vendors of the evaporated decoction of musty colocynth seed, Cape aloes, worthless scammony, and scentless cardamoms, sold under the name, attempt to ruin each other, by offering their rubbish at a price that precludes the possibility of a large profit, or even of the establishment of a respectable connection.

Extract of Conia. See EXTRACT OF HEMLOCK.

Extract of Contrayer'va. *Syn.* EXTRACTUM CONTRAYERVÆ, L. *Prep.* (Palat. Cod.) From contrayerva root, as EXTRACT OF CINCHONA—Ph. L.—*Dose.* 10 grs. to ½ dr.; as a diaphoretic tonic, in low conditions of the system.

Extract of Copaí'ba. *Syn.* RESINOUS EXTRACT OF COPAIBA; EXTRACTUM COPAIBÆ, E. C. RESINOSUM, L. *Prep.* (Mr. Thorn.) From balsam of copaiba, by distilling off the oil, until the residuum assumes the consistence of an extract.—*Dose.* 10 to 20 grs., or more. One of the many useless preparations which encumber modern pharmacy. It may be taken in 3-dr. doses without any perceptible effect beyond a fit of indigestion.

Extract of Copal'che. *Syn.* EXTRACTUM COPALCHI, E. CORTICIS C., L. *Prep.* From copalchi bark (*Croton pseudo-China*), as EXTRACT OF CASCARILLA, which it for the most part resembles.—*Dose.* 1 to 3 grs.

Extract of Couch Grass. *Syn.* EXTRACT OF DOG'S GRASS; EXTRACTUM GRAMINIS, L. *Prep.* 1. (P. Cod.) From the root of couch grass, or dog's grass (*Triticum repens*), as EXTRACT OF BISTORT—P. Cod.

2. From the fresh root, as EXTRACT OF ACONITE—Ph. L.

3. (Fluid; MELLAGO GRAMINIS, EXTRACTUM GRAMINIS FLUIDUM, L.—Ph. Hann. 1831.) From the decoction of the fresh root of couch grass, evaporated to the consistence of new honey. Pectoral.—*Dose.* 15 grs. to ½ dr., or more.

Extract of Cu'bebs. *Syn.* EXTRACTUM CUBEBÆ, L. *Prep.* 1. From the alcoholic tincture evaporated by a very gentle heat.—*Dose.* 5 grs. to 30 grs.

2. (Mr. Toller.) To the last add a little powdered Castile soap, when it begins to thicken, and evaporate to a pilular consistence. —*Dose.* 10 grs. to 30 grs.

3. (Fluid: LIQUOR CUBEBÆ, EXTRACTUM C. FLUIDUM, L.)—*a.* Cubebs (ground in a coffee-mill), 1½ lb.; rectified spirit, 1 quart; prepare a tincture, either by displacement or by digestion for a week, and reduce it, by distillation at a very gentle heat, until the whole measures exactly 1 pint. Every fl. oz. represents 2 oz. of cubebs.—*Dose.* 20 to 40 drops.

b. (M. Puche.) From cubebs and proof spirit, equal parts, by percolation; without subsequent evaporation. Represents its own weight in cubebs.—*Dose.* ½ to 1 fl. dr.

c. (Ph. U. S. 1851.) Cubebs, 1 lb. (nearly); ether, q. s.; make 1 quart of tincture; then distil off 1½ pint of the ether by the heat of a water bath, and expose the residuum in a shallow vessel until the remainder of the ether has evaporated.

4. (Oleo-resinous; EXTRACTUM CUBEBÆ, E. CUBEBARUM, E. C. OLEO-RESINOSUM, L.)—*a.* (M. Dublanc.) The essential oil resulting from the careful distillation of any given quantity of cubebs, is mixed with the resinous extract obtained by evaporating a tincture of the dried residuum made with rectified spirit; the whole being reduced to the consistence of a thick syrup. 1 lb. of cubebs yields about 6 oz. of this extract.

b. (Labelonge.) Cubebs are first exhausted with ether, and then with proof spirit, in a displacement apparatus; the alcoholic tincture is evaporated to an extract over a water bath, and when cold, the ethereal tincture is mixed with it, and the mixture abandoned to spontaneous evaporation until the ether is volatilised.

c. (W. Procter.) An ethereal tincture (by displacement) is poured into a large retort, and 5-6ths is drawn over by the heat of a water bath; the evaporation of the residuum, to the proper consistence, is carried on at a heat not exceeding 120° Fahr. The formula of the Ph. Baden. is nearly similar. Said to represent 6 to 8 times its weight in cubebs. 1 lb. yields 2 oz. of this extract.

d. (Hamb. Cod. 1845.) This resembles *a* (*above*).

Obs. This extract has a darkish brown colour, and tastes and smells strongly of cubebs. It is only slightly soluble in water.—*Dose.* 5 grs. to 20 grs.; made into an emulsion or pills, or enclosed in a capsule. See CUBEBS.

Extract of Cu'cumber. See ELATERIUM.

Extract of Cuspa"ria. EXTRACT OF ANGOSTURA BARK; EXTRACTUM CUSPARIÆ, E. CORTICIS C., E. ANGOSTURÆ, L. *Prep.* 1. From angostura bark, as EXTRACT OF CINCHONA—Ph. L.

2. (Alcoholic.) AS EXTRACT OF CINCHONA —Ph. E. Stronger than the last. Both are aromatic, bitter, tonic, and stimulant.—*Dose.* 10 grs. to ½ dr.; in dyspepsia, chronic diarrhœa, dysentery, &c.

Extract of Daff'odil. *Syn.* EXTRACTUM NARCISSI, L. *Prep.* 1. From the fresh flowers of daffodil or yellow narcissus (*Narcissus pseudo-narcissus*), as EXTRACT OF ACONITE—Ph. L.

2. (Alcoholic.) From the dried flowers, as EXTRACT OF BOX. Both are pectoral and expectorant; and in large doses nauseant and emetic.—*Dose.* ½ gr. to 2 grs.; in hooping-cough, &c.

Extract of Dandeli'on. See EXTRACT OF TARAXACUM.

Extract of Digita'lis. See EXTRACT OF FOXGLOVE.

Extract of Dog's Grass. See EXTRACT OF COUCH GRASS.

Extract of Dog'wood. *Syn.* EXTRACTUM CORNÛS, E. CORNI, L. *Prep.* From American or tree dogwood (*Cornus Florida*), as EXTRACT OF CINCHONA BARK.

Obs. In its general effects, American dogwood approaches the cinchonas, and is said to be not inferior to them in the cure of intermittents. (Bigelow.) It contains a peculiar bitter principle, called cornine. Several other varieties of the genus *Cornus*, as round-leaved dogwood (*Cornus circinata*), swamp dogwood (*Cornus sericea*), &c., are used in America, but are less valuable.

Extract of Dulcama"ra. See EXTRACT OF BITTER SWEET.

Extract of Elate'rium. *Syn.* INSPISSATED JUICE OF THE SQUIRTING CUCUMBER; SUCCUS SPISSATUS MOMORDICÆ ELATERII. For preparation and recent synonyms, see ELATERIUM.

Extract of El'der Berries. *Syn.* ELDER ROB; ROOB SAMBUCI, EXTRACTUM SAMBUCI, E. S. NIGRÆ, E. BACCARUM S., SUCCUS SAMBUCI INSPISSATUS, L. *Prep.* 1. (Ph. L. 1788.) The expressed and depurated juice of elder berries, evaporated to the consistence of honey.

2. (Ph. E. 1744.) To the above, when it begins to thicken, add 1-5th part of sugar.

3. (Ph. Bor.) As the last (nearly), but adding only 1 oz. of white sugar to each pound of the extract whilst still warm.—*Dose.* 1 to 4 drs.; in rheumatism, gout, and various skin affections.

Extract of El'ecampane. *Syn.* EXTRACTUM INULÆ, E. RADICUM I. CAMPANÆ, E. HELENII, L. *Prep.* 1. (Ph. L. 1746.) From a decoction of the dried root.

2. (P. Cod.) AS EXTRACT OF BISTORT—P. Cod.

3. (Ph. Suec. 1845.) From a tincture prepared with proof spirit and water, equal parts. —*Dose.* 10 grs. to ½ dr.; as a diaphoretic, expectorant, and tonic; in asthma, hooping-cough, various skin diseases, &c.

Extract of Elm. *Syn.* EXTRACTUM ULMI, E. CORTICIS U., L. *Prep.* 1. From the decoction of the bark of the common elm (*Ulmus campestris*).

2. (Soubeiran.) AS EXTRACT OF BOX. Astringent and alterative.—*Dose.* 20 grs. to 1 dr.; in secondary syphilis, chronic skin affections, &c.

Extract of Er'got. *Syn.* AQUEOUS EXTRACT OF ERGOT, HÆMOSTATIC EXTRACT; EXTRACTUM ERGOTÆ, E. E. AQUOSUM, E. SECALIS CORNUTI, E. HÆMOSTATICUM, L. *Prep.* 1. (B. P.) *Extractum Ergotæ Liquidum.* Ergot in coarse powder, 16; ether, 20; distilled water, 70; rectified spirit, 8. Shake the ether in a bottle with half its bulk of the water, and, after separation, decant the ether. Place the ergot in a percolator, and free it from oil by passing the washed ether through it; remove the marc and digest it in the remainder of the water for twelve hours at 160° F. Press out the liquor, and evaporate it to 9, and when cold add the 8 of spirit; allow it to stand for an hour to coagulate, filter, and make up the quantity to 16.—*Dose.* 15 to 30 minims.

According to Squire, the amount of ether employed should be double the above, in two percolations, and the marc should be dried in the air before digesting with water. See ERGOTINE (Bonjeau's).

2. (Alcoholic; EXTRACTUM ERGOTÆ ALCOHOLICUM, L.) See ERGOTINE (Wigger's).

Extract of Fern. *Syn.* EXTRACTUM FILICIS LIQUIDUM—B. P. See EXTRACT OF MALE FERN.

Extract of Flesh. See EXTRACT OF MEAT, ESSENCE OF BEEF, TEA (Beef), &c.

Extract of Fox'glove. *Syn.* EXTRACTUM DIGITALIS (Ph. E.), L. *Prep.* 1. (Ph. L. 1836.) From the leaves of *Digitalis purpurea*, as EXTRACT OF ACONITE—Ph. L.

2. (Ph. E.) From the filtered expressed juice, either evaporated *in vacuo*, with the aid of heat, or by exposure to a current of dry air.

3. (P Cod.)—*a.* AS EXTRACT OF BISTORT —P. Cod.

b. AS EXTRACT OF BOX—P. Cod.

4. (Ph. Baden.) AS ALCOHOLIC EXTRACT OF ACONITE—Ph. Bad.

Obs. The juice of foxglove is very readily injured by exposure to air and heat. The evaporation should therefore be conducted as rapidly as possible, but at a low temperature. It is narcotic, sedative, and is powerfully poisonous.—*Dose.* ½ gr., cautiously increased to 2 or 3 grs. It is principally given in fevers, dropsy, diseases of the heart, pulmonary consumption, epilepsy, scrofula, and asthma. This extract spoils by long keeping. The last two are stronger than the rest, and keep better. It is omitted in the present Ph. L.

Extract of Fu'mitory. *Syn.* EXTRACTUM FUMARIÆ, L. *Prep.* 1. From either the infusion or decoction of the dried leaves of common fumitory (*Fumaria officinalis*).

2. (P. Cod.) From the clarified juice of the fresh herb. Slightly aperient, diaphoretic, and alterative. It has been given in obstructions of the liver and cutaneous affections of the leprous kind.

Extract of Galls. *Syn.* EXTRACTUM GALLÆ, E. GALLARUM, L. *Prep.* 1. From the infusion by maceration or displacement with cold water.

2. From the hot infusion or decoction. The first is to be preferred. Astringent. *Used* chiefly in ointments and injections for piles, foul ulcers, &c., and, internally, in hæmorrhages, spitting of blood, &c.

Extract of Gen'tian. *Syn.* EXTRACTUM GENTIANÆ (B. P.), L. *Prep.* 1. (Ph. L.) Gentian root (sliced), 3 lbs.; distilled water (temperate), 4 pints; macerate for 12 hours, and gently express the liquor; repeat the maceration with water, 1 quart, for 6 hours; and evaporate the mixed liquors.

2. (Ph. L. 1836.) From the ordinary infusion of the root made with 10 or 12 times its weight of boiling water, the maceration being continued for 24 hours.

3. (Ph. E.) From an infusion prepared by percolation with cold water. The formulæ of the Ph. Baden, Paris, and U. S. are similar.

4. (B. P.) Gentian 1 lb.; water (boiling), 10; macerate for 2 hours, boil 15 minutes, strain, and evaporate to a soft pilular consistence.—*Dose.* 10 to 15 grs.

5. (Ph. D. 1826.) From the decoction.

Obs. On the large scale, this extract is almost universally prepared by exhausting the root by coction with water, as in the last formula. When well prepared, it is one of the smoothest and brightest extracts of the Pharmacopœia. Good gentian root yields by infusion in hot water fully 50%, and by decoction about 60% of extract.—*Dose.* 10 grs. to 30 grs., two or three times daily, as a stomachic bitter and tonic; either alone or combined with rhubarb, ginger, or aloes. It is, however, more especially used as a vehicle for chalybeates and other metallic preparations. The principal consumption of extract of gentian is by the brewers, in lieu of hops.

6. (HARD E. OF G.; E. G. DURUM, L.) The

last dried by a gentle heat until brittle enough to powder.

Extract, Goulard's. See SOLUTION OF SUBACETATE OF LEAD.

Extract of Guaiac'um. *Syn.* EXTRACTUM GUAIACI, L. *Prep.* 1. (Ph. L. 1746.) From lignum vitæ shavings or sawdust, exhausted by coction with water; as soon as the mass becomes thick, 1-8th of rectified spirit is to be added.

2. As the last, omitting the spirit. Diaphoretic, diuretic, and alterative; in dropsy, gout, rheumatism, skin diseases, &c.

Extract of Guarana'. *Syn.* EXTRACTUM GUARANÆ, E. PAULLINIÆ, L. *Prep.* (Dr. Gavrelle.) From tincture of guarana (seeds of *Paullinia sorbilis*), prepared by coction with proof spirit. Tonic and alterative.—*Dose.* 2 to 5 grs., twice or thrice daily.

Extract, Hæmostat'ic. See EXTRACT OF ERGOT.

Extract of Hedge Hyssop. *Syn.* EXTRACTUM GRATIOLÆ, L. *Prep.* 1. (Ph. Bor.) From the herb (*Gratiola officinalis*), as ALCOHOLIC EXTRACT OF ACONITE—Ph. Bor.

2. (Ph. Baden.) As EXTRACT OF ACONITE—Ph. Baden.

3. (Vinous.) As VINOUS EXTRACT OF CINCHONA. Purgative, diuretic, and vermifuge. —*Dose.* 2 to 5 grs., gradually increased, watching its effects; in dropsy, jaundice, gout, &c. It has been said to be the basis of the celebrated 'EAU MÉDICINALE D'HUSSON.'

Extract of Hel'lebore. The extracts prepared from three different plants may be included under this head:—

1. (EXTRACT OF BLACK HELLEBORE; EXTRACTUM HELLEBORI, E. H. NIGRI, L.)—*a.* (Ph. L. 1788.) From the infusion or decoction of black hellebore (*Helleborus officinalis*). —*Dose.* 5 to 12 grs.

b. (Alcoholic—P. Cod. & Ph. U. S.) As EXTRACT OF BOX (nearly). That of the Ph. Bad. is similar.—*Dose.* 3 to 8 grs.

c. (Vino-alcoholic—Cottereau.) Powdered black hellebore, 2 lbs.; salt of tartar, ½ lb.; dilute alcohol (sp. gr. ·935), 7 pints; digest 12 hours, and express the tincture; add to the marc, white wine, 7 pints; digest for 24 hours, express, mix the tinctures, filter, and evaporate.—*Dose.* 2 to 6 grs.

Obs. When prepared by coction with water till exhausted of soluble matter, black hellebore root yields about 40% of extract. In small doses, it is alterative, purgative, and resolvent; in larger ones, it is a drastic, hydragogue cathartic, and emmenagogue, dangerous unless combined and its effects carefully watched.

2. (EXTRACT OF GREEN HELLEBORE, E. OF AMERICAN H., E. OF ITCH-WOOD; EXTRACTUM VERATRI VIRIDIS, L.) From the fresh root (rhizome) of the green hellebore (*Veratrum viride*), as EXTRACT OF ACONITE—Ph. L.—*Dose.* ⅛ gr. to ½ gr. *Used* in America in the same cases as white hellebore.

3. (EXTRACT OF WHITE HELLEBORE; EXTRACTUM VERATRI, E. HELLEBORI ALBI, L.) From the root (rhizome) of the white hellebore (*Veratrum album*), as EXTRACT OF BLACK HELLEBORE.—*Dose.* $\frac{1}{12}$ gr. to ¼ gr. Emetic, purgative, stimulant, and highly acrid. In gout, rheumatism, and nervous affections, mania, &c. See VERATRINE.

Extract of Hem'lock. *Syn.* 'INSPISSATED JUICE OF HEMLOCK; EXTRACTUM CONII (B. P.), SUCCUS SPISSATUS CONII, L. *Prep.* 1. (B. P.) The inspissated juice of the fresh plant, prepared as directed for EXTRACTUM BELLADONNÆ.—*Dose.* 4 to 6 grs.

2. (Ph. L.) From the fresh plant (*Conium maculatum*), as EXTRACT OF ACONITE—Ph. L.

3. (Ph. E.) As EXTRACT OF FOXGLOVE—Ph. E.

4. (Ph. D.) As EXTRACT OF BELLADONNA —Ph. D.

Obs. Of all the inspissated juices (not even excepting that of aconite), this is the one most readily injured by exposure to the air and heat, and which soonest loses its qualities by age. Its active principle is CONINE. Extract of hemlock has a greenish colour, and a strong odour of the fresh-bruised plant. It is "of good quality only when a very strong odour of conia (a 'mouse-odour') is disengaged by degrees, on its being carefully triturated with liquor of potassa." (Ph. E.) "The extracts of hemlock may become feeble, if not inert, in one of two ways,—either by the heat being continued after the concentration has been carried to a certain extent, or by long keeping. On the one hand, I have always observed that from the point at which the extract attains the consistence of thin syrup, ammonia begins to be given off in abundance, together with a modified odour of conine; and, on the other hand, I have found extracts, which were unquestionably well prepared at first, entirely destitute of conine in a few years." (Christison.) "The most active extract is that which is procured by moderate pressure from the leaves only." (Brande.) "The extract of the Ph. D., being freed from the inert albumen and chlorophyll, contains most of the active principle, and is nearly soluble in water." (Royle.) On the large scale, the whole of the green portion of the plant is pressed for juice. 1 cwt. of hemlock yields from 3 to 5 lbs. of extract.—*Dose.* 2 grs., gradually increased to 5 grs., or more, until some obvious effect is produced; as an anodyne, alterative, and resolvent in various obstinate disorders, as glandular and visceral enlargements, foul and painful ulcers, scrofula, cancer, neuralgia, rheumatism, troublesome coughs, &c.

5. (Alcoholic; EXTRACTUM CONII ALCOHOLICUM, L.)—*a.* (Ph. Baden.) As ALCOHOLIC EXTRACT OF ACONITE—Ph. Baden.

b. (P. Cod.) As the last, but using proof spirit.—*Dose.* ½ to 2 grs.

6. (Dried; EXTRACTUM CONII SICCUM, L.) —*a.* As the DRIED EXTRACT OF ACONITE—P. Cod.

b. (Archer.) By drying the extract of the Dublin College with a continuous current of warm air.

Extract of Hemp. *Syn.* EXTRACT OF AMERICAN HEMP; EXTRACTUM APOCYNI, E. A. CANNABINI, L. *Prep.* From the root of the *Apocynum cannabinum*, as EXTRACT OF GENTIAN. A hydragogue cathartic.—*Dose.* 2 to 6 grs.; in dropsy, &c. The plant from which this extract is prepared is called 'INDIAN HEMP' in the United States of America, a practice which should be avoided, as this name is now almost exclusively appropriated to *Cannabis Indica*, a variety of the common hemp (*Cannabis sativa*, var. *Indica*) growing in India. See EXTRACT OF INDIAN HEMP.

Extract of Hen'bane. *Syn.* EXTRACT OF HYOSCYAMUS; EXTRACTUM HYOSCYAMI (B. P.), SUCCUS SPISSATUS HYOSCYAMI, L. *Prep.* 1. (Ph. L.) From the fresh leaves and leaf-stems of common henbane (*Hyoscyamus niger*), as EXTRACT OF ACONITE—Ph. L.

2. (Ph. E.) As EXTRACT OF FOXGLOVE—Ph. E.

3. (B. P.) From the fresh leaves and young branches, as EXTRACT OF BELLADONNA.—*Dose.* 3 to 6 grs.

4. (Ph. U. S.) From the expressed juice coagulated by heat and strained.

Obs. In the Paris Codex extracts are ordered to be prepared from henbane both by the processes Nos. 1 and 4 above.—*Product* (by the ordinary method):—1 lb. of the fresh leaves yielded fully 8 drs. of extract (Geiger); 1 cwt. yielded 4 to 5 lbs. (Brande); 1 cwt. of the recent plant yielded, by an ordinary screw press, 59½ lbs. of juice, and this, evaporated in a water bath, gave 5 lbs. 9 oz. of extract (Squire); 1¾ cwt. of the green herb yielded 11 lbs. of extract (Gray.)—*Dose.* 2 to 10 grs.; as an anodyne, hypnotic, antispasmodic, sedative, and narcotic; more especially in those cases in which the use of opium is objectionable. *Externally*, as a topical application to sore or inflamed parts, either made into an ointment or spread on plaster.

5. (Alcoholic; EXTRACTUM HYOSCYAMI ALCOHOLICUM, L.) The formulæ of the Ph. Bad., Par. & U. S. are similar to those for ALCOHOLIC EXTRACT OF ACONITE.

6. (E. OF HENBANE SEEDS; EXTRACTUM SEMINUM HYOSCYAMI, L.—P. Cod.) An extract of the seeds made with spirit sp. gr. ·900 (= about 16 o. p.) is dissolved in 4 parts of cold water, and the solution filtered and evaporated. Stronger than the simple extract.—*Dose.* ¼ gr. to 3 grs.

Extract of Ho'ly This'tle. *Syn.* EXTRACTUM CARDUI BENEDICTI, L. *Prep.* 1. (Ph. Baden.) From holy or blessed thistle (*Carduus Benedictus*) by displacement with cold water.

2. (Ph. Bor.) As EXTRACT OF GENTIAN—Ph. L. (nearly). Tonic, diaphoretic, febrifuge, often diuretic, and occasionally emetic.—*Dose.* 5 to 15 grs., as a tonic or stomachic, chiefly.

Extract of Hops. *Syn.* EXTRACTUM LUPULI, (B. P., Ph. L. & E.); E. HUMULI (Ph. D.), L. *Prep.* 1. (B. P.) Hop, 8; rectified spirit, 15; distilled water, 80. Macerate the hop in the spirit for 7 days, press out the tincture, filter, and distil off the spirit, leaving a soft extract; boil the residual hop with the water for one hour, then express the liquor, strain, and evaporate on a water bath to the consistence of a soft extract. Mix the two extracts, and evaporate at a temperature not exceeding 160° to a pilular consistence.—*Dose.* 5 to 10 grs.

2. (Ph. L.) From commercial hops (the strobiles or catkins of *Humulus Lupulus*), 2½ lbs.; boiling distilled water, 2 galls.; macerate for 24 hours, boil to a gallon, strain whilst hot, and evaporate to a proper consistence. The form of the Ph. E. is nearly similar.

3. (Ph. D.) As EXTRACT OF ALOES—Ph. D. Tonic and stomachic, and slightly anodyne and hypnotic.—*Dose.* 5 grs. to 30 grs.; in dyspepsia, and cases that do not permit of the use of opium. 1 cwt. of ordinary hops yield about 40 lbs. of extract. (Brande.) The druggists usually employ hops 2 or more years old, called by the dealers 'yearlings,' 'olds,' or 'old olds,' because these may be purchased at ⅔ to ½ the price of those of the last season's growth. The first of the above are estimated to have only ⅜ the strength of new hops; the second about ½; and the last little or none, at least in a medical point of view.

4. (Alcoholic; EXTRACTUM LUPULI ALCOHOLICUM, L.—Cottereau.) By displacement with proof spirit. Stronger than the aqueous extract.

Extract of Hore'hound. *Syn.* EXTRACTUM MARRUBII, L. *Prep.* 1. From the fresh herb, as EXTRACT OF ACONITE.

2. From the infusion or decoction. Antispasmodic, pectoral, tonic, and emmenagogue.—*Dose.* 10 grs. to 1 dr.

3. (Ph. Baden.) By displacement with cold water.

4. (Alcoholic; EXTRACTUM MARRUBII ALCOHOLICUM, L.)—*a.* From a tincture made with proof spirit. Said by M. Thoriel to possess considerable power as a febrifuge.—*Dose.* 5 grs. to 20 grs.

b. (Ph. Lusit.) From a tincture made with a mixture of rectified spirit, 1 part, and water, 7 parts. Inferior to the last.

Extract of Ind'ian Hemp. *Syn.* CANNABINE, HEMP RESIN, ALCOHOLIC EXTRACT OF INDIAN HEMP; EXTRACTUM CANNABIS INDICÆ, E. C. I. ALCOHOLICUM, RESINA CANNABIS, L. *Prep.* 1. (B. P.) Indian hemp in coarse powder, 1; rectified spirit, 5; macerate seven days, press out the tincture, distil off the spirit, and evaporate.—*Dose.* ¼ to 1 grain in pill.

2. (O'Shaughnessy.) The dried resinous tops of Indian hemp ('GUNJAH') are boiled in rectified spirit until all the resin is taken up, when most of the spirit is distilled off, and the

evaporation completed by the heat of a water bath. 1 cwt. yields about 7 lbs.

3. (Robertson). By slowly acting on the 'gunjah' with the vapour of alcohol, by a species of percolation; the spirit of the resulting tincture is partly removed by distillation, and the rest by slow evaporation at a temperature not above 150° Fahr. 1 cwt. yields about 8 lbs.—*Dose* of the last two, 1 to 3 grs., gradually increased.

4. (Messrs. Smith.) The bruised 'gunjah' is exhausted with tepid water, then with a solution of carbonate of soda (1 of carbonate to 2 of gunjah), and next with pure water; it is then pressed, dried, and exhausted by displacement with rectified spirit; the tincture is agitated with a milk of lime (containing 1 oz. of lime for every lb. of gunjah), and, after filtration or decantation, any retained lime is precipitated by a little sulphuric acid in slight excess; the tincture is next agitated with animal charcoal, and again f[illegible]red; most of the spirit is now removed by [illegible]distillation, and 3 or 4 times its bulk of wat[illegible] being added, the remaining spirit is removed by a gentle heat; lastly, the remaining water is poured off, and the resin washed with fresh water, and dried. Product, 6%.—Commencing *dose*, ¼ gr.

3. (Purified; EXTRACTUM CANNABIS INDICÆ PURIFICATUM, L.—Ph. D.) From the crude extract of Indian hemp, as imported ('CHURRUS'), 1 oz.; rectified spirit, 4 fl. oz.; dissolve, and after defecation, decant, and evaporate.

Obs. The preparations of Indian hemp are said to be anæsthetic, anodyne, hypnotic, stimulant, phrenic, and aphrodisiac, and, in overdoses, to produce catalepsy. They have been recommended in hysteria, hydrophobia, cholera, rheumatism, chorea, convulsions, and various other painful spasmodic and nervous affections of a serious character. According to the observations of Dr. O'Shaughnessy, 1 gr. of the extract produced catalepsy in a rheumatic patient. The extract prepared with the plant grown in our botanic gardens has quite a different effect to that of the Indian plant; and it also appears that the inhabitants of this country are less susceptible to its action than those of India, and consequently bear the drug in larger doses. This hemp is known in India as the 'increaser of pleasure,' the 'exciter of desire,' the 'cementer of friendship,' the 'causer of a reeling gait,' the 'laughter-mover,' &c. See EXTRACT OF HEMP (*above*), HEMP, &c.

Extract of Ipecac'uanha. *Syn.* EXTRACTUM IPECACUANHÆ, L. *Prep.* 1. (P. Cod.) From ipecacuanha, as EXTRACT OF BOX—P. Cod.

2. (Ph. Bor.) As EXTRACT OF HENBANE SEEDS. Expectorant and emetic.—*Dose.* 1½ to 8 grs.

Extract of I'ron. *Syn.* EXTRACTUM FERRI, E. MARTIS, L. *Prep.* 1. From tincture of tartarised iron.—*Dose.* 2 to 10 grs.; as a chalybeate tonic.

2. (Compound.) See EXTRACT OF APPLE.

Extract of Jalap. *Prep.* 1. (Alcoholic; E. M. ALCO- (B. P.), M, L.)—*a.* Ph. Hamb.) By distilling *Prep.* 1. of the tincture made with rectified rectified and filtering the residue, retaining what rate the[illegible] on the filter.
press out the simple distillation of the tinc- off the s[illegible] Green or brownish green; insoluble macerate [illegible] four hours, e[illegible] oz. mezereon root-bark yielded evaporate by a[illegible]b. Disp.) It is chiefly used mix the two e[illegible] blistering ointments and plas- perature not e[illegible] sistence for [illegible]. GREEN OIL OF MEZEREON grs. ZEREI ÆTHEREUM. B. P.)—*a*

2. (Ph. L.) Ja[illegible] bark cut small, 1 lb.; rectified spirit, 1 gal.; [illegible]s; ether, 1 pint. Macerate press the tincture; boil the [illegible] pints of the spirit for 3 days, 2 galls.; until reduced to ½ g[illegible] and press. To tincture and decoction separate[illegible] the remainder one distil and the other evaporate for 3 days, thickens; lastly, mix the two and [illegible] and press. the evaporation.—*Product.* About 66% = 100 of alcoholic and 50% of aqueous extract. (Brande.) 18 lbs. yield 12 lbs. of extract. (Lab. Journ.)—*Dose.* 6 to 15 grs.

3. (Ph. E.) From tincture of jalap prepared by displacement with rectified spirit. It consists of impure resin of jalap. It is more active than the last.—*Prod.* 16%.—*Dose.* 2 to 6 grs.

Obs. Extract of jalap is an active purgative. It should be well beaten up with a little sulphate of potassa, sugar, or some aromatic powder, to prevent it griping. The substance commonly sold as extract of jalap in the shops is prepared by boiling jalap root for 3 or 4 hours in water, when it is taken out, and well bruised or sliced, and again boiled with water until exhausted of soluble matter. The mixed decoctions are then allowed 12 or 14 hours for defecation, after which the supernatant portion is decanted and evaporated.

Extract of jalap "should be kept in the soft state (EXTRACTUM JALAPÆ, E. J. MOLLE), so as to form pills; and in the hard state (HARD EXTRACT OF JALAP; EXTRACTUM JALAPÆ DURUM), that it may be rubbed to powder." (Ph. L.)

Extract of Ju'niper. *Syn.* EXTRACTUM JUNIPERI, E. BACCARUM J., L. *Prep.* (P. Cod.) Macerate juniper berries in water at 77° to 86° Fahr., for 24 hours, strain, repeat the process with a fresh quantity of water, mix the liquors, filter, and evaporate.—*Dose.* 20 grs. to 1 dr.; as a stimulant diuretic, in dropsy, &c.; and also as a pill-basis.

Extract of Kalada'na. *Syn.* EXTRACTUM KALADANÆ, L. *Prep.* (Bengal Disp.) From the tincture of the seeds of kaladana (*Pharbitis Nil*). Purgative. Said to be equal to EXTRACT OF JALAP, and of double the strength.

Extract of Lettuce. *Syn.* INSPISSATED JUICE OF LETTUCE; EXTRACTUM LACTUCÆ (B. P.), L. *Prep.* 1. (B. P.) The inspissated juice evaporated to a pillular consistence, according

PYRETHRI, E. P. ÆTHERO-ALCOHOLICUM, L. *Prep.* (W. Procter.) Alcohol (rectified spirit), 1 pint; ether, ½ pint; mix, and pour it gradually on root of pellitory (*Anacyclus Pyrethrum*), 1 lb., placed in a percolator; afterwards pour on alcohol, 1 pint; and subsequently, sufficient dilute alcohol (proof spirit) to displace 2½ pints of tincture (ESSENCE OF PELLITORY, TOOTHACHE ESSENCE); the latter is either suffered to evaporate spontaneously, or by a very gentle heat, until a soft extract is attained. *Used* to destroy the sensibility of the nerves of teeth, previous to plugging, and for toothache.

Extract of Pep'per. *Syn.* EXTRACTUM PIPERIS, E. P. NIGRI, L. *Prep.* 1. From decoction of black pepper (bruised). Stimulant; stronger tasted than the berries, but less aromatic.—*Dose.* 10 grs. to 1 dr.; in agues.

2. (Fluid; EXTRACTUM PIPERIS FLUIDUM, L.—Ph. U. S.) From black pepper, as FLUID EXTRACT OF CUBEBS—Ph. U. S., separating the PIPERINE by expression through a cloth, and keeping the fluid portion for use.

Extract of Pimpinel'la. *Syn.* EXTRACTUM PIMPINELLÆ, L. *Prep.* From the root of burnet saxifrage (*Pimpinella saxifraga*), as EXTRACT OF HOPS. Astringent.—*Dose.* 10 to 20 grs.

Extract of Pink'root. *Syn.* EXTRACT OF WORM GRASS, E. OF WORMSEED ROOT; EXTRACTUM SPIGELIÆ, L. *Prep.* 1. From Carolina pinkroot (*Spigelia Marylandica*), as EXTRACT OF BOX—P. Cod.—*Dose.* 5 to 20 grs.

2. (Fluid; ESSENCE OF PINKROOT, LIQUOR OF P.; EXTRACTUM SPIGELLÆ FLUIDUM, L.) Pinkroot, 1 lb.; proof spirit, 3 pints; make a tincture, evaporate to 10 fl. oz., add sugar, ¾ lb., and rectified spirit, q. s. to make the whole measure exactly a pint.—*Dose.* For a child, beginning with ½ a teaspoonful.

3. (Compound; COMPOUND LIQUOR OF PINKROOT; EXTRACTUM SPIGELLÆ FLUIDUM COMP., L.)—*a.* (Estlack.) Carolina pinkroot or spigelia (bruised), 4 oz.; senna, 3 oz.; savine, 1 dr.; pour on boiling water, 1 quart; when cold, add rectified spirit, ½ pint; digest 24 hours, express (or percolate), filter, evaporate to 12 fl. oz., in which dissolve, manna, 1 oz.; sugar, 8 oz. Every fl. oz. is equal to 2 drs. of pinkroot, and 1½ dr. of senna.—*Dose.* For a child, ½ to 1 teaspoonful; for an adult, a tablespoonful.

b. (W. Procter.) Pinkroot, 16 oz.; senna, 8 oz. (both in coarse powder); diluted alcohol (sp. gr. ·935), 2 pints; macerate for 2 days, then proceed by displacement, adding fresh spirit, until 4 pints have passed through; filter, evaporate to 20 fl. oz., and add carbonate of potassa, 1 oz.; next add oils of caraway and aniseed, of each, ½ dr.; (previously triturated with) powdered sugar, 24 oz.; lastly, apply a gentle heat to dissolve the sugar.

c. (EXTRACTUM SPIGELLÆ ET SENNÆ FLUIDUM—Ph. U. S.) As the last (nearly).—*Dose,* As above. All the above preparations of pinkroot are regarded as powerful and certain anthelmintics; particularly the last two.

Extract of Pipsis'sewa. See EXTRACT OF WINTER-GREEN.

Extract of Poi'son Oak. *Syn.* EXTRACTUM RHOIS TOXICODENDRI, L. *Prep.* (P. Cod.) From the expressed juice of the leaves of *Rhus toxicodendron.* Narcotic, stimulant, and alterative. *Dose.* ½ gr. to 1 gr., gradually increased; in chronic rheumatism, obstinate skin diseases, &c.

Extract of Pomegran'ate. *Syn.* EXTRACTUM GRANATI, L. *Prep.* 1. (Soubeiran, & P. Cod.) From the root-bark of pomegranate, as EXTRACT OF BOX. In tape-worm.—*Dose.* 10 to 20 grs.; followed by a purgative.

2. (E. G. CORTICIS FRUCTÛS, L.) From the decoction of the fruit-rind. As the last.

Extract of Pop'pies. *Syn.* EXTRACTUM PAPAVERIS (B. P.), E. P. ALBI, L. *Prep.* 1. (B. P.) Capsules coarsely powdered, 16; rectified spirit, 2; distilled water, a sufficiency; mix the poppy capsules with 40 of the water, stirring them frequently during 24 hours; then pack in a percolator, and pass water slowly through them until about 160 have passed though; evaporate the liquor by a water bath to 20; when cold, add the spirit. After 24 hours, filter the liquor, and evaporate to a pilular consistence.—*Dose.* 2 or 5 grains.

2. (Ph. L.) Bruised poppy-heads (without the seeds), 15 oz.; boiling distilled water, 1 gal.; macerate 24 hours, boil to one half, strain, and complete the evaporation.

3. (Ph. E.) As the last, with "capsules not quite ripe."

Obs. The medical action of extract of poppies, for the most part, resembles that of opium; but it is considerably weaker, and is generally regarded as less prone to produce headache and delirium.—*Dose.* 2 to 12 grs. It is usually prepared by the large manufacturers, by exhausting the capsules, by coction with water; hence the inferior quality of the extract of the shops, which contains a considerable quantity of inert matter.

The principal consumption of this extract is among the brewers, brewers' druggists, and wine merchants. For this purpose it is evaporated until it becomes hard on cooling, when it is formed into half-pound rolls, and covered with paper, like lead plaster. One of these rolls added to a hogshead of ale, stout, or sherry, materially increases the 'headiness' or apparent strength of these beverages.

Extract of Pota'to. *Syn.* EXTRACTUM SOLANI TUBEROSI, L. *Prep.* (Dr. J. Latham.) From the stem and leaves of the potato plant, as EXTRACT OF ACONITE—Ph. L. Narcotic.—*Dose.* 2 to 10 grs.

Extract of Pur'ging Flax. *Syn.* EXTRACTUM LINI CATHARTICI, L. *Prep.* (Dr. B. Lane.) From the dried herb, as EXTRACT OF HOPS—Ph. L. Aperient and diuretic.—*Dose.* 5 to 10 grs.; 14 lbs. yielded 2¼ lbs. of extract.

Extract of Quas'sia. *Syn.* EXTRACTUM

QUASSIÆ (B. P.), Ex. Q. LIGNI, L. *Prep.* 1. (B. P.) Quassia scraped, 1 lb.; distilled water, a sufficiency; macerate the quassia in 8 oz. of water for 12 hours; pack in a percolator; add water till the quassia is exhausted; evaporate, filter before it becomes thick, and again evaporate in a water bath to a proper consistence for pills.—*Dose.* 2 to 5 grs.

2. From the decoction of quassia chips. Product, 5% to 6%.

3. (Ph. E.) From the rasped wood, as EXTRACT OF BISTORT—P. Cod. Bitter and stomachic. *Dose.* 5 to 10 grs., or more.

Obs. This extract is almost universally prepared by coction, and is principally consumed by the brewers, who employ it as a substitute for hops, in large quantities. The bark is frequently substituted for the wood, but is considerably less bitter. The Ph. Baden has an extract prepared with spirit of ·944.

Extract of Quince Seeds. *Syn.* EXTRACTUM CYDONIÆ, E. C. SEMINUM. *Prep.* From the decoction. Sucked as a lozenge, in hoarseness, &c.

Extract of Rhat'any. *Syn.* EXTRACTUM RHATANIÆ; E. KRAMERIÆ (B. P.), L. *Prep.* 1. (B. P.) Rhatany in coarse powder, 1; cold distilled water, 15; macerate 24 hours in 2 of the water, then percolate the whole; evaporate by water bath to dryness.—*Dose.* 5 to 20 grains.

2. (Ph. E. Baden and U. S.) From dried rhatany root (*Krameria triandria*), as EXTRACT OF BISTORT—P. Cod.

3. (Ph. Bor.) By two successive macerations in boiling water of 24 hours each, and evaporating at a temperature not exceeding 165° Fahr.

Obs. Extract of rhatany is astringent and tonic.—*Dose.* 10 to 20 grs. A large quantity of this extract, of very inferior quality, is imported from Brazil, and other parts of South America. It is kept in two states, hard and soft; the former resembles KINO, and is often sold for it; the latter is chiefly consumed by the manufacturers and 'improvers' of port wine.

Extract of Rhu'barb. *Syn.* EXTRACTUM RHEI (B. P.), L. *Prep.* 1. (B. P.) Rhubarb (sliced or bruised), 8 oz.; rectified spirit, 5 oz.; distilled water, 50 oz.; macerate 4 days, strain, and set it aside, that the fæces may subside; next decant the clear portion, strain, mix, and evaporate to a proper consistence over a water bath at 160 F.

2. (Ph. L.) AS EXTRACT OF CINCHONA—Ph. L. (nearly). "The extract is obtained of finer quality by evaporation in a vacuum with a gentle heat." The Baden formula is similar.

Obs. This extract is usually prepared by decoction from inferior and damaged rhubarb, picked out from the chests on purpose; hence the inferior quality of the extract of the shops. When made of good Turkey, or even East India rhubarb, it is a very valuable preparation.—*Dose.* As a stomachic, 5 to 10 grs.; as a purgative, 10 grs. to ½ dr. It is seldom exhibited alone. *Product.* 50%.

3. (Fluid; LIQUOR OF RHUBARB, ESSENCE OF R.; LIQUOR RHEI, EXTRACTUM RHEI FLUIDUM, L.)—*a.* (W. Procter.) Rhubarb (in coarse powder), 8 oz.; mix it with an equal bulk of coarse sand, and moisten it with dilute alcohol (sp. gr. ·935,=13 u. p.) to form a pasty mass; in a short time introduce it into a percolator, shake it until uniformly settled, and cover it with cloth or paper; then pour on the rest of the spirit (the remainder of 2 pints) until the product has little odour or taste of the root; next gently evaporate the tincture to 5½ fl. oz., and add sugar, 5 oz., when the whole should measure 8 fl. oz.—*Dose.* 15 to 30 drops.

b. (Ph. U. S.) As the last, adding of oils of fennel and anise, of each, 4 drops; (dissolved in) tincture of ginger, 4 fl. drs.

4. (Compound; EXTRACTUM RHEI COMPOSITUM, E. PANCHYMAGOGUM, L.—Ph. Bor.) Extract of rhubarb, 3 drs.; extract of aloes, 1 dr., (softened with) water, 4 drs.; mix, and add of soap of jalap, 1 dr., (dissolved in) proof spirit, 4 drs.; lastly, evaporate to an extract, dry this in a warm place, and powder. Stomachic and purgative.—*Dose.* 4 to 20 grs.

Extract of Rue. *Syn.* EXTRACTUM RUTÆ, E. FOLIORUM RUTÆ, L. *Prep.* 1. From rue leaves (*Rutæ graveolens*), as EXTRACT OF HOPS—Ph. L.

2. (Alcoholic—P. Cod.) AS ALCOHOLIC EXTRACT OF ACONITE—P. Cod. (nearly.) The formula of the Ph. Wert. is similar.

Obs. This extract is stomachic, carminative, and emmenagogue.—*Dose.* 10 to 20 grs., twice a day. It is usual to add a little of the essential oil to the extract, just before taking it out of the evaporating-pan, and when nearly cold. The first is the form adopted in trade in this country.

Extract of Saf'fron. *Syn.* POLYCHROITE; EXTRACTUM CROCI, L. *Prep.* 1. From hay saffron, as EXTRACT OF COLOCYNTH—Ph. L.

2. (P. Cod.) From the tincture. Superior to the last.

Obs. The first is used chiefly as a colouring and flavouring substance by cooks, confectioners, wine and cordial brewers, &c.—*Dose.* 5 to 15 grs.; as an excitant, antispasmodic, and emmenagogue.

Extract of Sarsaparil'la. *Syn.* EXTRACTUM SARZÆ, E. SARSAPARILLÆ, L.; EXTRAIT DE SALSEPAREILLE. Fr. *Prep.* 1. (Ph. L. 1836.) From sarsaparilla, as EXTRACT OF HOPS—Ph. L. The Ph. D. 1826 is similar.—*Dose.* 10 grs. to 1 dr. *Product.* (From Jamaica sarsaparilla) 32% to 36%.

2. (Alcoholic; EXTRACTUM SARZÆ ALCOHOLICUM, L.)—*a.* From a tincture of the root-bark, prepared with proof spirit, either by digestion or percolation.

b. (P. Cod. and Ph. U. S.) From sarsaparilla root (powdered), as ALCOHOLIC EXTRACT

OF ACONITE—P. Cod. Superior to the aqueous extract.—*Dose.* 10 to 20 grs.

3. (Fluid; LIQUOR OF SARSAPARILLA, ESSENCE OF S.; LIQUOR SARZÆ, ESSENTIA SARSAPARILLÆ, EXTRACTUM SARZÆ LIQUIDUM—Ph. L., E. S. FLUIDUM—Ph. E. & D., L.); EXTRACTUM SARZÆ LIQUIDUM—(B. P.) *a.* Jamaica sarsaparilla cut transversely, 16; distilled water (temp. 160° Fahr.), 280; rectified spirit, 1. Macerate in half the water for 6 hours, and decant the liquor; digest the residue in the remainder of the water for 6 hours more, mix the liquors, express and filter; evaporate by water bath to 7, or until it has a sp. gr. of 1·130; when cold add the spirit. Sp. gr. should be about 1·025.—*Dose.* 1 to 4 drs.

b. (Ph. L.) Sarsaparilla 3½ lbs.; distilled water, 3 galls.; boil to 12 pints, pour off the liquor, and strain whilst hot; again boil the sarsaparilla in water, 2 galls., to one half, and strain; evaporate the mixed liquors to 18 fl. oz.; and when cold, add of rectified spirit, 2 fl. oz. Each fl. oz. represents 2⅛ oz. of the root (nearly).

c. (Ph. E.) Sarsaparilla, 1 lb.; boiling water, 4 pints; digest 2 hours, then bruise the root, boil it for 2 hours, filter, and express the liquid; repeat the coction with water, 2 pints, as before; evaporate the mixed liquors to the consistence of a thin syrup, and, when cold enough, add of rectified spirit q. s. to make up 16 fl. oz. Each fl. oz. represents 6 drs. of the root, and 6 fl. oz. of the decoction.

d. (Ph. D.) Sarsaparilla, 1 lb. (avoir.); proceed as before, and add of rectified spirit, q. s. to make the product up to 20 fl. oz. Strength, as the last (nearly). In the Ph. D. 1826 the decoction of sarsaparilla, 1 lb. (troy), was ordered to be evaporated to 30 oz., which with the spirit (2 oz.) made the preparation only half the strength of the present one.

4. (Compound; EXTRACTUM SARZÆ COMPOSITUM, E. SARSAPARILLÆ COMP., L.) There is no form for this preparation in the Pharmacopœias, but it is nevertheless in immense demand, from its great convenience in dispensing. The following formulæ are employed by one of the wholesale houses that does largest in this preparation:—

a. Guaiacum shavings (from which the small has been sifted), 30 lbs., Italian juice, 24 lbs., mezereon root, 6 lbs., are boiled with water, q. s., for 1 hour; the decoction is then drawn off, and the boiling repeated with fresh water a second and a third time; the mixed decoctions are allowed to deposit for 6 or 8 hours, or longer, and the clear portion decanted and strained through flannel; the liquid is now reduced to the consistence of treacle, when extract of sarsaparilla, 9 lbs., is added, and the evaporation conducted at a considerably lower temperature until near its completion, when the source of heat is removed, and the remaining evaporation conducted at the expense of that retained by the metal of the "pan;" when nearly cold, and just before removing the extract to the 'pots' or 'jars,' essential oil of sassafras, 2 drs., dissolved in rectified spirit, 1 quart, is added, and quickly but completely stirred in. The *product* is a very showy article, if well managed, and weighs about 45 lbs., the precise quantity depending on the quality of the juice employed. It is labelled 'EXT. SARZÆ COMP.'

b. As the last, but only using 15 lbs. of juice, and that Solazzi. *Prod.* About 35 lbs. It is labelled and sent out as 'EXT. SARZÆ CO. OPT.'

c. By any of the forms given under COMPOUND DECOCTION OF SARSAPARILLA, either common or concentrated, by continuing the evaporation.—*Dose.* Same as that of the simple extract.

5. (Fluid Compound; COMPOUND LIQUOR OF SARSAPARILLA.)—*a.* From any of the preceding formulæ by arresting the evaporation when the fluid has acquired the consistence of a thin syrup, and adding to each pint, when cold, rectified spirit, 4 fl. oz.

b. (Alcoholic—W. Hodgson.) Sarsaparilla (bruised), 16 oz.; liquorice root (bruised), guaiacum wood (rasped), and sassafras bark (sliced), of each, 2 oz.; mezereon (sliced), 6 drs.; spirit, sp. gr. ·935 (=13 u. p.). 7 pints; digest 14 days, express, filter, evaporate to 12 fl. oz., add of sugar, 8 oz., and as soon as this is dissolved, withdraw the heat. Stronger than the last.—*Dose.* 1 fl. dr.

c. (E. SARSAPARILLÆ FLUIDUM—Ph. U. S.) As the last (nearly).

6. (From the root-bark; EXTRACTUM CORTICIS SARZÆ, L.) From the decoction or tincture of the root-bark. The cortical portion of sarsaparilla yields fully 50% of aqueous extract. "Five times as much as the meditullium." (Pope.)

Obs. Each of the above extracts of sarsaparilla (simple, fluid, and compound), when of good quality, dissolves in water, forming a deep reddish-brown solution, perfectly transparent, and depositing little sediment, even by standing some days. See SARSAPARILLA.

Extract of Scam'mony. *Syn.* RESIN OF SCAMMONY; RESINA SCAMMONII, E. S. ALCOHOLICUM, E. SIVE RESINA SCAMMONII (Ph. E.), L. *Prep.* 1. From powdered scammony, exhausted with proof spirit, and the resulting tincture distilled until little but water passes over; the remaining water is then poured from the resin, which is next well washed in boiling water and dried at a temperature below 240° Fahr. Brown; impure.

2. As the last, but using either alcohol of 90% or ether, and animal charcoal. White; pure.

Obs. Scammony resin is translucent, fusible, and combustible; and freely soluble in alcohol, ether, and oil of turpentine. It is frequently adulterated with jalap resin, a fraud readily detected by its insolubility in

the last two menstrua.—*Dose.* 5 to 10 grs. "When pure or virgin scammony can be procured, it is an unnecessary preparation." (Pereira.)

Extract of Scurvy-grass. *Syn.* EXTRACTUM COCHLEARIÆ, L. *Prep.* (P. Cod.) From the clarified juice of fresh scurvy-grass, by exposure to warm air. Anti-scorbutic, stimulant, anti-rheumatic, and diaphoretic.—*Dose.* 1 to 2 drs. The valuable principles of the juice are dissipated by much heat.

Extract of Sen'ega. *Syn.* EXTRACTUM SENEGÆ, L. *Prep.* 1. (P. Cod.) From seneka or snake-root (*Polygala Senega*), as EXTRACT OF BOX—P. Cod.

2. (Compound; EXTRACTUM SENEGÆ COMPOSITUM, E. S. ET SCILLÆ, L.—Ecky.) From equal parts of squills and senega, as the last, but by displacement. Both the above are stimulant, expectorant, sudorific, and diuretic. —*Dose.* 1 to 12 grs.

Extract of Sen'na. *Syn.* EXTRACTUM SENNÆ, L. *Prep.* 1. (EXTRACTUM SENNÆ AQUOSUM, L.)—*a.* As EXTRACT OF COLOCYNTH —Ph. L.

b. (P. Cod.) AS EXTRACT OF BISTORT—P. Cod.

c. (Ph. Bor.) From senna leaves, by maceration in tepid water (104° Fahr.) for 24 hours, and expression and filtration; the operation is repeated with fresh water, and the strained liquors evaporated to a thick extract (at 149° to 157° Fahr.), which is dissolved in water, 4 parts, the solution filtered, and again evaporated.—*Dose.* 10 to 20 grs. It is principally used as a basis for purgative pills. When prepared by decoction it is nearly inert. A better extract is prepared from the common tincture made with proof spirit.

2. (Alcoholic; EXTRACTUM SENNÆ ALCOHOLICUM, L.—Guibourt.) Senna (in powder). 1 part; rectified spirit, 5 parts; heat gradually to boiling, let it cool; in 24 hours express, strain, and repeat the process with fresh spirit; lastly, distil and evaporate. Proof spirit answers for this purpose.

3. (Fluid; EXTRACTUM SENNÆ FLUIDUM, L.—Ph. (U. S.) Senna (in coarse powder), 2½ lbs.; spirit (at or near proof), 64 fl. oz.; macerate 24 hours, then act by displacement, subsequently adding weak spirit (1 of rectified spirit to 3 of water) until 10 pints of tincture are obtained; evaporate to 1 pint, filter, add sugar, 20 oz., and oil of fennel, 1 fl. dr. (dissolved in) compound spirit of ether, 2 fl. drs. Every fl. oz. represents 1 oz. of senna.

Extract of Smoke. *Syn.* EXTRACTUM FULIGINIS, L. *Prep.* 1. (Aqueous.) Wood-soot, 2 oz.; water, 1 pint; boil to 16 fl. oz., filter, and evaporate.

2. (Acetic.) Wood-soot, 2 oz.; distilled vinegar and water, of each, ½ pint; as the last. Formerly reputed antispasmodic, alterative, &c.—*Dose.* 3 to 6 grs., 2 three times a day; in dyspepsia, hysteria, cancer, scrofula, and various syphilitical affections.

Extract of Snake-root. See EXTRACT OF SENEGA.

Extract of Soap'wort. *Syn.* EXTRACTUM SAPONARIÆ, L. *Prep.* (P. Cod. & Ph. Bad.) From the dried roots of soapwort (*Saponaria officinalis*), as EXTRACT OF BISTORT—P. Cod. Aperient and alterative.—*Dose.* 15 grs. to ½ dr.

Extract of Spruce. See ESSENCE OF SPRUCE.

Extract of Squills. *Syn.* EXTRACTUM SCILLÆ, L. *Prep.* 1. (Aqueous; E. S. AQUOSUM.—*a.* (Ph. Baden.) From squills, as EXTRACT OF COLOCYNTH—Ph. L. (nearly).

b. (Ph. Bor.) From squills, as EXTRACT OF SENNA—Ph. Bor. (nearly), but using boiling water, avoiding ebullition during the evaporation, and powdering the residuum.—*Dose.* 1 to 5 grs.

2. (Alcoholic; EXTRACTUM SCILLÆ ALCOHOLICUM, L.—P. Cod.) From the tincture prepared with proof spirit, by distillation and evaporation.—*Dose.* ½ to 3 grs., as an expectorant and diuretic, twice or thrice a day. In larger doses it is nauseant and emetic.

Extract of Stor'ax. See STYRAX.

Extract of Stramo"nium. *Syn.* EXTRACT OF THORN-APPLE; EXTRACTUM STRAMONII, (Ph. L. & D.), L. *Prep.* 1. (B. P.) Pack stramonium seeds, coarsely powdered, in a percolator, and pass about their own weight of washed ether slowly through them, remove the ether, and set aside. Now pour over them proof spirit until the seeds are exhausted; distil off the spirit, and evaporate the residue by a water bath to a proper pill consistence.—*Dose.* ¼ gr., gradually increasing.

2. (Ph. L.) Seeds of thorn-apple (*Datura stramonium*), 15 oz.; boiling distilled water, 1 gal.; macerate for 4 hours in a vessel lightly covered, near the fire; afterwards take out the seeds, bruise them in a stone mortar, and return them to the liquor; then boil down to 4 pints, strain whilst hot, and evaporate. The Ph. D. is similar. *Product.* (About) 12%. Anodyne and narcotic.—*Dose.* ¼ gr. to ½ gr., gradually increased, twice or thrice a day; in neuralgia, rheumatism, tic douloureux, spasmodic asthma, epilepsy, worms, &c.

3. (P. Cod. & Ph. U. S.) From the expressed juice of the fresh leaves, heated to boiling, and filtered. The P. Cod. also orders it to be prepared as EXTRACT OF ACONITE—Ph. L. Anodyne and narcotic.—*Dose.* ½ gr. to 1 gr.

Obs. On the large scale, this extract is prepared by expressing the juice of the fresh herb, and boiling the remainder in water; the juice and decoction are then mixed, filtered, and evaporated. 1½ cwt. of stramonium yielded 37 lbs. of juice, and this, with the decoction, gave 31 lbs. of extract. (Gray.)

4. (Alcoholic; EXTRACTUM STRAMONII—Ph. E., E. S. ALCOHOLICUM, L.)—*a.* (Ph. E. & Ph. U. S.) From the seeds (ground in a coffee-mill), by percolation with proof spirit. *Product.* (About) 14%; 1 lb. yielded 2¼ oz. (Recluz.)

b. (P. Cod.) From the leaves, as EXTRACT OF ACONITE—P. Cod.—*Dose.* ¼ gr., gradually increased. (See *above.*)

Extract of Suc'cory. *Syn.* EXTRACTUM CHICORII, L. *Prep.* (Guibourt.) From the fresh root, as EXTRACT OF ACONITE—Ph. L. Aperient, deobstruent, and tonic.—*Dose.* 10 gr. to ½ dr.

Extract of Sweet Flag. *Syn.* EXTRACTUM ACIDI, E. CALAMI AROMATICI, L. *Prep.* From the rhizomes, as EXTRACT OF RHUBARB—Ph. L. See SWEET FLAG.

Extract of Tan'sy. *Syn.* EXTRACTUM TANACETI, L. *Prep.* 1. From the herb (*Tanacetum vulgaris*), as EXTRACT OF HOP—Ph. L.

2. (Giordano). AS EXTRACT OF HOREHOUND—Ph. Lusitan.

Obs. This extract is said to be tonic, stomachic, anthelmintic, emmenagogue, and febrifuge. Dr. Clark says that in Scotland it was found to be serviceable in various cases of gout. The infusion is, however, preferable. —*Dose.* 5 grs. to 20 grs.

Extract of Tarax'acum. *Syn.* EXTRACT OF DANDELION; EXTRACTUM TARAXACI (Ph. L. & E.), E. T. HERBÆ ET RADICIS (Ph. D. 1826), L. *Prep.* 1. (B. P.), Crush fresh dandelion root, press out the juice, and allow it to deposit; heat the clear liquor to 212° F., and maintain the temperature for 10 minutes; then strain and evaporate by a water bath, at a temperature not exceeding 160° F. to a proper consistence.—*Dose.* 5 to 15 grains.

2. (Ph. L.) From the recent root of dandelion (*Leontodon Taraxacum*), as EXTRACT OF HOP—Ph. L. The formulæ of the Ph. E. & U. S. are nearly similar,

3. (Ph. D.) From the herb and root, as the other simple extracts (EXTRACTA SIMPLICIORA).

4. (P. Cod.) From the expressed juice, as EXTRACT OF STRAMONIUM—P. Cod.

5. (Ph. Bor.) AS EXTRACT OF SENNA—Ph. Bor. (nearly).

6. (Ph. Baden.) By displacement with cold water,

7. (Wholesale.) From the decoction.

8. (Fluid.) See LIQUOR OF TARAXACUM.

Obs. The extract of the shops is usually prepared by exhausting the root by coction with water. The products of the first two of the above formulæ, when recent, have a faint and agreeable odour, and a sweet bitter taste; those of Nos. 4, 5, and 6, smell strongly of the recent root, have a pale and lively brownish yellow colour, and a bitter acidulous taste, without any trace of sweetness; that of the last one is devoid of odour, and possesses a coffee-brown colour, and a sweetish, burnt taste, not much unlike a solution of burnt sugar. The medicinal virtue of this extract is greatest when the aroma and bitter taste of the recent root is well developed; and when sweet, its efficacy as a remedy is impaired. (Squire.)

Taraxacum root should be gathered during the winter months, when the quantity of the product is looked at; as then a given weight of the juice yields more extract; but in summer and autumn it possesses more bitterness and aroma. 4 lbs. of juice from roots gathered in November and December yielded 1 lb. of extract, while it took from 6 to 9 lbs. of juice from the root, gathered in spring or summer, to yield a like quantity. (Squire.) The herb yields by the evaporation of its expressed juice, about $5\frac{0}{0}$ of extract. According to Mr. Jacob Bell, the average yield of 1 cwt. of root is about $7\frac{1}{2}$ lbs. ('Pharm. Journ.,' x, 446.)

Good extract of taraxacum should be wholly soluble in water.—*Dose.* 10 grs. to ½ dr.; as a resolvent, aperient, and tonic, in liver and stomach complaints, &c.

Extract of Tea. *Syn.* EXTRACTUM THEÆ, L. *Prep.* 1. From an infusion of any of the rougher kinds of black tea. Astringent. Has been recommended in diarrhœa; formed into pills.—*Dose.* 10 grs. to ½ dr. A hard, black-looking substance, smelling and tasting faintly of tea, is imported under the same name from China.

2. (Pidding's.) The joint products of distillation and infusion combined. Proposed to be made in China, and exported as a condensed preparation of tea. (ESSENCE OF TEA; ESSENTIA THEÆ); to be used as a substitute for the leaves, in order to save the expense of freight, &c.

Extract of Thorn-Apple. See EXTRACT OF STRAMONIUM.

Extract of Tobac'co. *Syn.* EXTRACTUM TABACI, E. NICOTIANÆ, L. *Prep.* 1. (Chippendale.) From decoction of tobacco. Proposed as an external application in neuralgia, &c.

2. (Alcoholic; EXTRACTUM TABACI ALCOHOLICUM, L.—Ph. Bor.) Tobacco leaves, 1 lb.; spirit (sp. gr. ·900), 2 lb.; digest in a warm place for some days, express strongly, and again digest in a mixture of water and spirit (·900), of each, 1 lb., for 24 hours; again press out the liquor, and evaporate the strained and mixed liquors in a vapour bath, at a temperature not exceeding 167° Fahr.

Extract of Tor'mentil. *Syn.* EXTRACTUM TORMENTILLÆ, L. *Prep.* (Ph. Amst.) From the root of *Potentilla Tormentilla*, as EXTRACT OF HOPS—Ph. L. The Ph. Baden. directs its preparation by displacement with cold water. Astringent and febrifuge.—*Dose.* 15 to 30 grs.; in diarrhœa. It was formerly regarded as a specific in syphilis. (Lindley.)

Extract of U'va Ur'si. See EXTRACT OF WHORTLEBERRY.

Extract of Valer'ian. *Syn.* EXTRACTUM VALERIANÆ, L. *Prep.* 1. From valerian root, as EXTRACT OF HOP—Ph. L.; but using a covered vessel.

2. (Ph. Bor. and Baden.) AS EXTRACT OF CINCHONA—Ph. L. (nearly), employing strong

force in the expression of the liquor, and only evaporating to the consistence of syrup.

Obs. It is usual to add to this extract a little of the ESSENTIAL OIL OF VALERIAN, dissolved in a small quantity of rectified spirit, just before removing it from the evaporating-pan, and when nearly cold. Anti-spasmodic and nervine.—*Dose.* 10 grs. to ½ dr. In hysteric and spasmodic diseases. Valerian yields about 40% of soft extract.

3. (Alcoholic; EXTRACTUM VALERIANÆ ALCOHOLICUM, L.—P. Cod.) As EXTRACT OF BOX.—P. Cod.

4. (Fluid; EXTRACTUM VALERIANÆ FLUIDUM, L.—Ph. U. S). Rectified spirit, 12 fl. oz.; mix, add of valerian (in coarse powder), 8 oz.; digest and percolate, adding, subsequently, spirit (at or near proof) until 16 fl. oz. of tincture have passed through; let this evaporate spontaneously, in a shallow vessel, until reduced to 5 fl. oz.; in the mean time add fresh spirit to the mass in the percolator, until 10 fl. oz. more of tincture are obtained, which add to the above residuum of the evaporation, observing to dissolve any oleo-resinous deposit in a little rectified spirit, and to add it to the rest; lastly, filter, and add of rectified spirit, q. s. to make the whole measure 16 fl. oz.

Extract of Vanil'la. See LIQUOR OF VANILLA.

Extract of Wall Pel'litory. *Syn.* EXTRACTUM PARIETARIÆ, L. *Prep.* From fresh wall pellitory (*Parietaria officinalis*), as EXTRACT OF ACONITE—Ph. L. Aperient, diuretic, and pectoral.—*Dose.* 10 grs. to ½ dr.

Extract of Wal'nut. *Syn.* EXTRACTUM JUGLANDIS IMMATURÆ, L. *Prep.* 1. From unripe walnuts (*Juglans regia*), as EXTRACT OF ACONITE—Ph. L.

2. From the decoction of the green shells. Vermifuge.—*Dose.* 20 to 30 grs. in cinnamon water.

Extract of Walnut Leaves. *Syn.* EXTRACTUM JUGLANDIS FOLIORUM, L. *Prep.* 1. From the decoction of dried walnut leaves.

2. (Soubeiran.) By displacement with tepid water. Diaphoretic and alterative.—*Dose.* 2 to 4 grs., twice or thrice a day; in scrofula, scirrhus, &c.

3. (Alcoholic; EXTRACTUM JUGLANDIS FOLIORUM ALCOHOLICUM, L.—Ph. Bor.) From walnut leaves (cut), as ALCOHOLIC EXTRACT OF TOBACCO—Ph. Bor. (nearly).

Extract of Wa'ter-dock. *Syn.* EXTRACTUM RUMICIS AQUATICI, L. *Prep.* From the root, as EXTRACT OF HOPS, Ph. L. Astringent and antiscorbutic.—*Dose.* 15 grs. to 1 dr.; in skin diseases, &c.

Extract of Whor'tleberry. *Syn.* EXTRACT OF BEARBERRY; EXTRACTUM UVÆ URSI. (Ph. L.), L. *Prep.* From the dried leaves of the bearberry (*Arctostaphylos Uva-Ursi*), as EXTRACT OF HOPS—Ph. L.—*Dose.* 5 to 15 grs., twice or thrice a day; in chronic diseases of the bladder and kidneys, attended with increased secretion of mucus, without inflammation.

Extract of Win'ter Cher'ry. *Syn.* EXTRACTUM ALKEKENGI, L. *Prep.* From the berries of *Physalis alkekengi*, as EXTRACT OF ELDER. Aperient, detergent, and diuretic.—*Dose.* 2 to 4 drs.

Extract of Win'ter-green. *Syn.* EXTRACT OF PIPSISSEWA; EXTRACTUM CHIMAPHILÆ, L. *Prep.* From the herb winter-green or pipsissewa (*Chimaphila umbellata*), as EXTRACT OF HOPS—Ph. L.—*Dose.* 10 grs. to ½ dr.; in dropsy, scrofula, and chronic affections of the urinary organs.

Extract of Wood Sor'rel. *Syn.* EXTRACTUM ACETOSELLÆ, L. *Prep.* (Pideret.) From the expressed juice of the fresh herb (*Oxalis acetosella*). Acid, bitter, and antiscorbutic.—*Dose.* 15 grs. to ½ dr.

Extract of Worm Grass. See EXTRACT OF PINKROOT.

Extract of Worm'seed. *Syn.* EXTRACTUM CINÆ ÆTHEREUM, E. SEMINUM C. Æ., L. *Prep.* (Hamb. Cod. 1845.) Wormseed, 1 oz.; ether, 4 oz.; digest 3 or 4 days, press, filter, distil off 4-5ths, and evaporate the residuum to a proper consistence. *Prod.* 25% to 30%. Vermifuge.—*Dose.* 3 to 10 grs., night and morning, for 2 or 3 successive days, followed by a brisk purge.

Extract of Worm'wood. *Syn.* EXTRACTUM ABSINTHII; EXTRACTUM ARTEMESIÆ ABSINTHII, L. *Prep.* 1. (Ph. D. 1826.) From the dried flowering tops of wormwood, as the other simple extracts (EXTRACTA SIMPLICIORA—Ph. D.)

2. (Ph. Bor.) As EXTRACT OF RHATANY—Ph. Bor.

3. (P. Cod. & Ph. Baden.) By displacement by cold water.

Obs. Bitter stomachic, tonic, and vermifuge.—*Dose.* 10 grs. to 20 grs., 2 or 3 times daily; in dyspepsia, loss of appetite, gout, &c. It is usual to add a few drops of the oil of wormwood to the extract before taking it from the pan.

4. (Alcoholic; EXTRACTUM ABSINTHII ALCOHOLICUM, L.—Guibourt.) From a tincture prepared from the dried tops of wormwood boiled in proof spirit. More active than the last.

Extract of Yew. *Syn.* EXTRACTUM TAXI, L. *Prep.* 1. (Loder.) From the inspissated juice of the fresh leaves of the yew (*Taxus baccata*). Its action on the circulation greatly resembles that of digitalis, but is more manageable.—*Dose.* 1 to 7 grs.; in epilepsy, &c.

2. (Alcoholic,—Ph. Baden.) From the dried leaves, as ALCOHOLIC EXTRACT OF ACONITE—Ph. Baden.

Obs. In addition to the preparations given above, there are many others which are often called 'EXTRACTS.' These may be grouped under the following heads:—

Concentra'ted Extracts. *Syn.* RESINOIDS. Pharmaceutical preparations of more or less value, largely employed by the American phy-

sicians who style themselves 'ECLECTICS.' They are supposed to present in the most concentrated form the medicinal virtues of the plants from which they are derived. See RESINOIDS.

Flu'id Extracts. *Syn.* EXTRACTA FLUIDA, EXTRACTA LIQUIDA, L. This name has been applied in modern pharmacy to various preparations differing materially from each other in their degree of fluidity and concentration. Some of these have been already noticed, and others will be found under one or other of their synonyms. Much confusion would be avoided by confining the name 'FLUID EXTRACT' to those preparations only which differ from the ordinary officinal extracts in being in the liquid form; whilst others of a like character, but of less consistence or concentration, might be conveniently classed under the general denomination of 'LIQUORS' (LIQUORES, L.). The various condensed preparations of vegetable substances, now common in trade, professedly several times stronger than the common DECOCTIONS, INFUSIONS, and TINCTURES, might be simply and advantageously distinguished by the addition of 'CONCENTRATED' to their names. Tinctures made with rectified spirit, and of (say) at least 8 times the usual strength, might be appropriately termed 'ESSENCES.' See DECOCTION, ESSENCE, EXTRACT, INFUSION, OLEO-RESIN, SYRUP, TINCTURE, &c.

Extracts, Perfu'matory. See EXTRAIT.

Extracts, Pulver'ulent. *Syn.* DRIED EXTRACTS, DESICCATED E.; SACCHARATED E.; EXTRACTA PULVERATA, E. SICCA, E. CUM SACCHARO, L. *Prep.* 1. Ordinary soft extract of the drug, 4 parts; white sugar (in powder), 1 part; mix, and dry by exposure in a warm situation; lastly, reduce the mass to powder, and if it weighs less than 4 parts, triturate it with more powdered sugar until its weight is equal to the original weight of the extract used in its preparation. The strength of the extract thus continues unchanged.

2. (Ph. Bor.) As the last, but using powdered sugar of milk, in lieu of cane sugar.

3. (Gauger.) Alcoholic extract, 3 parts, rectified spirit, 1 part, are triturated together in a porcelain mortar until thoroughly incorporated, when white sugar (in powder), 15 oz., is gradually added, and the two carefully and completely blended together; the mixture is dried as before, and more sugar added until the whole weighs exactly 18 oz. Six grains represent one grain of the unprepared extract.

Obs. The above are admirable preparations, intended chiefly to render the perishable extracts of the narcotic plants (EXTRACTA NARCOTICA) less liable to suffer by age. See EXTRACT OF ACONITE (Saccharated), &c.

EXTRAC'TIVE. *Syn.* EXTRACTIVE PRINCIPLE. This substance was discovered by Fourcroy, and presumed by him to be the common basis of all extracts. It has since been proved by Chevreul and other chemists to be a heterogeneous compound, varying in composition with the plant from which it is extracted. Extractive has a brown colour, or one becoming so in the air; it speedily putrefies, and becomes oxidized, and is rendered insoluble by long exposure to air, and by repeated solutions and evaporations. In its unaltered state it is soluble in water and in alcohol, is nearly insoluble in ether, and is precipitated from its solutions by the acids and metallic oxides. With alumina it forms the basis of several brown dyes.

EXTRAIT. [Fr.] Literally an extract. Among perfumers, extraits are mostly spirituous solutions of the essential oils or odorous principles of plants and other fragrant substances. The French commonly apply the term to any concentrated spirit, either simple or compound. In the shops of the Parisian perfumers upwards of 60 preparations of the kind are distinguished by this name. The extracts of JASMINE, JONQUIL, MAY-LILY, ORANGE BLOSSOMS, VIOLETS, and other like flowers of delicate perfume, are obtained by agitating and digesting the 'huiles' and 'pommades' of the flowers with the purest rectified spirit. in the manner described under SCENTED SPIRITS ('esprits'). This process is repeated with fresh oil or pommade until the spirit is rendered sufficiently fragrant. The other extracts (both simple and compound) are made by the common methods of infusion and distillation. See ESSENCE, EXTRACT, SPIRIT, &c.

EYE. In anatomy and physiology, the organ of vision. In order that vision may be distinct, it is necessary that the pencil of rays diverging from each point of the object and entering the pupil should converge to a focus on the retina. Near-sightedness ('MYOPIA,' L.) is due to the too great convexity of either the 'lens' or 'cornea,' causing the rays to converge to a focus before reaching the retina. The spectacles worn by myopic persons have concave glasses, which, by increasing the divergence of the rays falling upon the eye, have the effect of carrying back each focal point towards the retina. In the long-sight of old people ('PRESBYOPIA,' L.) the foci of the refracted pencils are situated behind the retina, the 'lens' or the 'cornea' being not sufficiently convex. This defect is corrected by convex glasses, which increase the convergence of the incident rays. See BLINDNESS, COLOUR BLINDNESS, VISION, &c.

Eye Drops. See WATER (Eye).

Eye Pow'ders. See COLLYRIA.

Eye Salve. See OINTMENT (Eye).

Eye Snuff. See SNUFF.

Eye Waters. See WATER.

FACE A'GUE. The common name for the intermittent form of facial NEURALGIA or TIC DOULOUREUX. See NEURALGIA.

FACE PAINTS. *Syn.* FARDS, Fr. See

BLOOM, CARMINE, PEARL WHITE, ROUGE, &c.

FAC-SIM'ILE. An exact imitation of an original in all its traits and peculiarities. The term is chiefly used in relation to copies of old manuscripts, or of the handwriting of famous men, or of interesting documents, produced by engraving or lithography. See SIGNATURES.

FACTI"TIOUS. *Syn.* FACTITIUS, L. Artificial; made by art, in distinction from that produced by nature. Numerous illustrations of the application of this word occur in the pages of the present work.

FÆ'CES. Excrement. In the *laboratory*, the 'settling' or sediment deposited by a liquor. See DEFECATION.

FAINT'ING. *Syn.* SWOONING; SYNCOPE, DELIQUIUM ANIMI, L. In *pathology*, a state in which the respiration and circulation are apparently suspended for a time, or are extremely feeble. The symptoms are too well known to require description. The causes are supposed to be—diminished energy of the brain, and organic affections of the heart or neighbouring vessels. This has led nosologists to divide syncope into two varieties:—

1. *Occasional* (SYNCOPE OCCASIONALIS, S. ACCIDENTALIS, L.), primitively induced by sudden and violent emotions of the mind, powerful odours, derangement of the stomach or bowels, constrained position of the body, tight-lacing, pressure, loss of blood, debility from disease, &c. This variety is frequently followed by vomiting, and, occasionally, by convulsions or epileptic fits. The recovery is accelerated by the horizontal position, without the head being the least elevated, by which the arterial blood is more vigorously thrown upon the brain, and thereby stimulates it to resume its usual functions. Pungent substances (smelling-bottle, vinaigrette, &c.) may be applied to the nostrils, and cold water sprinkled on the face and chest. In all cases the dress (corset, waist-band, neck-cloth, &c.) should be instantly loosened, and indeed this is the first assistance which should be given, either in syncope or apoplexy. As soon as the patient can swallow, a little brandy-and-water, or wine, or a few drops of ether or spirit of sal volatile, may be given.

2. *Cardiac* (SYNCOPE CARDIACA, L.), arising without any apparent cause, with violent palpitation during the intervals, and altogether of a more formidable character than the preceding. The subsequent treatment must here be directed to the cure or alleviation of the original disease.

FAINTS. The first and last runnings of the whiskey-still. The one is technically termed the 'strong faints;' the other, the 'weak faints.' They are both purified by rectification, &c. See DISTILLATION.

FAITH. Dr. Pereira remarks, that "faith in the beneficial agency of remedies, and confidence in the skill of the medical attendant, are important adjuvants in the treatment of disease. To them both the physician and empiric owe part of their success."

FAL'LING SICK'NESS. See EPILEPSY.

FAR'CY. See GLANDERS.

FAR'INA. The flour of any species of corn, pulse, tuber, or starchy root. The most important kinds of farina are noticed under their respective heads. The following dietetic articles of a farinaceous character are extensively advertised:—

BAKER'S ALIMENTARY COMPOUND. Fine flour (pastrycook's), 2 parts; finely ground rice, 1 part.

BASTER'S COMPOUND FARINA. Wheat flour, 14 oz.; white sugar, 2 oz.

BRADEN'S FARINACEOUS FOOD. Similar to Hard's (*below*).

BRIGHT'S NUTRITIOUS FARINA. Rice flour and potato starch, equal parts.

BRIGHT'S BREAKFAST POWDER. Chocolate, 1 part; nutritious farina (Bright's) 2 parts.

BULLOCK'S SEMOLA. Wheat flour, from which a portion of the starch has been removed, so as to leave an excess of gluten.

DENHAM'S FARINACEOUS FOOD. Wheat flour, 3 parts; barley meal, 1 part; the mixture is slightly baked, and again ground and sifted. Said to be slightly laxative.

DURYEA'S MAIZENA. Indian corn starch prepared for food.

GARDINER'S ALIMENTARY PREPARATION. Pure rice flour, very finely ground.

HARD'S FARINACEOUS FOOD. Wheat flour, slightly baked, and resifted.

KINGSFORD'S OSWEGO PREPARED CORN. An excellent preparation of Indian corn.

LEATH'S ALIMENTARY FARINA. Wheat flour (baked), with some sugar, Indian corn meal, and tapioca. According to some, it also contains potato starch.

MAIDMAN'S NUTRITIOUS FARINA. Potato starch tinged with beet-root or other pink colouring matter.

PLUMBE'S FARINACEOUS FOOD. South-sea arrow-root, with about 1-3rd its weight of pea flour.

POLSON'S CORN FLOUR. The starch of Indian corn or maize prepared with great care. It is much used as a substitute for arrow-root, and for custards, puddings, &c.

SMITH'S NURSING FARINA. Equal parts of baked wheat flour and rice flour.

Obs. Many of the above compounds are deficient in the nitrogenous elements of nutrition, and all of them nearly destitute of the mineral and saline matters which are absolutely necessary to the formation of the bones and tissues, and the support of the body in health, and are consequently utterly unsuitable as an exclusive article of diet, especially for

young children. Unfortunately, it has been too much the fashion of medical men of late years to recommend these compounds, and even to furnish testimonials as to their excellence, apparently relying solely on the representation of their proprietors or vendors. We deem it, however, to be a public duty to caution parents and nurses against their injudicious use. As mere adjuvants or auxiliaries, when the natural food supplied by the mother may be insufficient for the nutrition of the infant, some of them may doubtless be of value; but in all other cases they should be largely combined with pure cow's milk, beef tea, meat broths or gravies, eggs, or other substances rich in the nitrogenous and saline elements of nutrition.

FARM'ING. The business or management of a FARM. Formerly farming was looked upon as a profession easily understood, and successfully pursued only by an empiric. It is now, however, regarded in a different light, and the farmer, to succeed, not only requires perseverance and observation, but also a sound knowledge of natural sciences. See AGRICULTURE, BUTTER, CHEESE, IMPLEMENTS, MANURES, SOILS, &c.

FASTING. See ABSTINENCE.

FAT. *Syn.* ADEPS, L. The fat of animals is a concrete oil contained in the cellular membrane of their bodies, more especially round the kidneys, in the folds of the omentum, at the base of the heart, upon the surface of the intestines, and among many of the muscles. Fat varies in consistence, colour, and odour, with the animal from which it is obtained. That of the carnivora is usually soft and rank-flavoured; that of the ruminantia solid and nearly scentless. It is generally whitest and most copious in the well-fed young animal, and yellowish and more scanty in the old. That under the skin and surrounding the kidneys (suet) is also more solid than that in the neighbourhood of the movable viscera. In the cetacea, or whale tribe, the fatty secretion assumes the form of oil. These variations in consistency depend upon the relative proportions of solid stearin and liquid olein present in the fat.

The vegetable fats are found in various parts of certain plants, but are generally most abundant in the seeds. They are extracted by simple pressure or else by boiling. Two kinds of vegetable fat, namely, palm-oil and cocoa-nut oil, are extensively employed in the useful arts.

All fats are lighter than water. They are all soluble in ether, benzole, and turpentine, and may be mixed with each other in any proportion.

In former times the fats of many animals were employed in pharmacy, but at present those principally used are lard and suet. In perfumery, in addition to these, beef marrow and bear's grease are employed. For both these purposes the crude material is cut into small pieces, and freed as much as possible from all extraneous membranes; after which it is placed in a boiler with water, and heated until it is completely fused, when the whole is strained, and allowed to cool very slowly. By this means a cake of cleansed fat is obtained, which may be readily separated from any adhering water.

Fats and the fat oils are best preserved by being run into glazed jars, and secluded from the action of the air. A little benzoic acid or gum-benzoin, dissolved in them by heat, will generally prevent, and in all cases greatly defer, the accession of rancidity. We introduced this method into the laboratory in our early days of manipulation, and ourselves, and others to whom we have made it known, have since employed it with undeviating advantage in the manufacture of cerates, ointments, and other preparations containing fatty matter or the fixed oils. It has been shown by Dr. Griesler that nitric ether, and its alcoholic solution, act in the same manner. A few drops are not only sufficient to prevent rancidity, but, it is said, will even destroy the disagreeable odour of rancid fat. When heated to remove the alcohol, they immediately become bright, clear, and scentless. See OIL, GLYCERIN, OLEIN, PALMITIN, STEARIN, TALLOW, &c., also *below*.

FAT'TY AC'IDS. In chemistry, compounds having acid properties derived from the various fats and oils. The radicals of these acids exist in the natural fats combined with a base called glyceryl. When fats are saponified by an alkali, stearate, palmitate, and oleate of potassa or soda, as the case may be, are produced and glycerin is set free. On decomposing either of these compounds with sulphuric acid a sulphate of the alkali is formed, and the fatty acid is precipitated. Some of the fatty acids, as stearic, cerotic, palmitic, and lauric, are solid at ordinary temperatures; others, as oleic, are liquid. The hard fatty acids are extensively used as candle materials, being superior in every respect to the natural fats from which they are derived.

FAT'TENING. Until comparatively a recent date, the plan used to fatten domestic animals was to prevent their taking exercise, and to gorge them with food. The excessive fat produced by these means was, however, found to be far from wholesome, and was less delicate than that arising in the natural way. This system was therefore gradually abandoned in favour of the present one, which consists in supplying the animal with abundance of wholesome food, and with the means of taking exercise, as far as the disposition or feelings dictate. Hence the farmers "in the most enlightened districts, such as Berwickshire, East Lothian, &c., instead of tying up their fattening cattle in stables like horses, and placing their food before them, put two or three together in small yards with sheds attached, in

which they can run about, eat when they choose, and take shelter from the rain, or cold, or the sun, at pleasure, under the open shed. Swine are treated in the same manner, and also spring lambs that are fattened for the market. Poultry are no longer kept in coops and crammed, or rabbits in hutches; but the former are allowed to take exercise in fields sown with various herbs, and the latter are kept in a species of artificial warren, where they can take exercise by burrowing." (Loudon.)

FEAR. Although fear is a depressing and debilitating emotion, and sometimes acts prejudicially on the health, it frequently acts as a curative or preventive of disease. It is a well-known fact that females who are the most faint-hearted and desponding during the period of their sex's trial, generally experience a more rapid convalescence than those who are more confident and resolute. During the raging of an epidemic fear generally induces temperance, cleanliness, and the adoption of other precautions which tend powerfully to prevent disease. Boerhaave, according to Pereira, is said to have prevented the occurrence of epileptic attacks (brought on by the sight of a person falling down in a fit in the sight of the hospital patients), by directing a red-hot iron to be applied to the person who should next be affected.

FEATHERS. Ostrich feathers are those most esteemed as articles of personal decoration, and goose feathers for beds; but the feathers of other birds are commonly used for both purposes.

Feathers are prepared for ornamental purposes by scouring them with white soap-and-water (1 oz. to the pint), used hot; they are next well rinsed in several successive portions of pure water, and after being drained and shaken, are, lastly, passed through water slightly blued with pure indigo, and dried out of the dust. When dry, the ribs are generally rubbed with a piece of glass, having a curved notch in it, for the purpose of increasing their pliancy, and the filaments are curled by drawing them between the edge of a blunt knife and the ball of the thumb of the hand which holds it.

Feathers, Bleaching of:—

A new trade has sprung up within the past ten years, by which black, brown, or grey feathers are bleached sufficiently to enable them to be dyed any required colour.

The process is as follows:—The feathers are first thoroughly washed with soap-and-water, to free them from any oil they may contain. They are next transferred to a bath composed of bichromate of potash dissolved in water, to which has been added a few drops of nitric or sulphuric acid. In this bath they rapidly lose their black, brown, or grey colour, and become almost white. On being removed from this bath they are well rinsed in water, and are then fit to be dyed, even the most delicate colour. Great care is required in the process, as the flue of the feather is apt to be destroyed, if kept too long in the bath. A bleached feather may be readily known by the yellow colour of its stem.

Other methods have been adopted, such as a bath of chloride of lime or sulphurous acid, &c., but the bichromate bath gives the best results.

BLACK. By immersion for 2 or 3 days in a bath (at first hot) of logwood, 8 parts, and copperas or acetate of iron, (about) 1 part.

BLUE. With the indigo vat.

BROWN. By any of the brown dyes for silk or woollen.

CRIMSON. A mordant of alum, followed by a hot bath of brazil wood, and afterwards by a weak one of cudbear.

PINK or ROSE. Wtth safflower and lemon juice.

PLUM. The red dye, followed by an alkaline bath.

RED. A mordant of alum, followed by a hot brazil-wood bath.

YELLOW. From an alum mordant, followed by a bath of tumeric or weld. Other shades may be obtained by a mixture of the above dyes.

Feathers may also be dyed by simple immersion, for two or three minutes, in a bath of any of the aniline colours.

Goose feathers for BEDS are generally PURIFIED by simply exposing them to the sun or in a stove until perfectly dry, and then beating them to remove loose dirt. When carelessly collected and dirty, they are sometimes first cleansed with lime water, or, better still, with a weak solution of carbonate of soda, or water to which a little solution of chloride of lime has been added; after which they are rinsed in clean water, and dried or stoved as before. Old feathers are cleansed or purified in the same way.

FEBRIFUGES. *Syn.* FEBRIFUGA, L. In pharmacy, substances or agents which cure or alleviate fever. The term is more particularly applied to medicines used against the ague, as CINCHONA BARK and ARSENIOUS ACID, and their preparations. The extreme value of cold water, as a drink in ardent fever, has been known in all ages. In 1723 Dr. Hancocke published a work entitled—'Febrifugum Magnum, or Common Water the best Cure for Fevers, and probably for the Plague,' which in a short time ran through several large editions, but appears to have been overlooked by the hydropaths of the present day.

FECULA. *Syn.* FÆCULA, L. The matter which subsides from cold water in which bruised or rasped vegetable substances have been washed. The fecula obtained from the seeds of the cereals and leguminosæ, and from tuberous or bulbous roots, consists of nearly pure STARCH. In some cases the starch is

associated with the green colouring matter (CHLOROPHYLL) and the narcotic principles of the vegetables which yield it. The green fecula obtained by straining the expressed juices of the leaves and herbaceous parts of plants is of this character.

The fecula of all the amylaceous roots, rhizomes, and tubers, may be easily obtained, on the small scale, by rasping them, pressing, and working the pulp in cold water, and after straining the resulting milky liquid through a hair sieve, allowing it to settle. The sediment may be again washed by diffusion through clean cold water, and must be, lastly, collected, and dried out of the dust, and without artificial heat.

The fecula of narcotic plants for medicinal purposes is obtained by allowing the expressed juice to repose for 24 hours, and then decanting the clear portion, and drying the residue. Sometimes heat is employed. See ARROW-ROOT, STARCH, &c.

FEET (The). To preserve the feet in a proper condition, they should be frequently soaked, and well washed in warm or tepid water. The nails of the toes should be pared, soaked, and well washed in warm or tepid water. The nails of the toes should be pared, to prevent their becoming inconveniently long, and from growing into the flesh. Many persons suffer severely from TENDER FEET. This generally arises from the use of thin cotton or silk stockings, and boots or shoes that are either too tight or stiff, or not sufficiently porous to permit of the escape of the perspiration. Waterproof boots and shoes which are also air-tight (as those of gutta percha and India rubber), are common causes of tender feet, and even of headaches, dyspepsia, and apoplexy. The best treatment of tender feet is the immediate adoption of worsted stockings or socks, and light, easy shoes of buckskin, goatskin, or some other equally soft kind of leather. It is highly necessary for the preservation of health to preserve the feet DRY; persons who are, therefore, exposed to the wet, or who are frequently passengers through the public streets in bad weather, should regard sound and good boots and shoes as of the first importance. In fact, in a hygienic point of view, a wet back should be less shunned than wet feet. Many persons frequently experience EXTREME COLDNESS and NUMBNESS OF THE FEET. The best and most natural remedy for this is active exercise or friction, the former being always adopted when possible. In such cases the use of warm woollen stockings is absolutely necessary, and the debilitated and aged may advantageously keep them on throughout the night, or at all events until the feet acquire a comfortable degree of warmth. The DISAGREEABLE ODOUR which is evolved by the feet of some individuals in hot weather may be removed by the observance of extreme cleanliness, and by occasionally soaking the feet in warm water, to which a small quantity of chloride of lime or sal ammoniac has been added.

DISTORTION OF THE FEET is not uncommon in childhood, being sometimes congenital, but as frequently the result of weakness or bad nursing. "A child with its feet turned inwards is called VARUS; when they are turned outwards it is styled VALGUS. The proper use of bandages, early applied, will generally correct these deformities; but if they be neglected in infancy they become incurable." (Med. Lex.) CLUB FOOT, of which there are several varieties, may also be frequently relieved by a simple surgical operation.

FELT'ING. This is a process by which various species of fur, hair, and wool, are blended into a compact texture, in many respects resembling cloth. It depends on the peculiar anatomical construction of these substances enabling them to interlace and intertwine with each other, by which they become permanently matted together. Felt was formerly chiefly employed for hats. It is now commonly used for mill-bands, filters, &c.; and when varnished or japanned, or saturated with asphalte or bitumen, as a durable substitute for japanned leather, and for roofing.

FENNEL. *Syn.* FŒNICULUM (Ph. L.), L. The fruit (seed) of *Fœniculum dulce*, or sweet fennel; the oil distilled from the fruit (OIL OF FENNEL; OLEUM FŒNICULI, L.) as well as a distilled water (FENNEL WATER; AQUA FŒNICULI, L.), are officinal in the Pharmacopœias. They are stimulant and carminative; but are now seldom employed.

FEN'UGREEK. The seeds of *Trigonella Fœnum Græcum*. Resolvent and stomachic. The seeds dye yellow; formerly roasted for coffee; now chiefly employed in veterinary medicine.

FER'MENT. *Syn.* FERMENTUM, L. A substance which induces fermentation. According to one view ferments are compounds whose decomposition proceeds simultaneously with that of the body undergoing metamorphosis. They all contain albuminous or azotised principles, which in a moist state putrefy and suffer decomposition. According to Pasteur, however, fermentation is excited by living organisms—fungi and infusoria. See FERMENTATION and YEAST.

FERMENTA'TION. *Syn.* FERMENTATIO, L. In *chemistry*, a peculiar metamorphosis of a complex organic substance, by a transposition of its elements under the agency of an external disturbing force. Fermentation, according to the theory proposed by Liebig, is a metamorphosis, by which the elements of a complex molecule group themselves so as to form more intimate and stable compounds. It is excited by the contact of all bodies the elements of which are in a state of active decomposition or fermentation. "In nitrogenised substances of a very complex constitution, putrefaction or fermentation is spontaneously established when

water is present, and the temperature sufficiently high, and it continues till the original compounds are wholly destroyed. Substances destitute of nitrogen, on the contrary, require, in order to their undergoing this metamorphosis, the presence of a nitrogenised substance, already in a state of putrefaction (fermentation)." (Liebig.) The substances which promote this change are termed FERMENTS, and among these the principal are gliadin, gluten, vegetable albumen, and all nitrogenous substances in a state of spontaneous decomposition or fermentation. "It is imagined that when these substances, in the act of undergoing change, are brought into contact with neutral ternary compounds of small stability, as sugar, the molecular disturbance of the body, already in a state of decomposition, may be, as it were, propagated to the other, and bring about the destruction of the equilibrium of forces to which it owes its being. The compound body, under these circumstances, breaks up into simpler products, which possess greater permanence." (Fownes.) YEAST, the ferment most commonly employed for inducing the vinous fermentation, is such a substance in a reactive state of putrefaction, and whose atoms are in continual motion. Putrefying animal substances are equally capable of exciting the same action. "If we add to a solution of pure sugar an albuminous substance, gaseous or fleshy matter, the development of yeast becomes manifest, and an additional quantity of it is found at the end of the operation. Thus, with nourishment, ferment engenders ferment. It is for this reason that a little fermenting must, added to a body of fresh grape juice, excites fermentation in the whole mass. These effects are not confined to alcoholic (vinous) fermentation. The smallest portion of sour milk, of sour dough, or sour solution of beet-root, of putrefied flesh and blood, solicasions like alterations in fresh milk, dough, solution of beet-root, flesh, and blood. But further, and which is a very curious circumstance, lose if we put into a liquid containing any ferment-

ed substance another in a sound state, the latter would suffer decomposition under the mere influence of the former. If we place urea in contact with the presence of beer-yeast, it experiences no change; while if we add it to sugar-water in a fermenting state, the urea is converted into the carbonate of ammonia. We thus possess two modes of decomposition; the one direct, the other indirect." (Ure.)

A very remarkable circumstance connected with fermentation is that it is always accompanied by the development of microscopic living organisms—fungi and infusoria. "So constantly, indeed, is this the case, that many chemists and physiologists regard these organisms as the existing cause of fermentation and putrefaction; and this view appears to be corroborated by the fact that each particular kind of fermentation takes place most readily in contact with a certain living organisms." (Fownes.) Thus the vinous or alcohol-producing fermentation is accompanied, or caused, by two fungi, called *Torula cerevisiæ* and *Penicillium glaucum;* the acetous or vinegar-producing fermentation by *Torula aceti;* the lactous fermentation (souring of milk) by *Penicillium glaucum;* &c. But whether fermentation is caused by a vital act of the fungi themselves, or by a peculiar state of the albuminous matter in which it occurs, is still an open question, owing to the many difficulties which surround investigations of this nature.

Fermentation or putrefaction differs from EREMACAUSIS or decay, in being limited to changes occurring in and beneath the surface of water, the effect being a mere transposition of elements, or a metamorphosis of the organic body. EREMACAUSIS, on the other hand, refers to the decomposition of moist organic matter, when freely exposed to the air, by the oxygen of which it is gradually burned and destroyed, without any sensible elevation of temperature. Although the presence of oxygen is essential to the commencement of this change, whenever fermentation is freely established it is no longer necessary, as it proceeds without the aid of any other substance external to the decomposing body, unless it be water or its elements. The entire absence of the exciting causes—warmth, air, and moisture—leaves even those substances which under ordinary circumstances are most liable to change, in a state in which they may remain for an almost indefinite period without perceptible alteration. Thus, animal substances in a frozen or dry state do not undergo decomposition, nor does a solution of sugar or the juice of grapes (must) when perfectly excluded from the air; but on the mere exposure of these substances to warmth, moisture, or atmospheric air, putrefaction or fermentation immediately commences. Remove the cork from the bottle of 'capillaire' on the parlour sideboard, or pierce the skin of one of the grapes on the dessert table with a needle, and these bodies, which would have otherwise suffered no change for weeks, or even months, will soon exhibit symptoms of spontaneous decomposition. The knowledge of this fact has been practically applied to the preservation of animal and vegetable substances for food. Even the most putrescible of these may be preserved for an unlimited period by enclosure in metallic cases, or glass bottles, from which the air has been completely removed and excluded.

The important duties which fermentation or putrefaction performs in the economy of our globe, and in several of the arts of life and civilisation, have long rendered the development of its principles an object of the highest interest and importance, both in a scientific and practical point of view. In its most extended sense, this subtile process of nature, though occasionally productive of injurious

effects, may be regarded as one of the most necessary and beneficial with which we are acquainted. Like the labours of a scavenger, it speedily removes from the surface of our globe those matters which would otherwise remain for some time without undergoing decomposition. It either dissipates in air, or reduces to more fixed and useful forms of matter, those organic substances which, by their presence, would prove noxious, or, at all events, useless to the animal and vegetable kingdoms. It is the giant power that cleans the Augean stable of nature, at the same time that it provides some of the most esteemed articles of utility and luxury for the well-being and enjoyment of man.

Chemists have distinguished fermentation into different varieties, which, in general, are named after the more important products of its action. Of late years, the number of these varieties has been greatly increased by the extension of the term to several operations besides those formerly included under it. See ACETIFICATION, BREAD, PUTREFACTION, BREWING, &c.

FERN (Male). *Syn.* MALE SHIELD FERN; FILIX MAS, RADIX FILICIS, L. The root (rhizome) of the *Lastræa Filix-mas*, or male fern. It is bitter, astringent, or vermifuge. —*Dose.* 1 to 3 drs., in powder, or made into a decoction, repeated for 3 or 4 days, and followed by a purge. It is chiefly given in tapeworm. In Switzerland it is deemed almost infallible, but has proved less successful in these countries. See OILS.

FERRICY'ANIDE. *Syn.* FERRIDCYANIDE, FERRIDCYANURET. A compound of ferricyanogen with a metal or other basic radical. The FERRICYANIDE OF POTASSIUM, or 'RED PRUSSIATE OF POTASH,' as it is often improperly called, is a well-known example. The ferricyanides of AMMONIUM and the ALKALIES and ALKALINE EARTHS are soluble; those of most of the METALS, insoluble. See *below*.

FERRICYAN'OGEN. *Syn.* FERRIDCYANOGEN, FERRIC-CYANOGEN. The peculiar salt-radical which exists in the so-called red prussiate of potash. It is isomeric with ferrocyanogen, from which it differs in capacity of saturation (being tribasic), and in the behaviour of its compounds with solutions of the metals. It has not been isolated. See POTASSIUM (Ferricyanide).

FERROCY'ANIDE. *Syn.* FERROCYANURET, PRUSSIATE; FERROCYANIDUM, FERROCYANURETUM, L. A compound of ferrocyanogen with a metal or other basic radical. The principal substance of this kind is the FERROCYANIDE OF POTASSIUM or 'YELLOW PRUSSIATE OF POTASH,' as it is often called. See the respective bases—AMMONIUM, POTASSIUM, SODIUM, &c., and *below*.

FERROCYAN'OGEN. *Syn.* FERROCYANOGENIUM, L. A bibasic salt-radical, composed of the elements of 3 equivalen GEN and 1 equivalent of the me has never been isolated. It un various bases to form FERROCY CYANOGEN, HYDROFERROCYANI &c.

s been mmon al, but or bad

FERRU'GO. [L.] Rust of i ned in- (Sesquioxide). e turned

FE'VER. *Syn.* FEBRIS, P roper use pathology, a condition characte lly cor- appetite, thirst, languor, debility lected ness to move, accelerated pulse, ind Lex.) of surface, and general disturbance of a functions. A large number of diseases which all or some of these symptoms appe are called FEVERS. They have been divid by nosologists into intermittent (INTERMI TENTES), remittent (REMITTENTES), and co tinued fevers (CONTINUÆ). The first of the are generally known as AGUES; the seco differ from agues in there being one or mc marked exacerbations and remissions of t symptoms, every 24 hours, but without a entire intermission. The terms 'hectic,' 'n vous,' 'bilious,' 'inflammatory,' &c., have al been applied to particular varieties of feve and names indicative of certain cutaneous pearances connected wiih them have been giv to others; as 'scarlet' fever, 'yellow' fev &c.

The usual symptoms of incipient fever (brile symptoms) are—chilliness (varying fr a simple shiver to a sensation of cold wat running down the back), a quick pulse, h and dry skin or flushing, languor, often evince by yawning, depression of spirits, alternate fit of shivering and heat, hurried and uneasy re spiration, flying pains in various parts of th body, as the head, back, and loins; loss o appetite, nausea or vomiting, dry mouth, furre tongue, costiveness, urine small in quantity and usually of a deep colour, &c. When an of these symptoms appear, their progress ma often be arrested by the timely exhibition o an emetic, followed by a saline purgative, an diaphoretics; at the same time promoting th action of these remedies by a low diet an drinking copiously of diluents, and carefull avoiding animal food, spirits, fermented liquors or anything at all stimulant. Whenever symp toms of fever become established, medical ad vice should be sought and implicitly followed In parts where it cannot be obtained the treat ment recommended under AGUE, INFLAMMA TION, REMITTENT FEVER, and TYPHUS, ma be followed with advantage.

In visiting or attending persons labouring under fevers, it is advisable to avoid immediate contact with them or their clothing, or stand ing near them in such a position as to inhale their breath, or the effluvia evolved (in some cases) by their bodies; and when remaining for some time in the apartment, it is preferable to sit or stand near the fireplace, or between the window and door, as such parts of the room are generally better ventilated than the

other portions. The greatest purifier of the atmosphere of a sick chamber is a good fire, because it occasions a continual current of the impure air up the chimney, and a corresponding influx of fresh air from without. Chloride of lime, or chloride of zinc, or their solutions, are also good purifiers. The first, however, should not be used in quantity, as the evolved chlorine might in that case impede the respiration of the patient. It is also advisable to avoid entering the room of a patient labouring under contagious diseases of any class when the stomach is empty, or the spirits depressed; and it has been recommended to clear the mouth of the saliva immediately after quitting the chamber. See ABLUTION, &c.

FI'BRIN. *Syn.* FIBRINE. An azotized substance, forming the coagulable portion of fresh-drawn blood, and the principal constituent of the muscular or fleshy parts of animals. It is eminently nutritious, and capable of yielding in the animal body albumen, caseine, and the tissues derived from them. (Liebig.)

Prep. Fibrin is easily obtained in a nearly pure state, by agitating or beating newly drawn blood with a small bundle of twigs, when it attaches itself to the latter under the form of long reddish filaments, which become white when worked with the hands in a stream of cold water. It may also be procured by washing the coagulum of blood, tied up in a cloth, in cold water, until all the soluble portions are removed. A small quantity of fat, which it still contains, may be removed by digesting it in ether.

Prop., &c. Pure fibrin occurs as long, white, elastic filaments, which are tasteless, inodorous, and insoluble in both hot and cold water. Wetted with acetic acid, it forms, for a time, a transparent jelly, which is readily soluble in pure water. Very dilute solutions of the caustic alkalies dissolve it completely, and the new solution greatly resembles liquid albumen. Dried by a gentle heat, it loses about 8% of water.

FIG. *Syn.* FICUS (B. P., Ph. L. E. & D.), CARICA, CARICÆ FRUCTUS, L. The figs of commerce are the dried fruit of *Ficus Carica*, the common fig-tree. They are demulcent, emollient, laxative, and pectoral. Roasted and boiled figs are occasionally employed as poultices gumboils and other affections of the mouth.

FIL'BERT. *Syn.* FILBERD. The fruit of the cultivated hazel or nut-tree (*Corylus Avellana*). Filberts are distinguished from common nuts by their lengthened figure and larger size. The best are imported from Spain.

FILES. The manufacture of these articles do not come within the limits of this work. It may, however, be useful to mention that FILES, FLOATS, and RASPS, which 'cut dull' from age, dirt, or being much worn, are greatly improved by being kept wet, immersed in water for some hours, or even for a day or two.

FIL'TER. *Syn.* FILTRUM, L. An instrument or apparatus for straining or filtering liquids.

FIL'TERING POWDERS. *Prep.* 1. Fuller's earth washed, dried without heat, and reduced to coarse powder.

2. From pipe clay or potter's clay, as the last. Both the above are used to filter and bleach oils.

3. From clay or fuller's earth, 1 part; fine siliceous sand, 2 parts; the two are separately washed, after which they are drained, and mixed together, and dried, as before. *Used* for GLUTINOUS OILS.

4. Granulated animal charcoal, sifted and fanned from the dust. *Used* to filter and bleach SYRUPS and VEGETABLE SOLUTIONS.

Obs. Filtering powders are prepared of several degrees of coarseness, and should be chosen with reference to the degree of fluidity of the liquid to be filtered through them. In no case should they be reduced to fine powder, as not only is the process of filtration thereby rendered unnecessarily tedious, but in some cases (as when charcoal dust is mixed with glutinous vegetable solutions and syrups) the filtrate carries off a portion of the powder, which can afterwards be separated from it only with considerable difficulty. See CHARCOAL, FILTRATION, OIL, &c.

FILTRA'TION. *Syn.* FILTRATIO, L. The separation of liquids from substances mechanically suspended in them, by passing them through media having pores sufficiently fine to retain or keep back the solid matter. Filtration is one of the most common and useful of the chemico-mechanical operations of the arts, and its successful performance in an economical and expeditious manner is therefore a matter of the highest importance in the laboratory, and, indeed, in almost every branch of human skill and industry, in which liquids are employed. Simple in principle, and apparently easily performed, it is, nevertheless, one of those operations which require no less of care than of tact and experience to conduct it with certainty and success. The losses sustained in the laboratory, by defective manipulation in this particular, often exceed those arising from ignorance and accidents in every other department conducted in it.

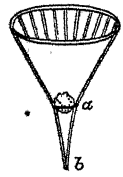
Filtration is usually resorted to for the purpose of freeing liquids from feculence, dirt, and other foreign matter, and for obtaining them in a clear or transparent state; but, in some cases, it has for its object the collection of the suspended substances, as precipitates, &c., and in others both these intentions are combined. The word 'filtration' is absolutely synonymous with 'straining,' but in the language of the laboratory it is usually applied to the operation of rendering liquids transparent, or nearly so, by passing them through fine media, as filtering paper, sand, and the like; whilst the

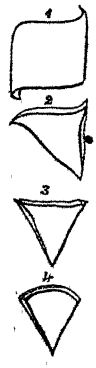
term 'straining' is employed to designate the mere separation of the grosser portion, by means of coarse media, flannel, horsehair cloth, &c., through which they flow with considerable rapidity. Filtration is distinguished from 'clarification' by its mere mechanical action, whereas the latter operates by depuration, or the subsidence of the suspended substances or fæces, arising from their gravity being naturally greater than the fluid with which they are mixed, or being rendered so by the application of heat, or by the addition of some foreign substance.

The apparatus, vessels, or media, employed for filtration, are called 'FILTERS,' and are technically distinguished from 'STRAINERS' by the superior fineness of their pores.

Both strainers and filters act on the same principles as the common sieve on powders; they all, in like manner, retain or hold back the coarser matter, and permit the liquid or smaller and more attenuated particles to pass through. The term 'medium' (plural 'media') is applied to the substance or substances through the pores of which the liquid percolates.

The forms of filters, and the substances of which they are composed, are various, and depend upon the nature of the liquids for which they are intended. On the small scale, funnels of tin, zinc, copper. wedgwood-ware, earthenware, glass, or porcelain, are commonly employed as the containing vessels. (See *engr.*) The filtering medium may be any substance of a sufficiently spongy or porous nature to allow of the free percolation of the liquid, and whose pores are, at the same time, sufficiently small to render it limpid or transparent. Unsized paper, flannel, linen, calico, cotton wool, felt, sand, coarsely powdered charcoal, porous stone, or earthenware, and numerous other substances of a similar kind, are employed for this purpose.





For many liquids that filter easily, and in which the suspended matter is of a coarse and porous nature, it is often sufficient merely to place a little cotton wool or tow, or a small piece of sponge, in neck of the funnel, as at (*a*) in the above engr.; but such an apparatus, from the small extent of the filtering surface, acts either slowly or imperfectly, and soon gets choked up. Filters of unsized paper are well suited for all liquids that are not of a corrosive or viscid nature, and are universally employed for filtering small quantities of liquids in the laboratory. A piece of the paper is taken of a size proportionate to the quantity of the liquid to be filtered, and is first doubled from corner to corner into a triangle (see *engr.*), which is again doubled into a smaller triangle, and the angular portion of the margin being rounded off with a pair of scissors, it constitutes a paper cone, which is placed on a funnel of proportionate capacity, and is then nearly filled with the liquid. A piece of paper so cut, when laid flat upon the table, should be nearly circular. Filtering paper is now sold ready cut in circles of various sizes, which simply require doubling for use. Another method of forming a paper filter, preferred by some persons, is to double the paper once, as above (see fig. 2), and then to fold it in a similar way to a fan, observing so to open it and lay it on the funnel that a sufficient interval be left between the two to permit of the free passage of the filtered liquid on its descent towards the receiver. The 'plaited filter,' as thus formed, is exceedingly useful for general purposes; it exposes the entire surface of the paper to the liquid, and allows filtration to proceed more rapidly than a 'plain filter' does. (See *engr.*)

In reference to funnels, it may be remarked, that those employed for filtering rapidly should be deeply ribbed on the inside, or small rods of wood or glass, or pieces of straw, or quills, should be placed between them and the paper. The neck or tubular part of the funnel should, in like manner, be deeply ribbed or fluted on the outside, to permit of the free passage of the air, when it is placed in a narrow-mouthed bottle or receiver. When this is not the case, filtration proceeds but slowly, and the filtered liquid is apt to be driven up the outside of the neck of the funnel by the confined air, and to be continually hissing and flowing over the mouth of the vessel. The breadth of a funnel, to filter well, should be about three fourths its height, reckoning from the throat (*a*). When deeper, the paper is liable to be continually ruptured, from the pressure of the superincumbent fluid; and when shallower, filtration proceeds slowly, and an unnecessarily large surface of the liquid is exposed to the atmosphere, and is lost by evaporation. To lessen this as much as possible, the upper edge of the glass is frequently ground perfectly smooth, and a piece of smooth plate-glass is laid thereon. When paper filters are of large dimensions, or employed for aqueous fluids that rapidly soften the texture of the paper, or for collecting heavy powders, or metallic precipitates, it is usual to support them on linen or calico, to prevent their breaking. This is best done by folding the cloth up with the paper, and cutting the filter out of the two, in the same way as would be done with doubled paper, observing so to place it in the funnel that the paper and calico may remain close together, especially towards the bottom.

The filtration of small quantities of liquid, as in chemical experiments, may often be conveniently performed by merely placing the paper on the circular top of a recipient (see *engr.*), or on a ring of glass or earthenware laid on the top of any suitable vessel. A filter of this kind that will hold one fluid ounce will filter many ounces of some liquids in an hour.

Good filtering paper should contain no soluble matter, and should not give more than $\frac{1}{250}$ to $\frac{1}{250}$ of its weight of ashes. The soluble matter may be removed by washing it, first, with very dilute hydrochloric acid, and secondly, with distilled water.

For filtering a larger quantity of a liquid than can be conveniently managed with a funnel, and also for substances that are either too viscid or too much loaded with feculence to allow them to pass freely through paper, conical bags made of flannel, felt, tweeled cotton cloth or Canton flannel, linen or calico, and suspended to iron-hooks by rings or tapes, are commonly employed. The first two of the above substances are preferable for saccharine, mucilaginous, and acidulous liquors; the third for oily ones; and the remainder for tinctures, weak alkaline lyes, and similar solutions. These bags have the disadvantage of sucking up a considerable quantity of the fluid poured into them, and are therefore objectionable, except for large quantities, or when they are to be continued in actual use as filters for some time. On the large scale, a number of them are usually worked together, and are generally enclosed in cases to prevent evaporation, and to exclude dirt from the filtered liquor that trickles down their sides. These arrangements will be noticed further on.

A simple mode of filtering aqueous fluids, which are not injured by exposure to the air, is to draw them off from one vessel to another, by means of a number of threads of loosely twisted cotton or worsted, arranged in the form of a syphon. (See *engr.*) The little cotton rope at once performs the operations of decantation and filtration. This method is often convenient for sucking off the water from a small quantity of a precipitate.

When solid substances, as porous stone or earthenware, are used as the media for filtration, vessels of metal, wood, or stone-ware, are employed to contain them and the supernatant liquid. In these cases the filtering medium is usually arranged as a shelf or diaphragm, and divides the vessel into two compartments; the upper one being intended to contain the dirty liquid, and the under one to receive the same when filtered. Such an apparatus is set in operation by merely filling the upper chamber, and may at any time be readily cleared out by reversing it, and passing clean water through it in an opposite direction. Small arrangements of this kind, intended to be screwed on to the water supply-pipe by either end, and which answer the purpose intended in the most satisfactory manner, have been manufactured and vended under the name of 'REVERSIBLE' or 'SELF-CLEANING FILTERS.' When pulverulent substances, as sand, coarsely powdered charcoal, &c., are employed, a similar arrangement is followed; but in this case the shelf or diaphragm must consist of any convenient substance pierced with numerous holes, over which must be placed, first a stratum of coarse pebbles, next some of a finer description, and on this a proper quantity of the sand, charcoal, or other medium. Over the whole should be placed another layer of pebbles, or a board or plate of metal or earthenware, pierced with a number of holes, to allow the liquid to be poured into the filter without disturbing its arrangement. Apparatus of this kind, of a permanent description, and arranged for filtering large quantities of liquids, are properly denominated 'FILTERING MACHINES.'

Among the liquids usually submitted to filtration, the following may be mentioned as the principal—water, oils, syrups, tinctures, vegetable juices, infusions, and decoctions.

The filtration of water may now be considered. The water of our wells is presented by nature ready filtered to the hand of man, and often exhibits an admirable degree of transparency and purity. It acquires this state by percolating through the mineral strata of the earth, which deprive it of the organic matter it derives from the soil and subsoil, but, at the same time, it dissolves a portion of the saline and earthy media through which it passes, and hence acquires that peculiar 'hardness' which is constantly found in spring water. On the large scale, this natural system of filtration has been imitated by some of the commercial companies that supply our cities and towns with water. Extensive beds of sand and gravel have been employed, with variable success, as the filtering media; and were it not that filters gradually lose their porosity by the accumulation of the retained matter in their pores, such a method would be excellent. But the great expense of such filters precludes the possibility of frequently cleaning or renewing them, by which means they can alone be kept in an efficient state.

A filter which possesses the advantages of being easily and cheaply cleaned when dirty, and which frees water from mechanical impurities with immense rapidity, may be formed by placing a stratum of sponge between two

perforated metallic plates, united by a central screw, and arranged in such a manner as to permit of the sponge being compressed to any required degree. Water, under gentle pressure, flows with such rapidity through the pores of compressed sponge, that it is said that a few square feet of this substance will perfectly filter several millions of gallons of water daily. This method of filtration has been made the subject of a patent, and has been favorably noticed by the legislature.

A few barrels or hogsheads of water may be easily filtered daily, by the arrangement represented in the engraving.

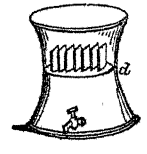
A A common water-pipe or cock.

b. A false bottom fitting in perfectly water tight.

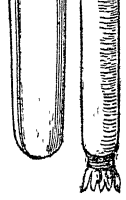
c. A perforated wooden or metallic vessel or box covered with a bag of felt or other filtering substance (not shown in the engraving). *d*. A small tube, fitting water-tight into the false bottom, and uniting the *interior* of the filter with the lower portion of the cask.

It is evident that when water is poured into the upper portion, *B*, of a vessel so arranged, it will sink through the filter *c*, and pipe *d*, into the lower chamber *C*, and this filtration will go on as long as the supply continues, and water is drawn from the cock *e*. By uniting the cock *e* with a tank or casks, and by keeping the upper portion *B* always full by means of a ball-cock, a considerable quantity of water may be thus filtered. The advantage of this plan is, that the filter *c* can be always readily got at, and easily cleaned or renewed.

For filtering water on the small scale, and for domestic use, 'alcarazzas,' diaphragms of porous earthenware and filtering-stone, and layers of sand and charcoal, &c., already referred to, are commonly employed as filtering media. The filtering power of porous stone or earthenware may be greatly increased by adopting the arrangement represented in the margin, which consists in making the diaphragm of the shape of a disc (*d*), supporting plates of the same material, the whole forming but one piece. The 'PLATYLITHIC WATER-FILTERS,' which are formed of porous stone cut on this plan, present 200 to 300 square inches of filtering surface. The 'PORTABLE FILTERS,' set up in stone-ware, that are commonly sold in the shops, contain a stratum of sand, or coarsely-powdered charcoal; before, however, having access to this, the water has to pass through a sponge, to remove the coarser portion of the impurities. Among the many new kinds of portable filters now offered for sale are two which claim special notice, viz., the 'MOULDED CARBON FILTER,' consisting of a spherical or cylindrical vessel formed of compressed carbon; and the 'SILICATED CARBON FILTER,' in which the medium is a compact substance, formed of animal charcoal and the ashes of Boghead coal.

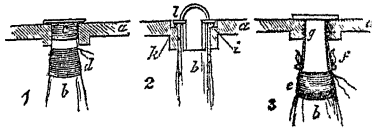


Oils are filtered, on the small scale, through cotton-wool, or unsized paper, arranged in a funnel; and on the large scale, through long bags, made of tweeled cotton-cloth (Canton flannel). These bags are usually made about 12 or 15 inches in diameter, and from 4 to 8 feet long (see *engr.*), and are inclosed in bottomless casings, or bags of coarse canvas about 5 to 6 or inches in diameter for the purpose of condensing a great extent of filtering surface into the smallest possible space. A number of these double bags (from 1 to 50 or 60) are connected with corresponding holes in the bottom of a block-tin or tinned-copper cistern, into which the oil to be filtered is poured. The mode in which these bags are fastened to the cistern is of the utmost importance, as on the joint being close and secure depends the integrity of the apparatus. The methods of doing this are figured in the engraving, which, with the references, will explain themselves, the same letters referring to the same parts of each.



Filtering-bag of cotton-cloth.

Cotton filtering-bag, '*encased*,' or enclosed in its canvas envelope, ready for fixing.



a. Bottom of cistern.
b. Filtering-bag.
c Screw of the conical nozzle fitting into the cistern
d. Binding cord connecting bag and nozzle.
e Binding cord connecting bag and lower nozzle.
f. Bayonet-catch, connecting the lower portion of nozzle fastened to the bag with the upper and fi part, *g*.
i. The thick hem at the top of the bag (purposely m large by enclosing a piece of thick cord therein), res on the shoulders, *k*.
l. A metallic cylinder, loosely fitting the hole in cistern, and over which the top of the bag is dra before being put into its place; when fitted, as in engraving, it retains the hem *i* securely in its place al the shoulder *k*.

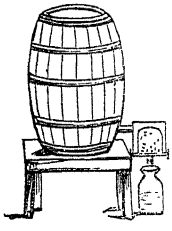
The second of the above arrangements the least expensive, and certainly the m convenient in practice; and when the linder *l* fits the hole closely (allowing for bag), is as safe, or safer, than an ordin screw.

The bags are surrounded by a wooden scr fitted up with doors for the purpose of k

ing off the dust; and the bottom of the apartment is furnished with large steam-pipes, by which a proper temperature may be kept up in cold weather. The use of heat should, however, never be had recourse to when it can be avoided, as although it vastly increases the rate of filtration, the oil so filtered is more apt to become opaque in cold weather than when the process is conducted at the natural temperature of the atmosphere. This is particularly the case with castor oil and sperm oil. In the United States of America, where the latter is consumed in enormous quantities for illumination, the best is always 'winter strained,' as it is popularly called. In practice, it is more convenient to have a number of small cisterns at work (say 50 or 100 galls. each), than one or two larger ones; as any accident that may occur is more easily remedied, and that without stopping the whole operation.

When cotton-cloth bags are employed without being 'creased,' or enclosed in others of canvas, they should not be longer than about 3 or 4 feet, and not wider than about 5 or 6 inches when filled. When larger they are dangerous.

A convenient method of filtering a single cask of oil is, to insert the pipe of a two-way patent filter into the cork-hole, by which means the whole will be filtered as drawn off, without any trouble on the part of the operator. This filter consists of a porous bag stretched over a perforated metallic vessel, nearly the shape and size of the exterior casing, and its edge is tightly screwed between the sides and bottom of the latter, so as to be quite water-tight. The cock communicates with the interior of the perforated plate and filter, and the supply-pipe with the exterior. By this means the interior chamber, which occupies $\frac{5}{6}$ths of the vessel, rapidly fills with filtered oil, and continues full as long as any liquor remains in the cask. This arrangement is also well adapted to the filtration of wines, beer, cordials, porter, and various other liquors. It is unequalled in simplicity and usefulness. The same filter may be removed from cask to cask, with the facility of a common cock.



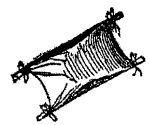
The filtration of SYRUPS is now generally effected on the large scale by passing them through the 'GREASED BAG FILTER' just described. On the small scale, as employed by confectioners and druggists, they are usually passed through CONICAL FLANNEL BAGS. (See page 739.) The filtration of thick syrups is, however, attended with some difficulty, and it is therefore a good plan to filter them in a somewhat dilute state, and afterwards to reduce them to a proper consistence by evaporation in clean vessels of tinned copper, by steam heat. Syrups, when filtered in a heated state, run well for a time, but the pores of the fabric rapidly get choked, from the thickening of the syrup and partial crystallization of the sugar, occasioned by the evaporation of the aqueous portion from the surface of the bag. This may be partially prevented by enclosing the bag in a metallic casing. On the whole, clarification is preferable for syrups to filtration, on the small scale. They need only be well beaten up while cold with a little white of egg, and then heated; a scum rises, which must be removed as soon as it becomes consistent, and the skimming continued until the liquid becomes clear. Any floating portions of scum that may have escaped notice are easily removed by running the syrup through a coarse flannel strainer, whilst hot. The most extensive application of the process of filtration in the arts is in the refining of sugars.

TINCTURES and DILUTE SPIRITS are usually filtered, on the small scale, through BIBULOUS or UNSIZED PAPER placed on a funnel; and on the large scale, through thin and fine COTTON BAGS. In general, however, tinctures clearify themselves by the subsidence of the suspended matter, when allowed to repose for a few days. Hence it is the bottoms alone that require filtering; the supernatant clear portion need only be run through a small hair sieve, a piece of tow or cotton placed in the throat of a funnel, or some other coarse medium, to remove any floating substances, as pieces of straw, &c. Spirits which are largely loaded with essential oil, as those of ANISEED, &c., run rapidly through paper or calico, but usually require the addition of a spoonful or two of magnesia before they will flow quite clear. When possible, tinctures, spirits, and all similar volatile fluids, are better and more economically cleared by subsidence or clarification than by filtration, as, in the latter way, a portion is lost by evaporation, and the strength of the liquid is thereby altered.

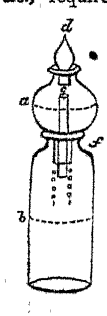
Vegetable juices should be allowed to deposit their feculous portion before filtration. The supernatant liquid will then be often found quite clear. It is only when this is not the case that filtration should be had recourse to. A small quantity may be filtered through coarse or woollen filtering paper, supported on a piece of coarse calico placed on a funnel; when the quantity is large, one of the CONICAL BAGS before described should be employed. The bottoms from which the clear portion has been decanted should be placed on a separate filter, or else not added until the whole of the other portion has drained through. Vegetable juices are often rendered clear, by simply heating them to about 180° or 200° Fahr., by which their albumen is coagulated; they are also frequently clarified by the addition of a little white of

egg and heat, in the same way as syrups. Many of them (as those of hemlock, henbane, aconite, &c.) are greatly injured by heat, and must consequently be filtered, or only simply decanted after repose. In all cases they should be exposed to the air as little as possible, as they rapidly suffer decomposition.

Vegetable infusions and decoctions may be cleared by defecation followed by filtration. The conical bags of flannel before described are usually employed for this purpose. When the liquid is to be evaporated to an extract, they are commonly suspended by a hook over the evaporating pan. A convenient method of straining these fluids, practised in the laboratory, is to stretch a square of flannel on a frame or 'horse,' securing it at the corners by pieces of string. (See *engr.*) Such a frame, laid across the mouth of a pan, is more easily fed with fresh liquid than a bag, whose mouth is 40 or 50 inches higher. The same purpose, for small quantities of liquid, is effected by laying the flannel across the mouth of a coarse hair sieve. The concentrated infusions and decoctions, being usually weak tinctures, may be filtered in the same way as the latter. (See *above.*) Many vegetable solutions, that from the viscidity of the suspended matter can scarcely be filtered, may be readily clarified with white of egg in the cold, or pass the filter rapidly if a very small quantity of acetic, tartaric, sulphuric, or other strong acid, is previously added.



Corrosive liquids, as the STRONG ACIDS, are filtered through powdered glass, or SILICEOUS SAND, supported on pebbles in the throat of a glass funnel, or through asbestos or gun-cotton placed in the same manner. Charcoal has also been employed for the same purpose, but is not fit for some acids. Strong caustic alkaline lyes are also filtered through powdered glass or sand. Weak alkaline lyes may be filtered through fine calico, stretched across the mouth of a funnel. Many corrosive liquids, as solution of potassa, &c., require to be excluded from the air during filtration. The simplest apparatus that can be employed for this purpose is that figured in the margin:—(*a*) is a globular bottle fitted with the ground stopper (*d*), and having a perforated neck (*f*) ground to the bottle (*b*); (*c*) is a small tube, wrapped round with as much asbestos, linen, or calico, as is required to make it fit the under neck of the bottle through which it passes. The tube (*c*) may also be fixed by placing pebbles and powdered glass or sand round it, as before mentioned. For use, the solution to be filtered is poured into the bottle (*a*) nearly as high as the top of the tube (*c*), and the stopper is replaced. The liquid then descends into (*b*), and a similar quantity of air passes up the tube into (*a*). LIQUOR POTASSÆ may be always obtained fine by depuration in close vessels, when the sediment of lime only need be filtered, which may be effected with calico fixed across the mouth of a funnel.

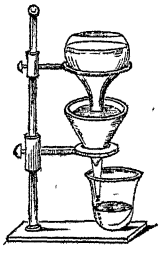


When a precipitate, or the suspended matter in a liquid, is the object of the filtration, the filter should be of such a nature that the powder may be easily separated from it, when dry, and that with the least loss possible. Linen filters are for this reason preferable for large quantities, and those of smooth bibulous paper for small ones. The powder should be washed down the sides of the filter, and collected, by means of a small stream of water, in one spot at the bottom, assisting the operation with a camel-hair pencil; and, when the whole is dry, it should be swept off the paper or cloth with a similar pencil or brush, and not removed by a knife, as is commonly done, when it can be possibly avoided.

The 'first runnings' of liquid from a filter are commonly foul, and are pumped back or returned until the fluid runs perfectly limpid and transparent, when it is 'turned into' the 'filtered liquor cistern,' or proper receiver. In many cases the liquid does not readily become transparent by simply passing through the filter; hence has arisen the use of FILTERING POWDERS, or substances which rapidly choke up the pores of the media in a sufficient degree to make the fluid pass clear. In the employment of these powders, care should be taken that they are not in too fine a state of division, nor used in larger quantities than are absolutely necessary, as they are apt to choke up the filter, and to absorb a large quantity of the liquid. The less filtering powder used, the more rapid will be the progress of the filtration, and the longer will be the period during which the apparatus will continue in effective action. For some liquids these substances are employed for the double purpose of decolouring or whitening, as well as rendering them transparent. In such cases, it is preferable first to pass the fluid through a layer of the substance in coarse powder, from which it will 'run' but slightly contaminated into the filter; or, if the powder is mixed with the whole body of the liquid, as in bleaching almond oil, &c., to pass the mixture through some coarser medium to remove the cruder portion before allowing it to run into the filter. Another plan is, after long agitation and subsequent repose, to decant the clearer portion from the grosser sediment, and to employ separate filters for the two. Granulated animal charcoal is used, according to the first method, to decolour

syrups, oils, &c.; and filtering powder by the second and third, to remove a portion of the colour, and to clarify castor and other oils. The common plan of mixing large quantities of filtering powder with castor oil, and throwing the whole into the filter, as adopted by the druggists, is injudicious. When simple filtration is required, it is better to use little or no powder, and to continue returning the oil that 'runs' through, until, by the swelling of the fibres of the filter bags, it flows quite clear. By this plan the same filters may be used for a long period of time (for many years), and will continue to work well; whilst, by the usual method, they rapidly decline in power, and soon deliver their contents slowly, and after a short time scarcely at all.

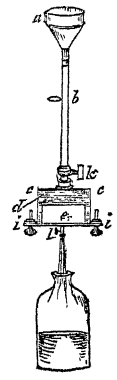
It is often of great advantage to render a filter 'self-acting,' or to construct it in such a way that it may 'feed itself,' so that it may continue full and at work without the constant attention of the operator. On the small scale, this may be readily effected on the principle of the common fountain lamp (see *engr.*); and on the large scale, by placing the vessel containing the unfiltered liquid on a higher level than the filter, and by having the end of the supply-pipe fitted with a ball-cock, to keep the liquid in the filter constantly at the same height.



The rapidity of filtration depends upon the—porosity of the filtering medium—the extent of the filtering surface—the relative viscidity or mobility of the filtering liquid—the pressure or force by which the liquid is impelled through the pores of the filter, and—the porosity and fineness of the substances it holds in suspension. The most efficient filter is produced when the first two or the first three are so graduated to the others that the liquid filters rapidly, and is at the same time rendered perfectly transparent.

In the common method of filtration no pressure is exerted beyond that of the weight of the column of the liquid resting on the filtering medium, but in some cases additional pressure is employed. This is had recourse to for the purpose of producing a more rapid filtration, and more especially for filtering liquids that, from their viscidity, will scarcely pass through the pores of substances sufficiently fine to remove their impurities in the ordinary way.

One of the easiest means of employing pressure in filtration is to increase the height of the column of the filtering liquid. From the peculiar properties of fluids, by which they transmit pressure in an equal degree in all directions, this column need not be of equal diameter throughout, but may be conveniently contracted to the size of a small pipe, as in the accompanying engraving, which represents a small filter on this construction at work. (*a*) is the funnel or reservoir of foul liquid; (*b*) a small pipe conveying the liquid to the filter; (*c c*) a chamber, of which the upper portion (*d*) is filled with the descending liquid, and the lower portion (*e*) with the filtering media; (*i i*) are screws by which the bottom plate is fastened on, which plate is removed to clean out or renew the filter. For use, the cocks (*k*) and (*l*) are closed, and the liquid poured into the funnel (*a*); the cock (*k*) is next opened, and, in a few minutes after, the cock (*l*), when an uninterrupted flow of filtered liquor will be obtained as long as any fluid remains in the funnel (*a*) and the tube (*b*). The length of the tube determines the degree of pressure. Care must be taken first to pass the foul liquid though a hair sieve, or some other strainer, to remove any substance that might choke up the pipe (*b*).



Another method of employing pressure in filtration is the withdrawal of the air from the receiving vessel, as in the vacuum filter, by which a pressure of about 14½ lbs. to the square inch becomes exerted on the surface of the liquid by the atmosphere. The vacuum in the receiving vessel may be produced by the air-pump or by steam.

A commoner method of applying pressure than either of those already mentioned is to condense the air over the surface of the liquid by means of a forcing-pump, or by steam.

On the small scale, pressure may be applied to filtration by means of a syphon, whose shorter leg has its mouth blown into the shape of a bell or funnel, over which filtering paper or fine calico may be stretched.

The application of pressure to filtration is not always advantageous, and beyond a certain limit is generally attended with inconvenience, if not with absolute disadvantage. It is found in practice that fluids under pressure take a longer period to run clear than without pressure, and that ruptures of the media more frequently take place in the former case, or with pressure, than in the latter. Great pressure is in no case advantageous.

The filters already noticed are those that act by the fluid descending through the media; but in some cases the reverse method is employed, and the liquid filters upwards, instead of downwards. These are called ascending filters, and are often preferable to those on the descending principle, because the suspended matters that require removal by filtration usually sink, and thus a portion escapes being

forced into the pores of the filter. They are also more convenient when pressure is employed. Their construction depends upon the same principles as the common filter, and merely requires that the feeding vessel should be higher than the upper surface of the filtering media. OILS are conveniently filtered in this way, because of their little specific gravity. By fixing a small filter on this principle into the head of a cask, and pouring in water through a funnel, whose neck reaches nearly to the bottom of the cask, the oil will float up and pass the filter, leaving the sediment behind. In cold weather hot water may be employed.

a. Cask of oil.
b. Stand.
c. Funnel for water.
d. Filter.

In some cases the upward and downward systems of filtration are united in the same apparatus, and this plan is advantageous where the space for operating is limited. For this purpose it is merely necessary to connect the bottom of an ascending filter with the top of a descending one, or the reverse; the proper pressure being in either case applied. See CLARIFICATION, DEFECATION, FININGS, &c.

FI'NINGS. Substances used by publicans, brewers, wine merchants, &c., to clarify their liquors.

Prep. 1. (BREWER'S FININGS; COOPER'S F.) Isinglass (finely shredded), 1 lb., and sour beer or cider or vinegar, 3 or 4 pints, are macerated together, and more of the sour liquor added as the isinglass swells, until about a gallon has been used, agitation with a whisk or a small bundle of twigs being occasionally had recourse to, for the purpose of promoting the solution. As soon as the whole of the isinglass is dissolved, the mixture is reduced to the consistence of thin syrup, with weak mild beer, or cider, or any other liquid that the finings are intended for. The whole is next strained through a tammy cloth or a hair sieve, and at once reduced to a proper state of dilution, by the addition of more liquor. *Product.* 6½ to 7 galls. "A pound of good isinglass will make about 12 galls. of finings." (Ure.) *Used* to clarify fermented liquors, especially beer. 1 to 1½ pint is the usual dose for a barrel of ale or porter; and a quart for a hogshead of cider or wine.

2. (SPIRIT FININGS.)—*a.* Alum (ord. cryst.), 1 lb.; powder, and divide it into 12 equal portions, which are to be separately wrapped in blue paper, and marked No. 1. Next take of carbonate of soda (sesquicarbonate of the shops), 6 oz.; divide this as the last, wrap it in white paper, and mark each parcel No. 2. Keeps dry anywhere.

b. From alum, 1 lb.; salt of tartar (dry), ¼ lb.; proceed as before. The white papers containing the salt of tartar must be kept in a dry, well-corked, wide-mouthed bottle or jar. Both of the last two are used to clarify gin and cordials. The contents of one of the blue papers are dissolved in about a pint of hot water, and the resulting solution is well 'rummaged up' with the liquor. A solution of the contents of one of the white papers, in about ½ pint of hot water, is then added, and the agitation continued for some minutes longer; after which the cask is 'bunged' close and the whole allowed to repose until the next day. This is sufficient for a barrel (say 30 to 36 galls.), but many persons use double the quantity. The effect is not only to clarify but also to 'blanch' the liquor.

Obs. Good liquors, either fermented or spirituous, need no artificial 'fining,' as they always clarify themselves by repose. With those, however, which are 'out of condition,' or of inferior quality, it is often necessary, as without such a proceeding, they remain unsaleable. This is particularly the case with malt liquor. "Attempts to clarify it in the cask seldom fail to do harm. The only thing that can be used with advantage for fining foul or muddy beer is isinglass." (Ure.) The disadvantages resulting from the artificial clarification of fermented liquors are—that they do not afterwards 'stand well on draught,' that much of the conservative astringent matter which they contain is precipitated with the 'finings,' that their piquancy and flavour is more or less diminished, and that they are more than usually liable to become flat and vapid, whether in cask or bottle. The larger the proportion of 'finings' used, the more marked are their injurious effects, and the shorter the interval which elapses before the accession of the several symptoms referred to. We have seen the most disastrous consequences follow the injudicious use of 'finings,' more especially in respect to those liquors in which a certain amount of piquancy, astringency and briskness, is an essential condition. In one instance which came under our notice upwards of 30 barrels of 'underground' (very strong old ale) was thus reduced in value to less than 1-3rd its original cost; and in another, a large bottled stock of the 'finest old Burton' was found to be utterly unsaleable. In both cases the 'spoiled liquor' was got rid of by mixing it in and selling it with 3*d.* and 4*d.* beer.

Liquors which 'refuse to fine' or become clear, when treated with 'finings' in the usual manner, are called 'stubborn' by coopers and cellarmen. See BREWING, GIN, MALT LIQUORS, WINES, &c.

FIRE. The calamities resulting from this destructive agent are of such frequent occurrence, as to justly claim a notice of the subject here. The causes of fires are numerous, and of a varied character, and, in most instances difficult to determine, because it is the interest of those concerned to suppress all evidence connected with the matter. Accident, the convenient word given to the imaginary hag to which so many fires are referred, if truth

fully interpreted, will, in general, be found to be equivalent to carelessness, recklessness, or guilt. We believe that there are few fires which have happened that might not have been prevented by the exercise of common prudence, and that a vast number have been caused by direct negligence, arising from sheer laziness and indifference, to use no harsher terms. As familiar instances, may be mentioned—allowing sparks to fall on the ground and remain there, without extinguishing them; carrying a naked candle into rooms containing inflammable substances; smoking carelessly and in dangerous places, as workshops, warehouses, on shipboard, &c.; keeping instantaneous light matches in improper places, and neglecting to pick up those that may happen to fall on the ground, &c. &c. The list might easily be extended, but we believe every reflecting reader can do so for himself. The great increase in the number of fires since the introduction of lucifer matches, and the almost general use of tobacco, cannot fail to have attracted the attention of every one. The danger of matches falling about might be avoided by the use of those which can only be ignited by rubbing them on the prepared surface of the box. There 'safety matches' are coming into general use, and must eventually supersede all the more dangerous kinds.

Prev. This consists of the exercise of those ordinary precautions which the good sense of every careful and trustworthy man, be he taskmaster or servant, cannot fail to suggest. It would be useless to enumerate them.

Fires might often be readily extinguished when first discovered by the timely application of a few buckets of water. When an apartment is found to be on fire, the door, chimney, and windows should be immediately closed, if possible, and only opened for the purpose of projecting water on the flames. By this means the supply of air will be cut off, and rapid combustion prevented. The same applies to the lower doors and windows of a house (especially the shop window), which are often injudiciously kept open or removed, under the pretence of rendering assistance. The neglect of this precaution has often caused a mere smouldering fire, that might have been easily put out, to burst into an unextinguishable mass of flame.

It has been proposed at various times to make certain additions to the water used for the purpose of extinguishing fires, in order to render its action more certain and effective. It is found that sal ammoniac (5 oz. to the gal.) exerts this property in a remarkable degree. Several other articles, as common salt, pearlash, and kitchen soda, act in the same way, though less effectively. A few buckets of such water will speedily arrest the progress of a fire before it has much extended itself. Such a plan is easily applied, by adding the saline matter to the buckets of water, which are either used by hand, or to feed the engine for the first few minutes of its working. When, however, a fire has made much progress, the action of such substances becomes scarcely perceptible.

Chimneys on fire are readily extinguished in several ways, without having recourse to throwing water down them from the top, by which much damage is frequently done to the furniture in the rooms. One of the simplest methods is, to cautiously scatter a handful of flowers of sulphur over the dullest part of the burning coals; the sulphurous vapours, being incapable of supporting combustion, rapidly extinguish the flames. Another method is, to shut the doors and windows, and to stop up the bottom of the chimney with a piece of wet carpet or blanket, throwing a little water or flowers of sulphur, or even common salt, on the fire immediately before doing so. By this means the draught is stopped, and the burning soot extinguished for want of air. In many of the first-class houses recently erected, 'fire-place shutters' are provided, which, when partly drawn down, act as powerful bellows or 'blowers;' and which, when wholly drawn down, so as to touch the hearth-stone, entirely close up the fire-place, and instantly extinguish the combustion of the fuel in the grate, or that of the soot in the chimney. This simple arrangement, the advantages of which were pointed out in an early edition of this work, renders fires in chimneys of little moment, as it is only necessary to draw down the shutter to put them out. If a chimney is stopped at top, instead of at the bottom, the whole of the smoke must, of necessity, be driven into the apartment.

Escape from apartments on fire may be best effected by creeping on the hands and knees. In this way the window or door may be reached. It is found that the atmosphere of a room so full of smoke as to produce suffocation to a person standing upright, may generally be safely breathed on nearly a level with the floor. A damp cloth, or handkerchief, tied over the mouth and nostrils, or, still better, over the whole face and head, will enable a person to effect a passage through the densest smoke, and, in many cases, to escape from buildings on fire, when otherwise it would be impracticable. Should descent by the staircase be found impossible, then the window should be immediately sought, and a ladder or fire-escape waited for. In the absence of either, if the danger is imminent, a rope should be made by tying the sheets and blankets of the bed together, one end of which should be firmly secured to a chair or table, or preferably to one of the bed-posts, and with this apparatus descent should be cautiously attempted. Jumping out of the window should be avoided, as persons who have not been brought up as clowns, or harlequins, run just as much danger in performing such an exploit as they do by remaining in the burning building. When it is impossible to escape from a burning build-

ing by the stairs or windows, retreat may be sometimes secured by a trap-door opening on to the roof, or by a skylight, when, unless it be an isolated house, the roof of one of the adjoining buildings may probably be gained with safety.

Fire-escapes of various kinds have been employed of late years in the metropolis, and have proved of the greatest value in rescuing persons from burning buildings.

It is said that there is no instance on record of a person being burnt to death in a dwelling-house in Edinburgh, where the houses are usually high; yet in London, where fire-engines and fire-escapes are provided in greater numbers, deaths are very frequent from this cause. The reason of this difference is, that in the former city the stairs are all made of stone, by which means a road of escape is secured.

The clothes of females and children, when on fire, may be most readily extinguished by rolling the sufferer in the carpet, hearth-rug, table-cover, a great-coat, cloak, or any other woollen article at hand. If this be expertly done, the flames may be rapidly put out, unless the skirts of the dress be distended by hoops or crinoline, when there is great difficulty in staying the progress of the flames. Should assistance not be at hand, the person whose clothes are on fire should throw herself on the ground, and roll the carpet round her, as before described; or if such a thing is not in the room, she should endeavour to extinguish the flames with her hands, and by rapidly rolling over and over on the floor. In this way the fire will be stifled, or at least the combustion will proceed so slowly that less personal injury will be experienced before assistance arrives. The advantage of assuming the horizontal position is manifest from the fact, that nine times out of ten it is the lower parts of the dresses of females that first catch fire.[1]

The extinction of fires on board ships by means of carbonic acid gas was some years since suggested to the Admiralty by Mr. J. R. Hancorn. He proposes that a simple and economical apparatus should be attached to every decked vessel, capable of supplying this gas, which is a well-known non-supporter of combustion, and will extinguish fire at the very instant of coming in contact with the burning matter. Chalk with sulphuric acid diluted with water (vinegar, or any other acid will do) yields 44% of the gas; hence, a ton of chalk, and a fourth part of that quantity of sulphuric acid, will be found sufficient to extinguish any fire on board a ship. Mr. Hancorn also proposed this as a method of destroying vermin in ships, such as rats and cockroaches, for which purpose it is more easily applied and more effectual than that usually adopted. This plan was rejected by the Admiralty, from a fear that the destructive action of the gas might extend to the crew as well as the fire. But "it surely is possible by mechanical means to expel the gas before again entering the ship's hold. At any rate, the grand point would be obtained of extinguishing the fire—though the crew might have only the deck to stand on."

It is often difficult to get horses out of buildings on fire, but it is said that they will readily come out if, after being blindfolded, the saddle and bridle, or the harness, &c., to which they are accustomed, are thrown over them as usual.

Fire Anni'hilator (Phillips's). This is essentially a gaseous fire engine, which at any moment can be made to discharge a stream of mixed gases and vapours having the power of checking combustion. When first introduced it was generally regarded as a most important invention, but it has not proved an effective substitute for the common water engine. For extinguishing fires on board ship and in close apartments it is undoubtedly well adapted, but as a street engine it is comparatively useless, owing to the unmanageable nature of its fire-annihilating vapours.

The composition with which the 'Fire Annihilator' is charged is a mixture of dried ferrocyanide of potassium, sugar, and chlorate of potassa. It is set in action by a blow on a glass vessel containing oil of vitriol, which, being fractured, permits the acid to flow over the 'charge,' when the anti-combustion gas is liberated, and rushes forth with great impetuosity.

Fire-damp. See HYDROGEN (Carburetted.)

Fire-en'gine. The common fire-engine is a compound forcing-pump, consisting of two 'forcing-pumps' placed on opposite sides of an air-vessel,' with which both communicate. The 'fulcrum' of the 'lever' by which both pumps are worked is placed midway between them; consequently they act alternately in charging the air-vessel. In order to obtain a very forcible jet, it is necessary to prevent the escape of any portion of the contents of the air-vessel until the confined air is considerably compressed. The lever is connected with hand-rails on each side of the engine, and these are alternately raised and depressed by the workers. Engines worked by steam power are now common in London and most of our large towns.

Fire-proofing. See INCOMBUSTIBILITY, &c.

Fire-works. See PYROTECHNY, and *below*.

FIRES. (In pyrotechny.) Coloured fires may be termed, not inaptly, the *chefs-d'œuvre* of the pyrotechnist's art, since on their excellence the attractions of most other varieties of fire-works depend. The following forms, under judicious management, yield fires of remarkable beauty.

Blue Fire. *Prep.* 1. From metallic an-

[1] For the mode of rendering muslin and other inflammable articles of ladies' apparel fire-proof, see INCOMBUSTIBLE FABRICS.

timony, 1 part; sulphur, 2 parts; nitre, 5 parts.

2. From realgar, 2 parts; charcoal, 3 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; nitrate of baryta, 77 parts.

3. (Mr. A. Bird.) Charcoal and orpiment, of each, 1 part; black sulphuret of antimony, 16 parts; nitre, 48 parts; sulphur, 64 parts.

4. (Fownes.) Tersulphuret of antimony, 1 part; sulphur, 2 parts; dry nitre, 6 parts. This is the composition used for the Bengal or blue signal light, employed at sea.

5. (Prof. Marchand.) Sulphur, sulphate of potassa, and ammonio-sulphate of copper, of each, 15 parts; nitre, 27 parts; chlorate of potassa, 28 parts. For theatrical illuminations. This may be rendered either lighter or darker coloured, by lessening or increasing the quantities of the sulphate of potassa and ammonio-sulphate of copper.

6. (LIGHT BLUE — Marchand.) Sulphur, 16 parts; calcined alum, 23 parts; chlorate of potassa, 61 parts.

7. (DARK BLUE — Marchand.) Calcined alum and carbonate of copper, of each, 12 parts; sulphur, 16 parts; chlorate of potassa, 60 parts.

8. (Marsh.) Sulphate of copper, 7 parts; sulphur, 24 parts; chlorate of potassa, 69 parts.

9. (Ruggieri.) Nitre, 2 parts; sulphur and zinc, of each, 3 parts; gunpowder, 4 parts.

10. From sulphur, 1 part; dried verdigris, 2 parts; chlorate of potassa, 9 parts.

Crimson Fire. *Prep.* 1. (Marsh.) Chlorate of potassa, 4¼ parts; charcoal (alder or willow), 5¾ parts; sulphur, 22½ parts; nitrate of strontia, 67⅓ parts. For pots.

2. (Marsh.) Charcoal, 4¼ parts; sulphuret of antimony, 5½ parts; chlorate of potassa, 17¼ parts; sulphur, 18 parts; nitrate of strontia, 55 parts. For boxes and stars.

3. (Marchand.) Sulphur, 16 parts; chalk (dry), 23 parts; chlorate of potassa, 61 parts. Turns on the purple. See RED FIRE (*below*).

Green Fire. *Prep.* 1. Nitrate of baryta, 77 parts; chlorate of potassa, 8 parts; fine charcoal, 3 parts; sulphur, 13 parts.

2. From metallic arsenic, 2 parts; charcoal, 3 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; nitrate of baryta, 77 parts. Very beautiful, particularly when burnt before a reflector.

3. (Mr. A. Bird.) Charcoal and black sulphuret of antimony, of each, 2 parts; chlorate of potassa, 5 parts; sulphur, 6 parts; nitrate of baryta, 80 parts.

4. (Fownes.) Lamp black, 1 part; chlorate of potassa, 4 parts; sulphur, 6 parts; dry nitrate of baryta, 18 parts.

5. (Marchand.) Boracic acid, 10 parts; sulphur, 17 parts; chlorate of potassa, 73 parts. Very beautiful.

6. (Marchand.) Chlorate of potassa, 18 parts; sulphur, 22 parts; nitrate of baryta, 60 parts. For theatrical illuminations.

7. (LIGHT GREEN — Marchand.) Sulphur, 16 parts; carbonate of baryta, 24 parts; chlorate of potassa, 60 parts. Extremely delicate.

8. (Marsh.) Charcoal and sulphuret of arsenic, of each, 1¾ part; sulphur, 10½ parts; chlorate of potassa, 23¼ parts; nitrate of baryta, 62½ parts. For pots or stars.

Lilac Fire. *Prep.* 1. (Marsh.) Black oxide of copper, 6 parts; dry chalk, 20 parts; sulphur, 25 parts; chlorate of potassa, 49 parts. For pans.

2. (Marsh.) From black oxide of copper, 3 parts; dried chalk, 22 parts; sulphur, 25 parts; chlorate of potassa, 50 parts. For stars.

Orange Fire. See RED FIRE, No. 8 (*below*).

Pink Fire. *Prep.* (Marchand.) Charcoal, 1 part; chalk and sulphur, of each, 20 parts; chlorate of potassa, 27 parts; nitre, 32 parts. For theatrical illuminations. See RED FIRE, No. 10 (*below*).

Purple Fire. *Prep.* 1. From lamp black, realgar, and nitre, of each, 1 part; sulphur, 2 parts; chlorate of potassa, 5 parts; fused nitrate of strontia, 16 parts.

2. (Marsh.) Sulphuret of antimony, 2¾ parts: black oxide of copper, 10 parts; sulphur and nitrate of potassa, of each, 22¾ parts; chlorate of potassa, 42 parts. For pans.

3. (Marsh.) Sulphate of copper, 9¾ parts; sulphur, 13 parts; chlorate of potassa, 77¼ parts. For stars.

4. From sulphur, 12 parts; black oxide of copper, 12 parts; chlorate of potassa, 30 parts. See CRIMSON FIRE, No. 3 (*above*), and RED FIRE, No. 9 (*below*).

Red Fire. *Prep.* 1. From sulphur, sulphuret of antimony, and nitre, of each, 1 part; dried nitrate of strontia, 5 parts.

2. (Mr. A. Bird.) Charcoal, 1 part; black sulphuret of antimony, 4 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; dried nitrate of strontia, 40 parts.

3. (Fownes.) Lamp black, 2 parts; chlorate of potassa, 8 parts; sulphur, 9 parts; dried nitrate of strontia, 32 parts.

4. (Marchand.) Sulphur, 16 parts; carbonate of strontia, 23 parts; chlorate of potassa, 61 parts.

5. (Marchand.) Chlorate of potassa, 20 parts; sulphur, 24 parts; nitrate of strontia, 56 parts. For theatrical illuminations.

6. (Marsh.) Coal dust, 2 parts; gunpowder, 6 parts; sulphur, 20 parts; dried nitrate of strontia, 72 parts.

7. (Ruggieri.) Sulphuret of antimony, 4 parts; chlorate of potassa, 5 parts; sulphur, 13 parts; fused nitrate of strontia, 40 parts. A little charcoal or lamp black makes it burn quicker.

8. (ORANGE RED — Marchand.) Sulphur, 14 parts; chalk, 34 parts; chlorate of potassa, 52 parts.

9. (PURPLE RED — Marchand.) Sulphur, 16 parts; chalk, 23 parts; chlorate of potassa, 61 parts.

10. (ROSE-RED — Marchand.) Sulphur, 16

parts; dried chloride of calcium, 23 parts; chlorate of potassa, 61 parts. See PINK FIRE.

11. From charcoal, 2 parts; chlorate of potassa, 6 parts; sulphur, 13 parts; dried nitrate of strontia, 40 parts.

Violet Fire. *Prep.* 1. From charcoal, 8 parts; sulphur, 10 parts; metallic copper, 15 parts; chlorate of potassa, 30 parts.

2. (DARK VIOLET—Marchand.) Alum and carbonate of potassa, of each, 12 parts; sulphur, 16 parts; chlorate of potassa, 60 parts.

3. (PALE VIOLET — Marchand.) Sulphur 14 parts; alum and carbonate of potassa, 16 parts; chlorate of potassa, 54 parts.

White Fire. *Prep.* 1. From nitre, 60 parts; sulphur, 20 parts; black antimony, 10 parts; meal powder, 6 parts; powdered camphor, 4 parts. For either pans or stars.

2. (Mr. A. Bird.) White arsenic, 1 part; charcoal, 2 parts; black antimony, 16 parts; nitre, 48 parts; sulphur, 64 parts.

3. (Marchand.) Charcoal, 2 parts; sulphur, 22 parts; nitre, 76 parts. For theatrical illuminations.

4. (Marchand.) Gunpowder, 15 parts; sulphur, 21 parts; nitre, 64 parts. As the last.

5. (Marsh.) Gunpowder, 12½ parts; zinc filings, 18 parts; sulphur, 23 parts; nitre, 46½ parts. For pans.

6. (Marsh.) Zinc dust or filings, 15 parts; sulphur, 28 parts; nitre, 57 parts. For stars.

7. (Ruggieri.) Sulphur, 13¼ parts; sulphuret of antimony, 17¼ parts; nitre, 48 parts.

8. (Ruggieri.) From realgar, 2 parts; sulphur, 7 parts; nitre, 24 parts.

9. (Ruggieri.) Charcoal, 1 part; sulphur, 24 parts; nitre, 75 parts.

10. (Ruggieri.) Iron or zinc borings, 25 parts; gunpowder, 100 parts.

Yellow Fire. *Prep.* 1. From sulphur, 16 parts; dried carbonate of soda, 23 parts; chlorate of potassa, 61 parts.

2. (Marchand.) Gunpowder, 14 parts; sulphur, 16 parts; dried soda, 20 parts; nitre, 50 parts.

3. (Marchand.) Charcoal, 1½ part; sulphur, 17½ parts; dried soda, 20 parts; nitre, 61 parts.

4. (Marsh.) Charcoal, 6 parts; sulphur, 19½ parts. For pans. Very beautiful.

Obs. The ingredients in the above compounds are to be separately reduced to powder, and sifted through lawn, after which they should be kept in well-corked wide-mouthed bottles until the time of mixing them for use. The chlorate of potassa, more especially, must be separately treated, and cautiously handled, in order to prevent the possibility of explosion, from friction, whilst it is in contact with combustible matter. The requisite quantity of each of the ingredients being weighed out and placed on a clean sheet of white paper, the whole is to be thoroughly but carefully mixed together with a light hand, by means of a bone or wooden knife. The compound is next lightly packed into small cups or pans for illuminations, or into small pill-boxes for stars and trains, a little priming and quick-match being lastly attached to each. To ensure success, the several ingredients must be dry and commercially pure; and though reduced to the state of a uniform powder, care must be taken that they are not absolutely 'dusty,' or too finely pulverised. The nitrate of strontia, alum, saltpetre, carbonate of soda, &c., before being weighed, require to be gently heated in an iron pot or pan, until they fall to powder, and lose their hygrometric moisture, or water of crystallisation. To ensure the perfect admixture of the ingredients, the whole, after they have been stirred together on paper, as before directed, may be passed through a hair or perforated zinc or brass sieve. Further, as coloured fires rapidly deteriorate by keeping, and even sometimes inflame spontaneously, to prevent disappointment and accidents they should not be prepared long before they will be required for use, and should be stored in some situation in which their spontaneous combustion would be productive of no disastrous consequences.

Of the above formulæ, those bearing the name of the late Mr. Marsh, of Woolwich, more especially deserve the attention of the pyrotechnist. See FLAME, PYROTECHNY, &c.

FISH. *Syn.* PISCES, L. Fishes form the *fourth class* of vertebrate animals (VERTEBRATA) in the Cuverian arrangement of the animal kingdom, and in the variety of their genera and species are second only to the INSECTA, whilst in prolificness and number they probably exceed all other animated beings that reach a size equal to that of even the smallest member of their prodigious race. Besides their value to man as food, they furnish him with oil, isinglass, and various other articles of utility and luxury, and provide, either directly or indirectly, an inexhaustible supply of manure for the fertilisation of his fields. As food, fish are undoubtedly wholesome and nutritious, although less so than the flesh of animals or the grains of the cereals. Of all the various substances used as aliments by man, fish are, however, the most liable to run into a state of putrefaction, and should therefore be only eaten when perfectly fresh, or, if not recently taken, then only when their perfect preservation has been ensured by any of the ordinary methods employed for the purpose. Those that are the whitest and most flaky when cooked, as cod, flounders, haddock, hake, soles, turbot, whiting, &c., are the most easily digested; and those abounding in oily matter, as eels, herrings, mackerel, salmon, &c., are most nutritious, though the most likely to offend the stomach. Salt-water fish have been said to be more wholesome than river fish, but without sufficient reason. Salted fish are hard of digestion, unless when carefully cooked and well masticated. Skin diseases are said to be more common among those who live continually on fish than among those who abstain from

it; but this probably arises from their use being unaccompanied by a proper quantity of fresh vegetables or fruit, both of which are scarcer on the sea-coast than further inland. As one of the components of a mixed diet, the value of fish is indisputable. Acid sauces and pickles are the proper additions to fish, from their power of retarding the progress of putrefaction, and of correcting the relaxing tendency of large quantities of oil and butter.

Artificial Propagation. The fecundity of fish is positively marvellous. According to the recent observations of Mr. Frank T. Buckland, salmon yield about 1000 ova or eggs to every lb. of their weight: a trout weighing 1 lb. produced upwards of 1000; a mackerel (1 lb.), 86,120; a herring (½ lb.), 19,840; a sole (1 lb.), 134,466; a turbot (8 lbs.), 385,200; and a cod (20 lbs.), 4,872,000. The ova here spoken of form what is commonly called the 'hard roe' of the female fish; the 'soft roe' is 'the milt' of the male fish. To protect the spawn, and the fry, when hatched, is the object of the art of fish-culture, which has made great progress during late years. When the spawn is not artificially protected, the greater portion is always wasted, being swept away by the stream, and devoured by fish, birds, and insects. The natural enemies of the newly hatched fish are, again, so numerous, that it is really surprising that any should escape destruction. According to given data and accurate calculations of the returns of fisheries made by Messrs. Ashworth and Buist, only one salmon egg out of every thousand deposited ever becomes a fish fit for human food. Other fish, both fresh and salt-water, suffer in proportion. The hatching of fish by artificial means has been carried out on a large scale in France, and has been commenced in Scotland and Ireland, and on a small scale in England. The spawning fish, having been caught by a net, is made to deposit her eggs by gently pressing on the abdomen; these are impregnated by 'milt' expressed from the male fish in a similar manner, and mixed with them in a shallow tub or other vessel prepared for the purpose. The impregnated eggs are placed in long shallow boxes, bottomed with gravel and pebbles, and so arranged that a small stream of water from a reservoir may flow from one to another. The time of hatching depends entirely upon the temperature of the water; from 40° to 45° Fahr. seems to be the healthiest temperature. After about 50 days (in the case of salmon), when all goes well, the young fish makes its appearance as a misshapen creature about an inch long, with a bag containing the yolk of the egg attached to its abdomen. At 3 days old the fry is about 2 grs. in weight; at 16 months it has increased to 2 oz. To preserve the young fish in health, the boxes must be covered with shades of slate or zinc. The French fish-breeders generally feed the young fry with boiled frogs powdered fine. The Scotch give boiled liver. Mr. Buckland prescribes a diet of roe of sole, or plaice, or whiting. As to the age at which it is advisable to turn the young fish out of the nursery, there is much difference of opinion. Some breeders recommend turning them out as soon as the 'umbilical bag' is absorbed; others think they should be taken care of till they are older and stronger, and better able to defend themselves or escape from attack. For full details respecting the artificial propagation of fish, the reader is referred to Mr. Buckland's recent work, entitled 'Fish-Hatching.'

Choice, &c. "The flesh of any fish is always in the highest perfection, or in season. as it is called, during the period of the ripening of the milt and roe. After the fish has deposited the spawn, the flesh becomes soft, and loses a great deal of its peculiar flavour. This is owing to the disappearance of the oil or fat from the flesh, it having been expended in the function of reproduction." (Fleming's 'Phil. of Zoology.') Fish should be dressed as soon after being caught as possible, as much of their peculiar delicacy and flavour is lost by keeping, even for a few hours. Turbot and salmon are said by the fishmongers to be improved in flavour when 2 or 3 days old, but this is surely a mistake, as the former, when dressed immediately after being caught, possesses a fine creamy taste, which it afterwards loses; whilst the latter, by the loss of a single tide, loses a portion of the fine white curd which is previously found between the flakes, and by longer keeping, this curd, with the larger flakes, disappear altogether. In the eyes of some epicures the richness is, however, increased by this change. Mackerel, and some other fish, suffer so much from keeping only a few hours, that they become quite unwholesome. Herrings offer a remarkable example of the advantage of dressing fish as fresh as possible. When cooked soon after being caught, they possess considerable delicacy and flavour. but after being kept for only a few hours the oil separates from the flesh, and they become soft, greasy, and strong-flavoured.

In the choice of every kind of fish, stiffness, brightness of the eyes, and redness of the gills, may be regarded as invariable signs of freshness. A peculiar elasticity will also be perceived in fish recently caught, little or no permanent impression being made by the ordinary pressure of the fingers, from the flesh immediately rising when the pressure is withdrawn. Fresh fish also lie in a partly curled position, and never quite straight, as is the case when they have been kept for some time. Thickness and fleshiness are deemed marks of the good condition of all fish.

Cleaning, dressing, &c. On the proper cleaning of fish preparatory to dressing it, depends much of its delicacy and flavour. Ordinary cooks seldom do this well, from not slitting the fish sufficiently open to permit the

inside to be thoroughly washed, and seldom using sufficient water. The superior flavour of fish cleaned by the fishmongers arises from their performing the operation more completely, and from the large quantity of water they employ about them. The flavour of all fish is improved by adding a little salt or vinegar to the last water in which they are washed. The sound, milt, and roe, should be carefully cleaned and preserved.

Fish is preferably 'dressed' by simple boiling, broiling, or frying; in fact, the finer kinds of fish are often injured by the excessive interference of the cook. When boiled, "all large fish, with the skin whole, must be placed on the fire in cold water; if crimped, or cut into slices or pieces, in boiling water; if whole, it must not be covered with more than two or three inches of water, or the skin will crack, and not only spoil the appearance of the fish, but will diminish the gelatine and gluten it contains, and instead of eating firm and full of flavour, it will be soft and woolly, especially if over-boiled." (Soyer.) As soon as a scum rises from boiling, it should be removed by the skimmer. The addition of a little salt or vinegar to the water improves the flavour of most fish, and renders the flesh firmer. The proportions should be "two teaspoonfuls of salt to every quart of water." "If the fish be whole, as soon as it begins to boil remove the cover on one side, and let it simmer gently until done." (Soyer.) A fish is known to be sufficiently dressed by the flesh in the thicker parts separating easily from the bone. "If a large fish, I generally try it by gently pushing a wooden skewer through the thickest part; if it goes in easily, it is done." (Soyer.) When this is the case it should be removed from the kettle, as by soaking in the water fish loses its firmness, and becomes soddened. Sole, skate, and mackerel, are usually put into boiling water, whether whole or sliced. Fish for broiling should be well washed in strong vinegar, wiped dry with a towel, and flowered before placing them on the gridiron; and the bars of the latter should be hot, and well buttered. (Rundell.) Fish for frying should be prepared as for broiling, and the butter, oil, or lard, should be allowed to boil for a minute or two before putting them into the frying-pan. The latter should be perfectly smooth and bright, and the butter or oil in abundance, to prevent the fish sticking to it and burning. As the fish are cooked solely by the heat of the melted fat, to fry them in the highest perfection there should be enough of it to cover them. Butter or oil is the best for the purpose. To avoid loss, the contents of the frying-pan, after the fish is removed, should be poured into a clean jelly-jar or basin, and reserved for another occasion. The fish being removed from the pan, the superfluous fat should be drained from them preparatory to 'serving' them. When fish is divided into fillets or cutlets before being cooked, it is usual to tak out the bones, and to dress it with force-meat &c.

In serving fish of the finer kinds, no other additions are required than melted butter and the ordinary fish sauces and pickles. The dishes are commonly garnished with raw parsley, for the sake of appearance, but boiled parsley, chopped small, should accompany it. All kinds of fish should be served on a napkin.

Caution. It sometimes happens that a fish-bone accidentally swallowed remains in the œsophagus, and occasions serious inconvenience; in fact, instances have been known where so much irritation has arisen that death has followed. In such cases it is advisable, as soon as possible, to take of tartar emetic, 4 grs., dissolved in warm water, ½ pint; and immediately afterwards the whites of six eggs. The coagulated mass will not remain in the stomach more than two or three minutes, and the remedy has been known to "remove no less than 24 pins at once."

FISH GLUE. See GLUE and ISINGLASS.

FISH SKIN. *Syn.* SHARK SKIN. The skin of the spotted dog-fish or rough hound (*chien de mer*, Fr.), stretched and dried. *Used* for polishing wood and ivory. Several other varieties of fish skin are employed in the arts. The dressed skin of the 'rousette' (*peau de rousette*, Fr.) is transparent, and very beautiful. Cemented on green paper, and rubbed down and polished, it is used as veneer for fancy boxes. The skins of several varieties of Squalus are also used for both the above purposes. See SHAGREEN.

FIVE HERBS. See SPECIES.

FIX'ATURE. *Syn.* BANDOLINE, CLYSPHITIQUE, EAU COLLANTE, FIXATEUR, Fr. This consists of any of the simple vegetable mucilages, combined with a little spirit, to preserve it, and with a little perfume, to render it more agreeable.

Prep. 1. From carrageen, Irish, or pearl moss, soaked in cold water for an hour or two, and after being drained, and pressed dry in a clean napkin, dissolved by boiling in soft water, q. s. The decoction is strained through cambric, and when nearly cold is mixed with about ⅓rd or ¼th of its volume of eau de Cologne or other scented spirit, with the further addition of a few drops (5 or 6) of oil of cloves. Sometimes a little brandy is added to the mucilage, and when it is intended for present use, as is common with home manufacturers, the spirit is frequently omitted altogether. ¼ oz. of the prepared moss is fully enough for ¾ pint of strained decoction, if rightly managed.

2. From quince seed boiled in water, as the last. ¼ oz. yields nearly ¾ pint of strained decoction.

3. Pale gum arabic (picked), 1½ oz.; rose water, 2 fl. oz.; pure water, 3 fl. oz.; dissolve.

4. Gum arabic, 3¼ oz.; water, ½ pint; dissolve, and drop in eau de Cologne, gradually,

until the cloudiness at first occasioned ceases to be removed by agitation; the next day decant the clear portion. All of the above are very superior, and keep well.

5. (Redwood.) Gum tragacanth, 1½ dr.; water, 7 oz.; proof spirit, 3 ozs.; otto of roses, 10 drops; macerate 24 hours, and strain.

6. Malt, 7 oz.; hot water (that will barely permit the finger to be held in it without pain), ½ pint; infuse in a covered jug or basin, gently press out the liquid, and as soon as cold, add of proof spirit (or brandy or Cologne water), 2½ fl. oz.. and strain.

Obs. Bandoline is used by ladies and by hairdressers for stiffening the hair, and to make it curl firmly and remain in place. It is applied either by moistening the fingers and passing the hair through them, or by means of a small sponge. See POMMADE.

FIXED AIR. See CARBONIC ACID.

FIXED OILS. See FAT and OILS.

FLAKE WHITE. See WHITE PIGMENTS.

FLAME. Gas or vapour in an incandescent state. The light emitted from pure flame is exceedingly feeble; illuminating power being almost entirely dependent upon the presence of solid matter. See ILLUMINATION, and below.

Flame Colours. The vapours of metallic compounds communicate colours to flames. The characteristic colours of some metals are very beautiful, and their exhibition forms a favorite experiment of chemical lecturers. The coloured flames are generally produced by the combustion of alcohol or rectified spirit upon certain salts in fine powder. In this way a GREEN colour is communicated by boracic acid, or chloride of copper; a RED one by the nitrates of iron, lime, or strontia; a VIOLET, by potassa and its salts; and a YELLOW, by nitrate of soda. Messrs. Church and Crookes have recently described a mode of exhibiting the characteristic flames of the metals which is admirably adapted for the lecture-table.[1] 'Gun-paper,' made in the same way as 'gun-cotton,' is to be soaked in solutions of the chlorates of the different metals, dried with care, and kept dry. A good 'gun-paper' for the purpose is prepared by soaking strips of Swedish filtering-paper for ten minutes in a mixture of 4 parts oil of vitriol with 5 parts strong nitric acid, both by measure. The strips, when taken out of the acid, should be washed first with cold, and then with hot rain or distilled water, till the washings are no longer sour to the taste. The solutions of the metallic salts need not be very strong; but if they are warm, the strips of 'gun-paper' will be more easily and completely saturated with them. Since some of the chlorates attract moisture from the air, it is better to dry the papers prepared with them before the fire previous to lighting them. They are shown to best advantage when a strip is loosely crumpled up into a pellet, lighted quickly at one corner, and thrown up into the air against a dark back ground. They leave after burning, if properly prepared, no ash whatever. Paper prepared with the salt of potassa gives a flash of VIOLET flame, that prepared with the soda salt the characteristic YELLOW flame, and that with chlorate of baryta a very beautiful GREEN light. The chlorates of strontium, lithium, and calcium, when thus ignited, gives intense colours. The VIOLET-BLUE flame of copper is well seen, even with the chloride of that metal, while paper soaked in nitrate of potassa shows the potassium flame better than if the chlorate be used. 'Gun-paper' prepared with a very weak solution of chloride or chlorate of thallium shows the characteristic SPRIG-GREEN flame of that metal with great distinctness. Chlorate of barium, being an article of commerce, may be employed for the preparation of the other chlorates, it being merely necessary to add to this salt in solution an exactly equivalent quantity of the sulphate or carbonate of the metal whose chlorate is desired. For instance, in order to make 'chlorate of copper,' 15·1 gr. of chlorate of barium being dissolved in hot distilled water, a boiling solution containing 12·5 gr. of pure crystallised sulphate of copper is to be added to it. Insoluble white 'sulphate of baryta' falls, while the solution, filtered and evaporated, yields the new chlorate in crystals. See FIRES, PYROTECHNY, &c.

[1] See 'Intellectual Observer,' April, 1868.

FLAN'NEL. It has been shown by the experiments of Count Rumford that the conducting power of the different materials employed for clothing varies considerably. A thermometer surrounded with cotton wool, and heated by immersion in boiling water, took 1046 seconds to lose 135° Fahr., when plunged into a bath of melting ice; but, under the same circumstances, when sheep's wool was employed, 1118 seconds elapsed before a like sinking of the thermometer took place ('Phil. Trans.,' 1792); thus showing the greater conducting power of the former, and consequently the superiority of the latter substance for the manufacture of warm clothing. But the chief advantage of wool, as an article of underclothing, depends less upon its actual power of conducting heat than its peculiar texture. Flannel acts as a gentle stimulus on the skin, and exercises the most beneficial action, by keeping the pores clean, and in a state most favorable to perspiration. This action is a species of friction similar in character, although inferior in degree, to that of the common flesh-brush or horse-hair glove, so long employed as a skin stimulant. Flannel has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed, but this is not the case with cotton and linen fabrics. The different effects of flannel and linen are particularly susceptible during brisk exercise. When the body is covered with the former, though perspiration be necessarily increased, the perspired matter

freely passes off through the flannel, and the skin remains dry and warm. If the same exercise be taken in linen shirts, perspiration, as in the former case, is indeed also increased, but the perspired matter, instead of being dispersed into the atmosphere, remains upon the linen, and not only clogs the pores of the skin, but gives a disagreeable sensation. From this property of flannel, persons who wear it next the skin seldom catch cold from changes of temperature, even though perspiring profusely; but in similar cases, when linen or calico shirts are worn, chilliness immediately comes on, followed by sniffling, sneezing, and cough, and all the other symptoms of severe catarrh.

The common objections raised against the use of flannel are founded on vulgar prejudices, ignorance, obstinacy, or bravado, and are undeserving of the notice of sensible people. In a fickle and moist climate like that of England, every person should wear a robe of flannel next the skin, or at all events a waistcoat of flannel reaching below the loins; and this should not be discarded as soon as the cold weather has passed, but its use should be continued all the year round; for in reality, flannel is, if possible, even more required in summer than in winter, because persons perspire more freely in hot than in cold weather, and are consequently more susceptible of cold, while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature and draughts of cold air, moisture, &c. Females, children, persons of delicate constitutions, and all others who from their habits of body or life perspire freely, or are much exposed, should wear flannel.

In washing flannels, it is recommended that they should only be put into warm water, by which method their colour will be preserved, and they will be prevented from shrinking.

FLASH. *Prep.* From burnt-sugar colouring, 1 gall.; fluid extract of capsicum or essence of Cayenne, ½ pint, or enough to give a strong fiery taste. Used to colour spirits, and to give them a false strength. It is made by the brewers' druggists, and labelled 'ISINGLASS AND BURNT SUGAR.'

FLASKS. The late lamented and ingenious Mr. Fownes suggested the employment of Florence oil-flasks as cheap substitutes for retorts, receivers, digesters, and some other vessels used for chemical purposes. His plan was to cut the neck smoothly round with a hot iron, and softening it in the flame of a good argand gas-lamp, to turn over the edge so as to form a lip, or border. The neck will then bear a tight-fitting cork without splitting.

FLAT'ULENCE. *Syn.* FLATULENCY, WIND. In pathology, a morbid collection of gas in the stomach and bowels. Its most common cause is indigestion. When the natural fluids of the stomach are secreted in a healthy state, they exercise an antiseptic and digestive action on the food, by which it is speedily reduced to a magma that is little liable to spontaneous change whilst in the body; but when the reverse is the case, fermentation soon commences, and the stomach and associated viscera become distended with gas, and all the well-known symptoms of flatulency are developed in rapid succession. The quantity of gas thus accumulated in the 'primæ viæ' is often enormous. An ordinary apple during fermentation yields about 600 times its bulk of gas, and many vegetables yield much more. (Dr. Hales.) It is, therefore, not at all surprising that so much inconvenience should be felt when the food, instead of being digested and assimilated, runs into the state of active fermentation.

The treatment of flatulency consists mainly in the selection of proper articles of food. Oleraceous vegetables, peas, beans, under-dressed potatoes, and indigestible fruits, should be especially avoided, as well as the use of large quantities of weak or warm liquids. The diet should consist principally of animal food, carefully but not over-cooked, with a sufficient quantity of good mealy potatoes (mashed, not whole), and good wheaten meal-bread, moderately seasoned with common salt and spices. The most suitable beverages are toast-and-water, and a little good brandy largely diluted with water. The healthy tone of the stomach may be re-established by the proper use of tonics, bitters, and mild aperients.

To relieve the fit of flatulency, carminatives and aromatics, as black pepper, mustard, peppermint, ginger, cinnamon, lavender, and most spices, may be had recourse to. A glass of peppermint cordial, or of brandy strongly flavoured with peppermint or ginger, is a popular and efficient remedy. A few drops (15 to 30) of ether, with a little tincture of capsicum or spirit of sal volatile, seldom fail to give relief. See DYSPEPSIA.

FLAVOURING SUBSTANCES. See ESSENCE, OIL (Volatile), SPICE, WINE, &c.

FLAX. See LINEN, LINSEED, and OIL.

FLEA. This troublesome little animal is the *Pulex irritans* of Linnæus, and belongs to the *Suctoria*, or fourth order of the *Insecta*. Its favorite haunts are our warm underclothing, and its most productive breeding-places are in the 'flue' which careless servants allow to accumulate underneath our beds. Cold, light, perfumes, and ventilation, are inimical to its propagation.

FLESH. *Syn.* CARO, L. The muscular substances of animals; the softer, solid portions of the body, as distinguished from the bones and fluids. See FIBRIN, FOOD, &c.

Flesh-brush. This simple instrument is used for exciting the cutaneous circulation. Those which have the bristles set on a leather back are esteemed the best. The flesh-glove or hair flesh-rubber is a useful modification of the

common flesh-brush. Those manufactured by Messrs. Savory and Moore, in imitation of the Indian kheesah or mitten, are superior to all others. In the absence of both flesh-brush and glove, a rough towel wound round the hand is no bad substitute. See FRICTION.

FLIES. See FLY.

FLIP. See EGG FLIP.

FLOUN'DER. A flat fish, very like the plaice, but smaller, and of more obscure colour. It is very common about the British coast, and is found in the Northern, Baltic, and Mediterranean seas. Its flesh is very wholesome.

FLOUR *Syn.* FARINA, L. The finely ground and 'dressed' meal of bread corn, and of the seeds of some of the leguminosæ. That known specifically as 'flour' in this country is obtained from spring varieties of *Triticum vulgare* (the common wheat).

Var., &c. Of varieties of flour there are several, depending chiefly on the amount of bran which they contain, and the relative fineness of the sieves through which they are passed:—

FINE WHEAT FLOUR, PASTRY FLOUR; FARINA, F. TRITICI, F. SEMINIS TRITICI. The finest flour, obtained from the meal produced in the first grinding of wheat between sharp stones, by means of a sieve of 64 wires to the inch. *Used* for pastry.

MIDDLINGS. The remainder of the flour of the first grinding, obtained by means of a slightly coarser sieve. *Used* for making household bread, but is mostly reground for the next variety.

SECONDS. The finest part of the flour, obtained by regrinding 'middlings' between blunt stones. *Used* by the bakers for their finest wheaten bread.

POLLARD. The coarse flour, from which the seconds has been sifted. *Used* for making sea biscuits and gingerbread, and to fatten poultry and hogs.

COUNTRY HOUSEHOLD FLOUR. This is usually ground only once, and sifted to $\frac{4}{5}$ths of the weight of the wheat.

AMMUNITION FLOUR is ground and sifted to nearly $\frac{5}{6}$ths the weight of the wheat.

According to Mr. Accum, thirty-two pecks of wheat in the London mills yield, of flour 38½ parts; pollard, 8 parts; and bran (*furfur tritici*), 12 parts; the bulk of the wheat being doubled by grinding.

According to Mr. Hard, miller, of Dartford, quoted by Dr. Pereira, the wheat having been ground in the usual way, is allowed to remain in the state of meal for some time before 'dressing,' which removes the heat caused by the process, and enables the miller to obtain more flour, and the baker a better quality, than if 'dressed' immediately it is ground.

"The process of dressing is by a wire cylinder containing a certain number of sheets of different texture or fineness, which cylinder contains eight hair brushes attached to a spindle passing through the centre of the cylinder, and laid out so as to gently touch the wire. This cylinder is fed by a 'shoe' with the meal; then the 'flour' and 'offal,' after passing through the wire in this way, are divided by wooden partitions fixed close to the outside of the cylinder." "The produce of the wheat-meal dressed through the wire machine consists of—1, Flour;—2, White Stuff, or Boxings, or Sharps;—3, Fine Pollard;—4, Coarse Pollard, or Horse Pollard;—5, Bran. The 2nd product (*i. e.* the white stuff) is then submitted to another 'dressing' through a fine cloth machine, and produces—1, Fine Middlings, for biscuits;—2, Toppings, or Specks;—3, Dustings;—4, Best Pollard, Turkey Middlings, or Coarse Middlings."

TABLE *of the Produce of One Quarter of Wheat* (=504 lbs.) By Mr. HARD.

Flour	392 lbs.
Biscuit or fine middlings	10 „
Toppings or specks	8 „
Best pollard, Turkey p., or twenty-penny	15 „
Fine pollard	18 „
Bran and coarse pollard	50 „
Loss by evaporation and waste	11 „
	504 „

Comp. According to Vauquelin, French wheat flour contains about 10% of water, 11% of gluten, 71% of starch, 5% of sugar, and 3% of gum; and the water of the dough amounts to about 50%. The quantity of the bran in wheat ranges under 2%.

Pur. This article of food is very frequently adulterated both by the miller and the baker, as has been before alluded to in the article on bread. The principal physical characteristics of wheat flour of good quality are the following:—it has a dull white colour, somewhat inclining to yellow;—it exhibits no trace of bran, even when pressed smooth with the hand, or with a polished surface;—its cohesiveness is so great, that on being squeezed in the hand, the lump is some time before it loses its shape;—it has a homogeneous appearance, and does not lose more than from 6% to 12% by being carefully dried in a stove. The smaller the loss in this way the finer is the quality, other matters being equal, and the more economical in use. (See *below*.)

Tests. 1. Solution of ammonia turns pure wheat flour yellow; but if any other corn has been ground with it, pale brown; or if peas or beans have been ground with it, a still darker brown.

2. Solution of potassa, containing about 12% of caustic alkali, dissolves pure wheat-flour almost completely; but when it is adulterated with the flour of the leguminous seeds (beans, peas, &c.), the cellulose of these substances

remains undissolved, and its hexagonal tissue is readily identified under the microscope. Mineral substances (chalk, plaster of Paris, bone dust, &c.) are also insoluble in this test, and appear as a heavy white sediment.

3. Boiling water poured on the sample causes the evolution of the peculiar odour of pea or bean flour when these substances are present. Bread made with such flour evolves a like odour on being toasted.

4. Pure hydrochloric acid poured on potato flour, or on wheat flour adulterated with it, develops a smell of rushes; it also dissolves starch, but changes the colour of pure wheat-flour to a deep violet.

5. Nitric acid turns wheat flour of an orange-yellow colour, but forms a stiff and tenacious jelly with potato fecula, the colour of which it does not alter.

6. A portion of the suspected sample submitted to dry distillation in a stoneware retort, and the distillate collected in a receiver containing a little water, the latter is found to remain perfectly neutral if the wheat flour is pure, but acquires a distinctly alkaline reaction when beans, pulse, or pea meal is present. (Rodrigues.)

7. Triturate 300 grs. of the sample with an equal weight of clean siliceous sand, and after five minutes form a homogeneous paste with water; afterwards further adding more water, until about 2 fl. oz. have been used. The filtered liquid, treated with an equal quantity of a strong and pure aqueous solution of iodine, develops a pink colour, which gradually disappears, when the specimen examined consists of pure wheat flour; but assumes a deep-purple colour, which disappears much more slowly, if the flour is adulterated with even 10% of fecula or potato flour. This test succeeds, not only with flour and meal, but also with macaroni, vermicelli, &c. (M. Chevallier.)

8. The milky liquid holding the starch in suspension (see Anal., next col.) is poured into a small conical glass, and left at rest for some time; the clear liquid is then decanted, and any remaining water carefully sucked up with a pipette, and the whole left for some time, in order that the deposit may harden. The upper gray layer is next removed with a teaspoon, and the harder and stiffer second layer left undisturbed until it becomes quite solid by digestion. When in this state, it may be upset on a chemist's slab in the form of a cone, upon a lump of dry plaster. The fecula or potato starch (if any is present), being heavier than that of wheat, forms the apex of the cone, and its quantity may be estimated in the following manner:—The operator cuts from the apex of the little cone above mentioned a slice, which he triturates only for a short time in an agate mortar (one of glass, or porcelain, or wedgwood-ware, will not do), and he tests that with aqueous solution of iodine. If it turns blue, it is fecula. Another slice is treated in the same manner, until the operator comes to the wheat starch, which, in the present instance, is not affected by the aqueous solution of iodine. This difference of behaviour of the two species of starch with iodine is due to the friction of the pestle and mortar, which is sufficient to divide or tear the envelopes of the particles of the potato starch, which then become blue when treated by solution of iodine. The particles of wheat starch, on the contrary, are not disaggregated by that treatment, and being therefore protected by their envelope, are not acted upon by the solution of iodine, or, at most, assume only a brown tinge. (M. Robine.)

9. Wheat flour adulterated with plaster of Paris, ground bones, chalk, and potato flour, has a higher specific gravity than a sample of the pure flour. This may be readily ascertained by any person, by filling a small vessel with some pure flour, and then with the given sample. "A vessel which will contain 1 lb. of wheat flour will contain 1½ lb. of fecula" (potato flour), and hence "the proportion of this adulteration may be easily estimated." (Ure.)

10. If to a sample of wheat flour is added a solution of potassa, containing about 1¾% of the pure alkali, the granules of potato farina, or of bean meal, or pea meal, present (if any), will acquire 4 or 5 times their original volume, whilst those of the pure wheat starch will be scarcely affected by it. This change is very perceptible under a microscope of small power. 2 parts of liquor of potassa (Ph. L.) and 5 parts of distilled water form a mixture that answers for the above purpose.

11. By means of the microscope the admixture of the cheaper feculas and meals with wheat flour is readily detected by the characteristic appearance of the starch grains; and when the adulteration exceeds 9% or 10%, its extent may be readily estimated with considerable accuracy. As the range of adulteration is generally from 12% to 27%, this method is applicable in the greater number of cases.[1]

Analysis. The value of wheat flour as an aliment depends upon the quantity of gluten, sugar, starch, and phosphate of lime, which it contains; and its superiority over the flour of the grains of the other cereals is referred to its containing a larger proportion of the first and last of these substances than they do. The quantitative analysis of flour is very simple, and may be easily made by persons unacquainted with chemistry, by attending to the instructions below:—

a. Make 1000 grs. of the sample into a dough with a little water, let it rest an hour, and then gently knead it in successive waters, until the starchy particles are perfectly removed. Collect the portion (GLUTEN) left in the hand, drain off the water, place it on a piece of filtering or blotting paper, several times doubled, and set it aside.

[1] See also BREAD *Adult.* and *Exam.*

b. Mix the several waters employed in the preceding process, and set them aside in a tall vessel, to deposit the suspended portion (STARCH). After a sufficient time pour off the clear liquid, and throw the whole of the sediment on a weighed paper filter, placed in a funnel, observing to remove the portion adhering to the bottom of the vessel by means of a little clean water, that none may be lost.

c. Evaporate the decanted liquid, as well as what runs from the filter, until it becomes curdy, then filter it through a piece of weighed blotting paper, and preserve the sediment (ALBUMEN); next evaporate the residuum to the consistence of a syrup, agitate it with 10 times its weight of alcohol, and filter, observing to wash the paper filter clean with a little alcohol after the solution has passed through it. The substance on the paper is PHOSPHATE OF LIME and GUM, and must be set aside. By subsequent digestion in water, filtration, and evaporation, the two may be obtained separately.

d. Evaporate or distil off the spirit from the solution and washings, as above; the residuum is SUGAR.

e. Dry the substances educed as above, by a gentle heat, and weigh them. The weight of the albumen may be taken with that of the gluten, as it possesses about the same nutritive value, and also because it has been asserted by some persons that the former substance is in reality gluten, and not albumen. By dividing the given weights by 10, the per-centage value of the sample is obtained. The pieces of filtering paper employed should be carefully dried and weighed before using them, and the same degree of heat should be employed for this purpose as that to which they will be afterwards exposed in the drying of the substances resulting from the operations.

Obs. The above method of ascertaining the actual value of any sample of flour as an article of food, though not strictly accurate, approximates sufficiently to the truth for all practical purposes, and is well adapted to the wants of the baker and large purchaser. In many cases it will only be necessary to perform the first part of the process (*a*), which will give the per-centage of the most important constituent of the flour; the rest being of minor consequence.

In addition to what has been already stated in the article on BREAD, it may be useful to mention, that a pound of the best flour, from thoroughly dried wheat, will take 10 fl. oz. of water to form it into ordinary dough, or 9 fl. oz. to form it into bread dough. Under the old parliamentary acts, a sack of flour (280 lbs.) was presumed to produce 80 loaves (quartern or quarter-peck), the weight of which, within 48 hours after being baked, was to be 4 lbs. 5½ oz. each. At the present time fully 92 loaves, weighing 4 lbs. each, are produced by the London bakers from one sack of flour, when honest weight is given; but as the latter is rarely the case, and the bread is frequently 'slack' or 'under-baked,' and thus contains more water than good bread ought to do, a much larger product is commonly obtained. The dough loses about ⅓th of its weight in baking, if in batches; but fully ⅓th, if baked in small loaves, and placed in the oven separately. The best bread contains about 1⅓ths of its weight of added water; and common bread, often much more than ¼th. The proportion of water in the London bread has greatly increased during the last few years, owing to the introduction of the fraudulent plan of making the dough with rice jelly or moss jelly. This is the reason why the bread of some bakers suffers such a loss of weight in a few hours after being taken from the oven. A 4 lbs. loaf of bread purchased from a baker at Lambeth, after remaining on the sideboard of a sitting-room for 24 hours, was found to have lost no less than 6½ oz. by evaporation, and in two days longer its interior cells were covered with green mould, and the whole was unfit for food. The bakers, aware of these facts, are particularly careful not to bake more bread than they can dispose of whilst 'new,' and are in the habit of refusing to weigh their bread before selling it, when it is more than 10 or 12 hours old, although they are liable to be 'fined' for such a refusal. See BREAD, CAKES, FARINA, &c., also *below*.

Flour, Baked. *Syn.* FARINA TOSTA, F. TRITICI TOSTA, L. *Prep.* From wheat flour, carefully baked in a 'slack' oven, until it acquires a pale-buff hue. Astringent; used to make food for infants troubled with diarrhœa. See FARINA.

Flour, Barley (Prepared). *Syn.* FARINA HORDEI PREPARATA, L. *Prep.* (Ph. Bor.) From barley flour, compressed into a tin cylinder until the vessel is 2-3rds full, which is then suspended at the upper part of a still 2-3rds filled with water, and after the 'head' is fitted on, the water is kept boiling for 30 hours (2 days of 15 hours each). Lastly, the upper layer being removed, the rest is reduced to powder, and kept in a dry place.

Flour, Boiled. *Syn.* TRITICINA, FARINA PREPARATA, L. *Prep.* From fine flour, tied up in a linen cloth as tight as possible, and after it has been frequently dipped into cold water, the outside of the cloth is covered over with flour, until a crust is formed around it, to prevent the water soaking in, and then boiled for a long time, and when cold, it is divided into small oblong pieces. For *use*, it is reduced to powder, either by grinding or grating it, and is then prepared like arrow-root. It forms a good diet for children, in diarrhœa, &c.; and as it may be easily prepared at home, it has the advantage of being free from adulteration.

Flour, Jones's Patent. *Prep.* From kiln-dried flour, 1 cwt.; tartaric acid, 10½ oz.; mix thoroughly; after 2 or 3 days, add, of bicar-

bonate of soda, 12 oz.; lump sugar, ½ lb.; common salt, 1½ lb.; mix, and pass the compound through the 'dressing-machine.' It is necessary that the whole of the ingredients should be perfectly dry, and separately reduced to fine powder before adding them to the flour. By simply mixing it with cold water, and at once baking it, it produces light, porous bread.

Obs. We have already had occasion to pay a passing tribute to the excellence and usefulness of Jones's Patent Flour.[1] It is, indeed, invaluable in every household, as furnishing the means of producing, with great economy, and extemporaneously, not merely cakes, puddings, pastry, and fancy bread, but the 'staff of life' itself, household bread, of a purity, flavour, and lightness, seldom, if ever, met with in that purchased of the bakers.

Flour, Sewell's Patent.—*a.* (No. 1.) Flour, 1 sack (280 lbs.); hydrochloric acid (sp. gr. 1·14), 45 oz.; mix, by adding the acid in a 'spray.'—*b.* (No. 2.) To the last, add (expertly) bicarbonate of soda, 39 oz.; mix thoroughly, and pass the whole through a sieve or 'dressing machine.'

Obs. This flour is used as the last, to which, however, it is inferior in quality. No. 1 will keep 5 weeks. No. 2 will keep a month. Jones's flour will keep good in a dry place for years. If No. 1 is alone employed for the dongh, to each pound of the flour, 63 grs. of bicarbonate of soda, with salt, q. s., must be added. The patentee claims for his invention the merit of the soda and acid being converted into culinary salt in the process of mixing up the flour and baking the dough.[1]

FLOWERS. *Syn.* FLORES, L. These beautiful and fragrant ornaments of our gardens and our dwellings are too highly esteemed by all classes of the community to require anything in favour of their cultivation to be said here. Our remarks will, therefore, chiefly refer to their collection, improvement, and preservation.

'Full' or 'double flowers,' or those in which the internal organs become petals, are so much more beautiful than the 'single flowers' of the corresponding species and varieties, that their production, with tolerable ease and certainty, has long been a desideratum with both the professional and amateur florist. Various plans have been proposed having this object in view, among which are the following:—1. The use of the best seed only, but not before it is at least 3 or 4 years old.—2. The selection of the outer row of seed only, and its careful preservation intact for at least 2 seasons before sowing it. We are assured that this method is particularly successful with dahlias.—3. The removal of the plants to a shady situation as soon as the flower-buds begin to develop themselves, and stinting them with water and nourishment for a few weeks. In this method a few only of the buds are permitted to mature; the rest being snipped off with a pair of scissors as early as possible.—4. The use of small pots and a scanty supply of water until the flowers are partly developed, when water is supplied in abundance, with or without the addition of a little liquid manure.

To hasten the 'blooming' of flowers, it is a common practice with the gardeners to grow them in as small pots as is consistent with their healthy existence, and carefully to avoid transplanting them to larger pots, for several weeks before their usual time of blossoming. A plant on the point of flowering, if transferred to a larger pot and a richer soil, immediately commences making roots and leaves, whilst the embryo flowers either wholly decay, or their development is checked until the usual season of their production has passed over.

The following liquid has been used with great advantage to promote the vigorous growth and the early flowering of plants:—Sulphate or nitrate of ammonia, 4 oz.; nitrate of potassa, 2 oz.; sugar, 1 oz.; hot water, 1 pint; dissolve and keep it in a well-corked bottle. For *use*, put 8 or 10 drops of this liquid into the water of a hyacinth glass or jar, for bulbous-rooted plants, changing the water every 10 or 12 days. For flowering plants in pots, a few drops must be added to the water employed for them. The preference should be given to rain water for this purpose. The fluid sold under the name of liquid guano may be used in the same manner.

Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. When growing on the parent stem, the large amount of evaporation from the surface of their leaves is compensated for by an equivalent proportion of moisture supplied by the roots; but when they are plucked, the evaporation from the surface continues, while the supply of moisture is cut off. To supply, in part, this loss of moisture by evaporation, has arisen the almost universal practice of placing flowers in water; but their mutilated stems possess a far inferior power of sucking up fluids to that of the roots, and thus their decay is only deferred for a time. To preserve them more effectually, or at least to render their existence less ephemeral, we may surround them with a moist atmosphere, by which the loss of water from the surface of their leaves will be reduced to the smallest possible amount. "It is now eighteen years ago since we first saw, in the drawing-room of a gentleman, in the hot dry weather of the dog-days, flowers preserved day after day in all their freshness by the following simple contrivance:—A flat dish of porcelain had water poured into it. In the water a vase of flowers was set; over the whole a bell-glass was placed, with its rim in the water. This was a 'Ward's case' in principle, although different in its construction. The air that surrounded the flowers being confined beneath the bell-glass, was kept constantly moist with the water that rose into

[1] See UNFERMENTED BREAD.

it in the form of vapour. As fast as the water was condensed it ran down the sides of the bell-glass back into the dish; and if means had been taken to inclose the water on the outside of the bell-glass, so as to prevent its evaporating into the air of the sitting-room, the atmosphere around the flowers would have remained continually damp. We recommend those who love to see plenty of fresh flowers in their sitting-rooms in dry weather to adopt this method. The experiment can be tried by inverting a tumbler over a rose-bud in a saucer of water." ('Gardener's Chron.')

Another method by which some flowers may be preserved for many months is to carefully dip them, as soon as gathered, in perfectly limpid gum water, and after allowing them to drain for 2 or 3 minutes, to set them upright, or arrange them in the usual manner in an empty vase. The gum gradually forms a transparent coating on the surface of the petals and stems, and preserves their figure and colour long after they have become dry and crisp.

Faded flowers may be generally more or less restored by immersing them half-way up their stems in very hot water, and allowing them to remain in it until it cools, or they have recovered. The coddled portion of the stems must then be cut off, and the flowers placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds, on which it proves useless.

Flowers may be produced in winter by taking up the plants, trees, or shrubs, in the spring, at the time when they are about to bud, with some of their own soil carefully preserved around the roots, and placing them upright in a cellar till Michaelmas; when, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hot-house, when they must be treated in the usual manner. By this method, in the month of February, fruits or roses will appear. Flowers sown in pots about Michaelmas may thus be made to bloom at Christmas.

The apparently instantaneous flowering of plants, exhibited a few years ago by M. Herbert to an astonished audience, was, we believe, effected by the heat generated by fragments of quicklime concealed in the mould close to, but not in immediate contact with, the roots. The plants selected by M. Herbert—a group of geraniums and a rose tree—were planted in two rather deep boxes of garden mould, and were covered with glass shades. The operator commenced by pouring over the roots, from a small watering-pot, a liquid which, uniting to the ingredients already in the earth, caused a great heat, as was shown by an intense steam or vapour, which was evolved within the shades, and allowed, to some extent, to escape through a small hole in the top, which at first was kept closed. The effect upon the geraniums was certainly almost instantaneous: the buds beginning to burst in about five or six minutes, and the plants being in full bloom within ten minutes, when the blossoms were gathered by M. Herbert, and distributed amongst the ladies present. With the rose tree the exhibitor was less fortunate. The invention may prove useful where ladies require to decorate their drawing-rooms or boudoirs with the beauties of the floral world somewhat earlier in the season than they can otherwise be obtained. It must not, however, be forgotten that the plants are, as it were, parboiled during the process, and die after a few days.

The collection and preservation of flowers for medicinal purposes and distillation, will be found noticed under VEGETABLE SUBSTANCES.

Flowers, Artificial. The beauty and value of these pleasing articles of personal decoration mainly depend upon the taste and ingenuity of the maker. The delicate fingers of woman, and her ready powers of imitation and invention, combined with her natural affection for the chaste and beautiful, have enabled her the more especially to excel in this manufacture. The productions of the female artificial florists of the French capital are justly admired everywhere.

The French employ velvet, kid, and fine cambric for the petals, and taffeta for the leaves. Very recently thin plates of bleached whalebone have been used with great success for some portions of artificial flowers.

As colours and stains, the following are employed in Paris:—

BLUE. Indigo dissolved in oil of vitriol, and the acid partly neutralised with salt of tartar or whiting.

GREEN. A solution of distilled verdigris.

LILAC. Liquid archil.

RED. Carmine dissolved in a solution of salt of tartar, or in spirits of hartshorn.

VIOLET. Liquid archil, mixed with a little salt of tartar.

YELLOW. Tincture of turmeric.

The above colours are usually applied to the petals with the finger.

FLOWERS. *Syn.* FLORES, L. Among chemists, this term is applied to various pulverulent substances obtained by sublimation, as flowers of antimony, benzoin, zinc, sulphur, &c. The term has been discarded from modern chemical nomenclature, but is still commonly employed in familiar language and trade.

FLUID CAMPHOR. *Prep.* (Sir J. Murray.) From camphor (in powder), 1 dr.; freshly precipitated carbonate of magnesia, 2 drs.; cold distilled water, 1 pint; the solution is effected by forcing in carbonic acid gas under pressure. Each fl. oz. contains 3 grs. of camphor, and 6 grs. of carbonate of magnesia. See ESSENCE OF CAMPHOR.

FLUID MAGNE'SIA. *Syn.* LIQUOR MAGNESIÆ CARBONATIS, L. M. BICARBONATIS, L. The preparations sold under this name are

mere solutions of freshly precipitated carbonate of magnesia in water, formed by means of carbonic acid gas, under powerful pressure, and long agitation. Those best known are Sir J. Murray's and Mr. Dinneford's, each fl. oz. of which are said to contain about 17½ grs. of the carbonate, but their actual richness in the latter seldom exceeds 10 or 12 grs., and by the time they reach the consumer is often as low as 5 or 6 grs. Recently precipitated carbonate of magnesia placed in a bottle or other suitable vessel, which is then filled by means of a soda-water apparatus with water fully charged with carbonic acid gas, readily dissolves on slight and cautious agitation, and the aerated water becomes saturated with magnesia. A scruple of carbonate of magnesia put into a soda-water bottle, and thus treated, is all taken up in from 20 minutes to half an hour, and the beverage continues beautifully clear.

FLUM'MERY. A species of thick hasty-pudding made with oatmeal or rice, flavoured with milk, cream, almonds, orange flowers, lemons, &c., according to fancy.

Prep. 1. (DUTCH FLUMMERY.) From blancmange and eggs, flavoured with lemon peel and sweetened with sugar.

2. (FRENCH FLUMMERY.) From equal parts of blancmange and cream, sweetened, and flavoured. The above are poured into forms, and served cold, to eat with wine, spirit, cider, &c.

3. (A. T. Thomson.) Take oatmeal or groats, 1 quart; rub it for a considerable time with hot water, 2 quarts; and let the mixture stand until it becomes sour; then add another quart of hot water, and strain through a hair sieve. Let stand till a white sediment is deposited, decant the fluid portion, and wash the sediment with cold water. This is now to be boiled with fresh water, until it forms a mucilage, stirring the whole time. A light and nutritious food, during early convalescence.

FLUOHYDRIC ACID. See FLUORIDE OF HYDROGEN.

FLU'ORIDE OF HYDROGEN. HF. *Syn.* FLUOHYDRIC ACID; HYDROFLUORIC ACID; A. HYDROFLUORICUM, L. An acid composed of hydrogen and fluorine. It was discovered by Scheele, but was first obtained in a pure state by Gay-Lussac and Thénard, in 1810.

Prep. Pour concentrated sulphuric acid on half its weight of fluor spar, carefully separated from siliceous earth, and reduced to fine powder. The mixture must be made in a capacious leaden retort, and a gentle heat only applied, and the evolved gas must be collected in a leaden receiver, surrounded by ice.

Prop., &c. A colourless fluid below 59° Fahr., which speedily evaporates in dense white fumes when exposed to the air. Its affinity for water exceeds that of sulphuric acid, and its combination with that fluid is accompanied with a hissing noise, and a considerable increase of its sp. gr. up to a certain point. It attacks glass and silica, for which reason it cannot be preserved in glass vessels. Bottles of lead, silver, platinum, or pure gutta percha, are used to keep it in. It is highly corrosive, instantaneously destroying the skin on contact, and producing deep and serious ulcerations; its vapour is pungent, irritating, irrespirable, and poisonous. With the bases it unites to form FLUORIDES.

In the arts, hydrofluoric acid is used for etching on glass.

FLU'ORIDES. Compounds of fluorine with metals and other basic radicals. The fluorides of the metals are, with the exception of those of the alkaline metals, insoluble in water, while the fluorides of hydrogen, boron, and silicon, are gaseous, condensing at a low temperature to volatile liquids.

FLU'ORINE. F. *Syn.* FLUORINIUM, L. An element that has not yet been isolated, owing to its attacking and combining with every element or compound that at present has been exposed to it, except oxygen. It is presumably gaseous, and of a pale greenish-yellow colour.

FLU'OSILICIC ACID. *Syn.* FLUORIDE OF SILICON AND HYDROGEN; HYDROFLUOSILIC ACID. *Prep.* From powdered fluor spar, and siliceous sand or powdered glass, of each, 1 part; concentrated sulphuric acid, 2 parts; mix in a glass retort, apply a gentle heat, and pass the evolved gas into water through a layer of mercury. Decomposition ensues, silica being deposited in a gelatinous state, and hydrofluosilicic acid or fluosilic acid remains in solution. The acid liquor is used as a test for potassium and barium, with whose salts it yields nearly insoluble precipitates.

FLUX. *Syn.* FLUXUS, FLUOR, L. In medicine, a term formerly applied to several diseases attended with a copious discharge, as diarrhœa (FLUX), dysentery (BLOODY FLUX), English cholera (BILIOUS FLUX), fluor albus (WHITE FLUX), &c. These terms are still current among the vulgar.

Flux. In metallurgy, &c., a term applied to various substances of easy fusibility, which are added to others which are more refractory, to promote their fusion.

Prep. 1. (BLACK FLUX.) Nitre, 1 part; crude tartar or cream of tartar, 2 parts; mix, and deflagrate, by small quantities at a time, in a crucible, heated to dull redness. The product consists of carbonate of potassa, mixed with charcoal in a finely divided state. *Used* for smelting metallic ores. It exercises a reducing action, as well as promotes the fusion. It must be kept in a dry corked bottle.

2. (CHRISTISON'S FLUX.) Carbonate of soda (cryst.), 8 parts; charcoal (in fine powder), 1 part; heat the mixture gradually to redness. For reducing arsenic.

3. (CORNISH REDUCING FLUX.) Crude tartar, 10 parts; nitre, 4 parts; borax, 3 parts; triturate together.

4. (CORNISH REFINING FLUX, WHITE

FLUX.) Crude tartar and nitre, equal parts, deflagrated together. See BLACK FLUX.

5. (CRUDE FLUX.) Same as BLACK FLUX, omitting the deflagration. Reducing.

6. (FRESENIUS'S FLUX.) Carbonate of potassa (dry), 3 parts; cyanide of potassium, 1 part. For the arsenical compounds.

7. (LIEBIG'S FLUX.) Carbonate of soda (dry) and cyanide of potassium, equal parts. As the last. See ARSENIOUS ACID.

1. (MORVEAU'S REDUCING FLUX.) Powdered glass (free from lead), 8 parts; calcined borax and charcoal, of each, 1 part; all in fine powder, and triturated well together. *Used* as BLACK FLUX.

9. (WHITE FLUX.) See *above*.

10. (FLUXES FOR ENAMELS.) See ENAMELS.

11. (Various.) Borax, tartar, nitre, sal-ammoniac, common salt, limestone, glass, fluor spar, and several other substances, are used as fluxes in *metallurgy*.

Obs. On the large scale, crude tartar is employed in the preparation of fluxes; on the small scale, commercial cream of tartar or bitartrate of potassa.

FLY. The common house-fly (*Musca domestica*) causes considerable annoyance to the person in hot weather, as well as damage to handsome furniture, especially to picture frames, gilding, and the like. The best way to exterminate them is to expose on a plate one or other of the mixtures given under FLY POISON (*below*). The blow-fly (*Musca vomitoria*), and other insects, may be kept from attacking meat by dusting it over with black pepper, powdered ginger, or any other spice, or by skewering a piece of paper to it on which a drop or two of creasote has been poured. The spices may be readily washed off with water before dressing the meat.

It is a fact not generally known, that flies will not pass through a netting made of fine silk, thread, or wire, even though the meshes may be an inch apart, unless there is a window or light behind it. This affords us a ready means of excluding these insects from all our apartments which have windows only on one side of them, without keeping the latter closed. It is merely necessary to have an ornamental netting stretched across the opening, when, although flies may abound on the outside, none will venture into the room so protected. If, however, there is a window on the other side of the room, they will fly through the netting immediately. See *below*.

Fly Papers. Those papers which, a few years ago, were sold about the streets of London by harsh-voiced cries of "Catch 'em alive-o!" and which might be seen in many shop-windows covered with dead and dying flies, were prepared by rubbing factitious bird-lime over sheets of paper. It would be difficult to conceive a more cruel or more offensive mode of catching flies than that of glueing their living bodies to an adhesive surface. A preferable kind of fly-paper is that called 'PAPIER MOURE,' which contains a large quantity of arsenic in its substance. This paper is kept wet when in use, and the flies, by sipping the moisture, are poisoned.

Fly Poison. *Prep.* 1. A strong solution of white arsenic (say 1 dr. to the pint), sweetened with moist sugar, treacle, or honey. Sold under the name of 'FLY WATER.'

2. Treacle, honey, or moist sugar, mixed with about $\frac{1}{12}$th their weight of King's yellow or orpiment.

Obs. Both the above are dangerous preparations, and should never be employed where there are children.

3. (Redwood.) Quassia chips (small), $\frac{1}{4}$ oz.; water, 1 pint; boil 10 minutes, strain, and add of treacle, 4 oz. "Flies will drink this with avidity, and are soon destroyed by it."

4. Black pepper, 1 teaspoonful; brown sugar, 2 teaspoonfuls; cream, 4 teaspoonfuls. See *below*.

Fly Powder. The dark gray-coloured powder (so-called 'sub-oxide') obtained by the free exposure of metallic arsenic to the air. Mixed with sweets, it is used to kill flies.

Fly Water. See FLY POISON (*above*).

FOILS. These are thin leaves of polished metal, placed under precious stones and pastes, to heighten their brilliancy, or to vary the effect. Foils were formerly made of copper, tinned copper, tin, and silvered copper, but the last is the one wholly used for superior work at the present day.

Foils are of two descriptions:—white, for diamonds and mock diamonds, and—coloured, for the coloured gems. The latter are prepared by varnishing or lacquering the former. By their judicious use the colour of a stone may often be modified and improved. Thus, by placing a yellow foil under a green stone that turns too much on the blue, or a red one under a stone turning too much on the crimson, the hues will be brightened and enriched in proportion.

Prep. 1. (CRYSTAL, DIAMOND, or WHITE FOIL.)—*a.* This is made by coating a plate of copper with a layer of silver, and then rolling it into sheets in the flatting mill. The foil is then highly polished, or covered with crystal varnish.

b. The inside of the socket in which the stone or paste is to be set is covered with tin foil, by means of a little stiff gum or size; when dry, the surface is polished and the socket heated, and whilst it is warm, filled with quicksilver; after repose for two or three minutes, the fluid metal is poured out, and the stone gently fitted in its place; lastly, the work is well-fitted round the stone, to prevent the alloy being shaken out.

c. The bottom of the stone is coated with a film of real silver, by precipitating it from a solution of the nitrate in spirit of ammonia, by means of the oils of cassia and cloves.[1] This method vastly increases the brilliancy both of

[1] See SILVERING.

real and factitious gems, and the work is very permanent.

2. (COLOURED FOILS.) The following formulæ produce beautiful coloured effects, when judiciously employed:—

a. (Amethyst.) Lake and Prussian blue, finely ground in pale drying oil.

b. (Blue.) Prussian blue (preferably Turnbull's), ground with pale, quick-drying oil. *Used* to deepen the colour of sapphires.

c. (Eagle marine.) Verdigris tempered in shell-lac varnish (alcoholic), with a little Prussian blue.

d. (Garnet.) Dragon's blood dissolved in rectified spirit of wine.

e. (Vinegar garnet.) Orange lake finely tempered with shellac varnish.

f. (Green.)—*α.* From pale shell-lac, dissolved in alcohol (lacquer), and tinged green by dissolving verdigris or acetate of copper in it.

β. From sesquiferrocyanide of iron and bichromate of potassa, of each, ½ oz.; ground to an impalpable powder, first alone, and then with gum mastic (clean and also in fine powder), 2 oz.; a little pyroxilic spirit is next added, gradually, and the whole again ground until the mass becomes homogeneous and of a fine transparent green. The beauty increases with the length of the grinding. The predominance of the bichromate turns it on the yellowish green; that of the salt of iron, on the bluish green. For use it is to be thinned with pyroxilic spirit. ('Chem.,' iii, 231.) *Used* for emeralds.

g. (Red.) Carmine, dissolved in spirit of hartshorn, or in a weak solution of salt of tartar, and a little gum (dissolved) added.

h. (Ruby.)—*α.* From lake or carmine, ground in isinglass.

β. Lake ground in shell-lac varnish. Both are used when the colour turns on the purple.

γ. From bright lake ground in oil. *Used* when the colour turns on the scarlet or orange.

i. (Yellow.)—*α.* Various shades of yellow may be produced by tinging a weak alcoholic solution of shell-lac or mastic, by digesting turmeric, annotta, saffron, or socotrine aloes in it. The former is the brightest, and is used for topazes.

β. From hay saffron digested in 5 or 6 times its weight of boiling water until the latter becomes sufficiently coloured, and a little solution of gum or isinglass added to the filtered liquor. When dry, a coating of spirit varnish is applied.

Obs. By the skilful use of the above varnishes, good imitations of the gems may be cheaply made from transparent white glass or paste; and by applying them to foils set under coloured pastes (FACTITIOUS GEMS), a superior effect may be produced. The pigments employed must be reduced to the finest state possible by patient grinding, as without this precaution transparent and beautiful shades cannot be formed. The palest and cleanest mastic and lac, dissolved in alcohol, and also the palest and quickest drying oil should alone be used when these substances are ordered. In every case the colour must be laid on the foil with a broad soft brush; and the operation should be performed, if possible, at once, as no part should be crossed, or twice gone over, whilst wet. If the colour turns out too pale, a second coat may be given when the first one has become quite dry, but this practice should be avoided if possible.

FOMENTA'TION. *Syn.* FOMENTATIO, FOMENTUM, FOTUS, L. A liquid, either simple or medicated, used for local bathing. Fomentations are distinguished from lotions, chiefly in being applied in a heated state, and in larger quantities, and for a longer period at a time.

Fomentations are chiefly employed to allay pain or irritation, or to promote suppuration or the healthy action of the parts. As the intention is to convey heat, combined with moisture, to the part fomented, the utmost care must be taken to manage the application so as to promote the object in view as much as possible. Flannel cloths wrung out of the hot or boiling liquid, by means of two sticks, turned in opposite directions, form the best vehicles for fomentations. If they are shaken up, and laid lightly over the part, they involve a considerable quantity of air, which, being a bad conductor, retains the heat in them for a considerable time. "In every process of fomenting there should be two flannels, each (say) three yards long, with the ends sewed together, to admit of the boiling water being wrung out of them; and the one flannel should be got ready whilst the other is applied. The fineness or the coarseness of the flannel is not a matter of indifference. The coarser it is the less readily does it conduct heat, and the longer it retains its warmth; therefore it is more efficient for fomenting. White flannel also retains the heat longer than coloured flannel." (Dr. R. E. Griffith.) More harm than good is frequently done by allowing the patient to become chilled during the application. "If only one (flannel) is used, the skin becomes chilled during the time occupied in removing the flannel, soaking it in the water, wringing it out, and reapplying it; but if two are used, one of them is ready, and can be applied the moment the other is taken off, by which means the part is never exposed to the air, no matter how long the fomentation is continued. In some diseases (rheumatism, peritonitis, &c.), the patient is scarcely conscious of a degree of heat which scalds the nurse's hands. In this case the fomenting flannels should be put in a towel, by which means they may be wrung out without being handled by the nurse, and may be applied far hotter than can be done by any other method." (Dr. J. B. Nevins.)

The quantity of liquid forming a fomentation, as well as the size of the cloths employed,

must entirely depend upon circumstances. In some cases (as in slight affections of the face, &c.), the application may be effectually made by holding the part in the steam of the hot liquid, and bathing it continually by means of a sponge or cloth. In some instances ½ pint to a pint of liquid may be found a sufficient quantity; whilst in others, several quarts will be required. Under all circumstances, care must be taken to keep the fomentation as near as possible at the temperature ordered, during the whole time of its application; and, as soon as the operation is finished, to quickly wipe the part dry, and to cover it with ample clothing, in order that the reaction set up may not be prematurely checked.

Fomentations usually consist of simple water, or the decoction of some simple vegetable substance, as chamomiles, elder flowers, or mallows; but, occasionally, the leaves and flowers of aromatic and narcotic plants, and saline matter, are employed under this form. The following formulæ are given as examples:—

Fomentation, An'odyne. *Syn.* FOTUS ANODYNUS, FOMENTATIO ANODYNA, FOMENTUM ANODYNUM, L. *Prep.* 1. Simple decoction of poppy-heads.

2. (Hosp. F.) Poppy-heads (without the seeds), 1½ oz.; water, 3½ pints; boil to 2½ pints; add of elder flowers, ¾ oz.; boil to a quart, and strain. Used to allay pain.

3. (Pierquin.) Opium, 1 oz.; wine, 1 quart; boil to a pint and strain. Used in severe gouty, rheumatic, neuralgic, and syphilitic pains.

4. Opium, 1 oz.; water, 1 quart; boil to ¾ pint, add pyroligneous acid, 2 fl. oz.; boil for 10 minutes longer, then further add of sherry wine, ¾ pint; and as soon as the whole again boils, strain it for use. Superior to the last, and cheaper.

Fomentation, Antineural'gic. *Syn.* FOMENTATIO ANTINEURALGICA, L. *Prep.* 1. (Mialhe.) Acetate of morphia, 2 gr.; acetic acid, 2 or 3 drops; eau de Cologne, 2 or 3 dr.; dissolve. In facial neuralgia.

2. (Trousseau and Reveil,) Cyanide of potassium, 1 dr.; distilled water, 6 fl. oz.; dissolve, and keep it in a well-closed bottle in the dark. Used in neuralga, especially in that of the face (tic douloureux). A compress of lint or soft linen is dipped in it and applied to the part. It must not be used internally or applied to a wounded surface, as it is very poisonous. See ANODYNE FOMENTATIONS, NOS. 3 and 4 (above), also STIMULANT FOMENTATION.

Fomentation, Antiseptic. *Syn.* FOMENTATIO ANTISEPTICA, L. *Prep.* 1. Decoction of mallows, 4 pints; sal ammoniac, 2 oz.; dissolve, and add of disulphate of quinine, 20 gr., dissolved in camphorated spirit, 4 fl. oz.

2. (Hosp. F.) Decoction of bark, 1 quart; infusion of chamomile, 1 pint; camphorated spirit, 2 fl. oz.; hydrochloric acid, 1 fl. dr. Both are used when there is a tendency to gangrene or putrescence.

Fomentation of Ar'nica. *Syn.* FOMENTATIO ARNICÆ, L. *Prep.* 1. Flowers of arnica, 1 oz.; water, 3 pints; boil to a quart, and strain. *Used* in contusions.

2. (Graefe.) Flowers of arnica, 2 oz.; rue (leaves), 1 oz.; boiling water, q. s. to strain 12 fl. oz. of infusion after an hour's maceration at nearly the boiling temperature. *Used* in contusions and extravasations, especially as an application to black eyes.

3. (Radius.) Flowers of arnica, ½ oz.; boiling vinegar, q. s. to strain 6 fl. oz. of infusion, in which dissolve of carbonate of ammonia, 2 dr. *Used* in œdema of the scrotum.

Fomentation, Aromat'ic. *Syn.* FOMENTATIO AROMATICA, FOTUS AROMATICUS, L. *Prep.* 1. Sea wormwood, southernwood, and chamomiles, of each, 1 oz.; laurel leaves, ½ oz.; water, 5 pints; boil to ½ gall., and strain. In rheumatism, cutaneous affections, colic, &c.

2. (Augustin.) Rosemary, ½ oz.; red wine and water, of each, 3 fl. oz.; infuse and strain with expression. In contusions, especially black eyes.

3. (Hosp. F.) Cloves and mace, of each, 1 oz.; opium, 20 gr.; red wine (boiling), 1 pint; digest at near boiling for 1 hour, and strain. *Used* as both the last.

4. (Rideau.) Bay leaves, rosemary, southernwood, and wormwood, of each, 1 oz.; water, 2 quarts; boil 5 minutes, and strain. As No. 1.

Fomentation, Astrin'gent. *Syn.* FOTUS ASTRINGENS, F. ROBORANS, L. *Prep.* 1. Decoction of oak bark.

2. To each quart of the last, add of alum, 1 dr.

3. (Ph. Chirur.) Bruised galls, 1 oz.; boiling water, 2½ pints; digest 1 hour, and strain.

4. (Ricord.) Tannin, 2½ dr.; aromatic wine (hot), ½ pint; dissolve.

5. Bistort and pomegranate peel, of each, 2 oz.; sal ammonia, ¼ oz.; red wine 1 pint; infuse at a gentle heat. The above are used in hæmorrhages, piles, prolapsus, &c.

Fomentation of Belladon'na. *Syn.* FOTUS BELLADONNÆ, L. *Prep.* (Ophthalmic Hosp.) Extract of belladonna, 1 dr.; boiling water 1 pint. *Used* to dilate the pupil in certain affections of the eye; it is usually applied on the forehead.

Fomentation of Cham'omile. *Syn.* FOMENTATIO ANTHEMIDIS, L. *Prep.* Chamomiles, 2 oz.; water, 3 pints; boil 10 minutes, and strain with expression. Emollient.

Fomentation, Diuret'ic. *Syn.* FOMENTATIO DIURETICA, L. *Prep.* (Trousseau.) Tinctures of squills and foxglove, of each, 2 oz.; hot water, 6 fl. oz.; mix. Applied by lint or linen compresses to the insides of the thighs, in dropsies, when the stomach will not bear diuretics.

Fomentation of El'der Flowers. *Syn.* FOTUS SAMBUCI, L. *Prep.* From elder flowers, 1 oz.; boiling water, 2 quarts; digest in a hot

place for 1 hour, and express the liquor. Emollient.

Fomentation, Emol'lient. *Syn.* FOMENTATIO EMOLLIENS, L. *Prep.* 1. Marshmallow root and poppy-heads, of each 1 oz.; water, 3 pints; boil to a quart, and strain.

2. (P. Cod.) Emollient herbs, 1 oz.; boiling water, 1 quart; infuse 1 hour, and strain with expression. (See above.)

Fomentation, Narcot'ic. *Syn.* FOMENTATIO NARCOTICA, L. *Prep.* (P. Cod.) Narcotic herbs, 1 oz.; boiling water, 1½ pint; infuse as last.

Fomentation, Resol'vent. *Syn.* FOTUS RESOLVENS, L. *Prep.* (Richard.) Fomentation of elder flowers, 8 fl. oz.; liquor of diacetate of lead, ½ fl. dr.; mix. *Used* to discuss tumours, &c.

Fomentation, Stim'ulant. *Syn.* FOMENTATIO STIMULANS, L. *Prep.* 1. Sesquicarbonate of ammonia, 1 oz.; tincture of cantharides, 2 fl. oz.; warm water, 1 pint.

2. Household mustard, 4 oz.; hot water, 1½ pint; mix. Both the above are rubefacient and counter-irritant, and excellent in rheumatism, neuralgia, &c.

Fomentation, Ver'mifuge. *Syn.* FOMENTATIO VERMIFUGA, FOTUS ANTHELMINTICUS, L. *Prep.* Leaves and flowers of tansy, wormwood, and chamomile, of each, 3 oz.; water, 1 quart; boil to 1½ pint, and strain. Applied to the abdomen, &c., in worms.

FOOD. *Syn.* CIBUS, MATERIA ALIMENTARIA, L. Anything which feeds or promotes the natural growth of organic bodies, by supplying them with materials which, by assimilation, may be converted into the substances of which they are composed; or which, by its decomposition or slow combustion, maintains the temperature, or some other essential condition of life, at the proper standard. The numerous articles employed as food are all compounds; and in many cases they consist of mechanical mixtures or chemical combinations of two or more compounds. Organized matter, or that which has possessed either animal or vegetable life, or which has been produced by living organs, seems to be alone capable of assimilation, to any extent, by the animal system; and hence it is from the organic kingdom that our aliments are necessarily derived. Water, iron, earthy phosphates, chloride of sodium, and other salts, which form the inorganic constituents of the body, though not of themselves nourishing, are also assimilated when taken in conjunction with organic aliments, and then contribute essentially to nutrition. In the animal and vegetable substances employed as food, these inorganic compounds are provided in small but sufficient quantities to meet the requirements of the healthy body; and in this state of combination alone can they be regarded in the light of aliments. A complete consideration of this subject embraces, not only all the substances used as food, but also those things which when taken with them improve their flavour, promote their digestion, and render them more wholesome and nutritive; and also their preparation for the table in its various relations with health and disease.

The following 'BILLS OF FARE,' for which we are indebted chiefly to Soyer, Rundell, and others, exhibit the various articles in season at different periods of the year.

FIRST QUARTER. January.—Poultry and Game: Pheasants, partridges, hares, rabbits, woodcocks, snipes, turkeys, capons, pullets, fowls, chickens, and tame pigeons.—Fish: Carp, tench, perch, lampreys, eels, cray-fish, cod, soles, flounders, plaice, turbot, thornback, skate, sturgeon, smelts, whitings, lobsters, crabs, prawns, and oysters.—Vegetables: Cabbage, savoys, colewort, sprouts, leeks, onions, beet, sorrel, chervil, endive, spinach celery, garlic, scorzonera, potatoes, parsnips, turnips, brocoli (white and purple), shalots, lettuces, cresses, mustard, rape, salsafy, and herbs of all sorts (some dry and some green); cucumbers, asparagus, and mushrooms are also to be had, though not in season.—Fruit: Apples, pears, nuts, walnuts, medlars, and grapes.

February and March.—Meat, fowls, and game, as in January, with the addition of ducklings and chickens.—Fish: As the last two months. (Cod is not thought so good from February to July, although it is still sold at the fishmonger's.)—Vegetables: The same as the previous months, with the addition of kidney-beans.—Fruit: Apples, pears, and forced strawberries.

SECOND QUARTER. April, May, and June.—Meat: Beef, mutton, veal, lamb, and venison (in June).—Poultry: Pullets, fowls, chickens, ducklings, pigeons, rabbits, and leverets.—Fish: Carp, tench, soles, smelts, eels, trout, turbot, lobsters, chub, salmon, herrings, cray-fish, mackerel, crabs, prawns, and shrimps.—Vegetables: As before; and in May, early potatoes and cabbages, peas, radishes, kidney-beans, carrots, turnips, cauliflowers, asparagus, artichokes, and numerous salads (forced).—Fruit: (in June), strawberries, cherries, melons, green apricots, and currants and gooseberries for tarts; pears, grapes, nectarines, peaches, and some other fruit.

THIRD QUARTER. July, August, and September. — Meat, as before. — Poultry, &c.: Pullets, fowls, chickens, rabbits, pigeons, green geese, leverets, and turkey poults. Two former months, plovers and wheat-ears; (in September), partridges, geese, &c.—Fish: Cod, haddocks, flounders, plaice, skate, thornback, mullets, pike, carp, eels, shellfish (except oysters), and mackerel (during the first two months of the quarter, but they are not good in August).—Vegetables: Of all sorts, beans, peas, French-beans, &c. — Fruit: (In July), strawberries, gooseberries, pine-apples, plums (various), cherries, apricots, raspberries, melons, currants, and damsons. (In August and September), peaches, plums, figs, filberts, mulber-

ries, cherries, apples, pears, nectarines, and grapes. (During the latter months), pines, melons, strawberries, medlars, and quinces. (In September), Morella cherries, damsons, and various plums.

FOURTH QUARTER. October, November, and December. — Meat, as before, and doe venison.—Poultry and Game: Domestic fowls, as in first quarter; pheasants (from the 1st of October); partridges, larks, hares, dotterels; (at the end of the month), wild-ducks, teal, snipes, widgeon, and grouse.—Fish: Dories, smelts, pike, perch, halibuts, brills, carp, salmon-trout, barbel, gudgeons, tench, and shellfish.—Vegetables: (As in January), French-beans, last crops of beans, &c.—Fruit: Peaches, pears, figs, bullace, grapes, apples, medlars, damsons, filberts, walnuts, nuts, quinces, services, and medlars. (In November)—Meat, &c.: Beef, mutton, veal, pork, house-lamb, doe venison, and poultry and game as in the last month.—Fish: As the last month.—Vegetables: Carrots, turnips, parsnips, potatoes, skirrets, scorzonera, onions, leeks, shalots, cabbage, savoys, colewort, spinach, chardbeats, chardoons, cresses, endive, celery, lettuces, salad-herbs, and various pot-herbs.—Fruit: Pears, apples, nuts, walnuts, bullace, chestnuts, medlars, and grapes. (In December)—Meat, &c.: Beef, mutton, veal, house-lamb, pork, and venison.—Poultry and Game: Geese, turkeys, pullets, pigeons, capons, fowls, chickens, rabbits, hares, snipes, woodcocks, larks, pheasants, partridges, sea-fowls, guinea-fowls, wild ducks, teal, widgeon, dotterels, dun-birds, and grouse.—Fish: Cod, turbot, halibuts, soles, gurnets, sturgeon, carp, gudgeons, codlings, eels, dories, and shell-fish.—Vegetables: As in last month. Asparagus, &c., forced.—Fruit: As before, except bullace.

FOOL. Cooks give this name to a species of jam made of boiled and crushed fruit, mixed with milk or cream, and sweetened.

Ap'ple Fool. From the peeled and cored fruit, placed in a jar, with moist sugar, q. s. to render it palatable, and a very little cider or perry; the jar is set in a saucepan of water over the fire, and the heat continued until the apples become quite soft, when they are pulped through a colander, and a sufficient quantity of milk, a little cream, and some sugar, added to bring them to the proper 'palate.'

Goose'berry Fool. From gooseberries, as the last. Those which are unripe are generally preferred. These preparations, when nicely made, are very pleasant and wholesome.

FOOT (Human.) See FEET.

FOOTS. Coarse moist sugar. The scrapings of the sugar hogsheads, refuse sugar, waste, and dirt, is also sold to the publicans under this name, who use it in the adulteration of their beer; chiefly to make it stand more water, and to impart 'briskness.'

FORCE'MEAT. *Syn.* FARCE, STUFFING. A species of sausage meat, either served up alone, or employed as an ingredient in other dishes.

Mrs. Rundell truly remarks that "at many tables, where everything else is done well, it is common to find very bad forcemeat or stuffing." To avoid this error, care should be taken to so proportion the ingredients that "no one flavour should predominate; yet if several dishes be served the same day, there should be a marked variety in the tastes of the forcemeats, as well as of the gravies. A general fault is, that the tastes of lemon-peel and thyme overcome all others; therefore they should only be used in small quantities." Forcemeats should be just consistent enough to cut with a knife, but not dry and heavy. Herbs are very essential ingredients; and it is the copious and judicious use of them that chiefly gives the cookery of the French its superior flavour. "To force fowls, meat, &c., is to stuff them." (Mrs. Rundell.)

FOR'CING. Horticulturalists apply this term to the art of accelerating the growth of plants, so as to obtain fruits or flowers at unusual seasons. Dung-beds, bark-beds, and frames, pits, and houses, with glass roofs, are commonly employed by the gardeners for this purpose.

FORMATE. *Syn.* FORMIATE. Salts, in which one atom of hydrogen in formic acid is replaced by a metal or other basic radical. They are best obtained either by direct saturation of the acid, or by double decomposition; most of them are very soluble, and are decomposed by hot oil of vitriol. Formate of ammonium crystallises in square prisms; formate of sodium, in rhombic prisms; formate of potassium is deliquescent, and crystallises with difficulty; the formates of barium, calcium, magnesium, and strontium, form small prismatic crystals; formate of lead assumes the shape of small colourless needles, soluble in 40 parts of water; the formates of cobalt, iron, manganese, nickel, and zinc, are easily crystallisable, whilst that of copper forms very beautiful, large, bright-blue rhombic prisms; formate of silver is less soluble than the salt of lead, and is decomposed at a gentle heat.

FORMIC ACID. $HCHO_2$. *Syn.* HYDROGEN FORMIATE. An organic acid, obtained by oxidizing many organic substances, and found in the red ant.

Prep. Sugar, 1 part; water, 2 parts; binoxide of manganese, 3 parts; mix in a retort capable of holding fully 10 times the bulk of the ingredients, and add, cautiously, oil of vitriol, 3 parts, diluted with an equal weight of water; as soon as the first violent effervescence has subsided, heat may be applied, and the product collected and purified, as below.

Formate of lead in fine powder is introduced into a long glass tube, one end of which is connected with an apparatus evolving sulphuretted hydrogen, and the other with a receiver. As soon as the salt is entirely decomposed (blackened) a very gentle heat is

applied, and the distilled liquid collected; the product is, lastly, boiled for a minute or less, to expel any adhering sulphuretted gas. This furnishes chemically pure formic acid.

From wood spirit, 1 part; bichromate of potassium and sulphuric acid, of each, 3 parts; the sulphuric acid, diluted with an equal weight of water, being gradually added last. A portion of wood spirit distils over with the acid, and may be again treated with bichromate of potassium and sulphuric acid, when a fresh portion of formic acid will be produced. This process yields a large product.

Prop., purific., &c. The products of the above processes are limpid and colourless; the stronger ones fume slightly in the air, and possess an extremely penetrating odour. The acid obtained by the second process boils at 209° Fahr., crystallises in brilliant scales below 32°, and has the sp. gr. 1·2353. Its vapour is inflammable, and burns with a blue flame. It is extremely corrosive, and rapidly destroys the texture of living organic substances. The products of the other processes are very dilute, and possess the above properties in only a minor degree. They may all be purified and concentrated by saturating them with pure carbonate of sodium or of potassium, and after subjecting the liquid to a gentle heat for a short time, and liberating the formic acid from the salt by means of dilute sulphuric acid, finally submitting the mixture to distillation, when the hydrated acid will come over perfectly pure.

Formic acid reduces the salts of mercury and silver, and forms salts with the bases termed formiates.

Formic acid is readily distinguished from acetic acid, which in many points it resembles, by heating it with a little solution of oxide of silver or mercury; the metal is reduced, and precipitated in a pulverulent state, while carbonic acid is extricated. The odours of the two acids also vary.

FORM'ULA. [L.] In pharmacy and medicine, a short form of prescription; a recipe. By chemists, the term is applied to a grouping of symbols, expressing the composition of a body; thus, HCl (standing for 1 atom of hydrogen united to 1 atom of chlorine) is the formula for hydrochloric acid. A chemical formula is termed empirical when it merely gives the simplest possible expression of the composition of the substance to which it refers. A rational formula, on the contrary, aims at describing the exact composition of molecule, or combining weight of the substance, but stating the absolute number of atoms of such of the elements essential to that object, as well as the mere relations existing between them. The empirical formula is at once deduced from the analysis of the substance, reckoned to 100 parts; the rational formula requires, in addition, a knowledge of its combining quantity, which can only be obtained by direct experiment, by synthesis, or by the careful examination of one or more of its most definite compounds. Thus, the composition of acetic acid is expressed by the formula CHO, which exhibits the simplest relations of the three elements; if we want to express the quantities of these, in atoms required to make up one molecule of acetic acid, we have to adopt the formula $C_2H_4O_2$ or $HC_2H_3O_2$.

FOR'MYL. *Syn.* FORMYLE. A hypothetical organic radical, having the composition C_2H. Its existence was inferred from the constitution of certain organic compounds which are now referred to the methyl-series. Formic acid was supposed to be an oxide of formyl; and chloroform, the terchloride of formyl.

FOX GLOVE. *Syn.* DIGITALIS (B. P.), L. A genus of plants belonging to the natural order *Scrophulariaceæ*. The leaves of the uncultivated '*Digitalis purpurea*,' or purple foxglove are officinal in our pharmacopœias. They must be gathered before the terminal flowers have expanded. "The petiole and midrib of the leaf being cut off, dry the lamina." (Ph. L.) The seeds (DIGITALIS SEMINA), which were ordered, as well as the leaves, in former pharmacopœias, are said to be in many points preferable to them. When good, the leaves are of a dull-green colour, and possess a feeble narcotic odour, and a bitter, unpleasant taste. Both the dried leaves and the powder should be preserved in corked bottles covered with dark-coloured paper, or in well-closed tin canisters, and kept in a dark cupboard; and the stock should be renewed yearly, as age considerably diminishes the medicinal activity of digitalis.

Action, uses, &c. Foxglove is diuretic, sedative, and antispasmodic, and exerts a specific action over the cerebro-spinal system, promoting the functions of the absorbents, and reducing the force of the circulation in a remarkable manner. It is administered in fevers and inflammations, to reduce the frequency of the pulse, and to allay excessive vascular excitement; in dropsy (unless the habit is full and pulse tight and cordy), as a diuretic, either alone, or combined with squills, calomel, salines, or bitters; in internal hæmorrhages, as a sedative, when the pulse is full, hard, and throbbing; in diseases of the heart and great vessels, and in phthisis, to reduce the force and velocity of the circulation; in epilepsy and insanity, to repress vascular excitement; and in spasmodic asthma, scrofula, and several other diseases, with one or other of the above intentions.

The greatest caution is required in the use of foxglove, as its effects accumulate in the system, and the unwary practitioner is occasionally surprised at the sudden demise of his patient, even after he has left off the use of this drug.—*Dose.* ½ gr. to 1½ gr., in powder, every 6 hours. See EXTRACT, INFUSION, TINCTURE, &c.

FOX'ING. See MALT LIQUORS.

FRACT'URE. *Syn.* FRACTURA, L. The breaking or disrupture of a bone. When the

bone is nearly divided into two parts, it is called a SIMPLE FRACTURE; when the integuments are also lacerated, a COMPOUND FRACTURE; and when the bone is splintered, a COMMINUTED FRACTURE.

FRANK'INCENSE. *Syn.* COMMON FRANKINCENSE; THUS (Ph. L.), L. The turpentine which exudes from the bark of *Abies excelsa* (Norway spruce fir) and *Pinus palustris* (pitch or swamp pine), hardened by the air. (Ph. L.) The gum-resin olibanum, which is the produce of the *Boswellia thurifera*, is the 'odorous frankincense' of commerce.

Prepared Frankincense. *Syn.* THUS PRÆPARATUM (Ph. L.), L. *Prep.* (Ph. L.) Frankincense, 1 lb.; water, q. s. to cover it; boil until the resin is melted, and strain through a hair sieve; when the whole has cooled, pour off the water, and keep the frankincense for use. Resembles common resin in its general properties.

FRAX'ININ. *Syn.* FRAXIN; FRAXINA, L. A peculiar bitter, neutral, and crystallizable substance, soluble in boiling water, extracted from the bark of *Fraxinus excelsior*, or common ash. It is febrifuge.

FREC'KLES. These are round or oval-shaped yellowish spots, similar to stains, developed on the skin. There are two varieties—FRECKLES, or SUMMER FRECKLES, resulting from the action of the sun and heat during the summer season, and disappearing with the hot weather or exposure; and—COLD FRECKLES, which occur at all times of the year. The former are chiefly confined to persons of fair complexion, whilst the latter attack persons of all complexions indifferently, and sometimes assume a lively yellow or greenish colour.

Treatment. Common freckles may generally be removed by the frequent application of dilute spirits, acids, or alkaline solutions; the last two just strong enough to prick the tongue. Cold freckles commonly occur from disordered health, or some general disturbance of the system, to which attention should be chiefly directed. In both varieties the solution of bichloride of mercury (Ph. L.), or Gowland's lotion, will be found a most useful external application. See *below*.

Freckles, Lotion for. *Prep.* 1. Bichloride of mercury, 5 gr.; hydrochloric acid, 30 drops; lump sugar, 1 oz.; rectified spirit of wine, 2 oz.; rose water, 7 oz.; agitate together until the whole is dissolved.

2. Petals or leaves of red roses, 1 oz.; hot water, 12 fl. oz.; infuse an hour, and strain, with expression, ½ pint; add of citric acid, 30 gr.; dissolve, and in a few hours decant and clear.

3. Rose leaves (dried), ½ oz.; lemon juice (freshly expressed) and rum or brandy, of each, ¼ pint; digest 24 hours, and squeeze out the liquor for use.

5. (Kittoe's.) Sal ammoniac, 1 dr.; spring water, 1 pint; lavender water or eau de Cologne, ½ oz.; mix. The above are applied with the fingers night and morning, or oftener.

Freckles, Pomade for. *Prep.* 1. Citrine ointment, 1 dr.; simple ointment, 7 dr.; otto of roses, 3 drops.

2. Elder flower ointment, 1 oz.; sulphate of zinc (levigated), 20 gr.; mix by porphyrization, or by trituration in a wedgwood-ware mortar. Both the above, applied night and morning, are excellent for either cold or summer freckles.

FREEZ'ING MIXTURES. See ICE and REFRIGERATION.

FRENCH BER'RIES. *Syn.* PERSIAN BERRIES, AVIGNON B.; GRAINES D'AVIGNON, Fr. The unripe berries or fruit of the *Rhamnus infectorius*. They are imported from France and Persia; those from the latter country being esteemed the best. Some writers state that the Persian berries are the product of a distinct species, namely, *R. amydalinus*. They are chiefly used for dyeing morocco leather yellow. Their decoction dyes cloth, previously mordanted with alum, tartar, or protochloride of tin, of a yellow colour; with sulphate of copper, an olive; and with red sulphate of iron, an olive-green colour.

FRENCH POL'ISH. Several varnishes are used under this name. That most generally employed is a simple solution of pale shell-lac in either methylated spirit or wood naphtha. Sometimes a little mastic, sandarac, or elemi, or copal varnish, is added to render the polish tougher.

Prep. 1. From pale shell-lac, 5½ oz.; finest wood naphtha, 1 pint; dissolve.

2. Pale shell-lac, 3 lb.; wood naphtha, 1 gall. Methylated spirit (68 o. p.) may be substituted for the naphtha in each of the above formulæ.

3. Pale shell-lac, 5 oz.; gum sandarac, 1 oz.; spirit (68 o. p.), 1 pint.

4. Pale shell-lac, 5½ oz.; gum elemi, ¾ oz.; spirit, 1 pint.

5. Pale shell-lac, 1¼ lb.; mastic, ¼ lb.; spirit, 2 quarts.

6. Pale shell-lac, 2¼ lb.; mastic and sandarac, of each, 3 oz.; spirit, 1 gall.; dissolve, add copal varnish, 1 pint, and mix by roughly agitating the vessel. All the above are used in the manner described below.

7. Shell-lac, 12 oz.; wood naphtha, 1 quart; dissolve, and add of linseed oil, ½ pint.

8. Shell-lac, ½ lb.; gum sandarac, ¼ lb.; spirit, 1 quart; dissolve, add of copal varnish, ½ pint; mix well, and further add of linseed oil, ½ pint. The last two require no oil on the rubber.

Obs. The preparation of French polish is precisely similar to that of other spirit or naphthalic varnishes. Sometimes it is coloured, in order to modify the character of the wood. A REDDISH TINGE is given with dragon's blood, alkanet root, or red sanders wood; and a YELLOWISH TINGE, by turmeric root or gamboge. When it is simply desired to DARKEN the wood, brown shell-lac is employed to make

the polish; and when the object is to keep the wood LIGHT COLOURED, a little oxalic acid (2 to 4 dr. to the pint) is commonly added. These substances are either steeped in or agitated with the polish, or with the solvent, before pouring it on the 'gums,' until they dissolve, or a sufficient effect is produced. French polish is not required to be so clear and limpid as other varnishes, and is, therefore, never artificially clarified. See VARNISH, and *below*.

FRENCH POL'ISHING. This process, now so generally employed for furniture and cabinet work, is performed as follows:—The surface to be operated on being finished off as smoothly as possible with glass paper, and placed opposite the light, the 'rubber' being made as directed below, and the polish (see above) being at hand, and preferably contained in a narrow-necked bottle, the workman moistens the middle of the flat face of the rubber with the polish, by laying the rubber on the mouth of the bottle and shaking up the varnish against it, once, by which means the rubber imbibes the proper quantity to cover a considerable extent of surface. He next encloses the rubber in a soft linen cloth, doubled, the rest of the cloth being gathered up at the back of the rubber to form a handle. The face of the linen is now moistened with a little raw linseed oil, applied with the finger to the middle of it, and the operation of polishing immediately commenced. For this purpose the workman passes his rubber quickly and lightly over the surface uniformly in one direction, until the varnish becomes dry, or nearly so, when he again charges his rubber as before, omitting the oil, and repeats the rubbing, until three coats are laid on. He now applies a little oil to the rubber, and two coats more are commonly given. As soon as the coating of varnish has acquired some thickness, he wets the inside of the linen cloth, before applying the varnish, with alcohol, or wood naphtha, and gives a quick, light, and uniform touch over the whole surface. The work is, lastly, carefully gone over with the linen cloth, moistened with a little oil and rectified spirit or naphtha, without varnish, and rubbed, as before, until dry.

The RUBBER for French polishing is made by rolling up a strip of thick woollen cloth (list) which has been torn off, so as to form a soft elastic edge. It should form a coil, from 1 to 3 inches in diameter, according to the size of the work.

FRES'CO-PAINTING. See PAINTING.

FRICANDEAU. [Fr.] Among *cooks*, a ragoût, or fricassée of veal. The same term is also sometimes applied to stewed beef, highly seasoned.

FRICASSEE. [Fr.] A dish prepared by stewing or semi-frying, highly flavoured with herbs, spices, or sauce. Small things, as chickens, lamb, &c., and cold meat, are usually formed into fricassees.

FRIC'TION. In a general sense, the act of rubbing one body against another; attrition.

Friction. In *mechanics*, this is the resistance which the surface of a moving body meets with from the surface of the body on which it moves. To lessen the amount of friction in machines, various unctuous substances, as oil, tallow, soap, black-lead, &c., are used by engineers. These substances act by imparting smoothness to the points of contact, and thus reduce their resistance to each other. The full consideration of the subject belongs to engineering.

Friction. In *medicine*, friction, whether simple or conjoined with liniments, is a therapeutical agent of considerable power. By it, the circulation is promoted in debilitated parts, and medicinal substances (iodine, mercurials, opium, &c.) are made to penetrate the pores of the skin. "The benefit of friction, which consists of motion and heat, whether or not the same be raised by rubbing the body with a coarse cloth or the flesh-brush, has advantages inconceivable and scarcely credible, by which the obstructions of the pores and cutaneous glandules are opened, their stagnating juices broken into small particles, dissolved, and rendered fit to be carried off in perspiration, in the room of which, as my Lord Verulam well observes, new juice will succeed with new vigour to the body; and longevity, saith that great naturalist, is this way most certainly promoted" (Daniel Turner).

Simple friction is performed by the hand alone, or with a piece of flannel, a hair glove or a flesh-brush. "If it be properly performed—namely, by short, brisk strokes with the tips of the fingers, and with great celerity, when the naked hand is the agent; and if it be continued for an hour or upwards, and repeated several times a day—its influence in reducing swelled glands and swellings of the joints, as well as in alleviating rheumatic pains, is very great; but, besides being well performed, the friction should be continued for (at least) half an hour, in order to render it useful." (Dr. R. E. Griffith.)

Gentle, slow, and equable friction, by producing a continued repetition of an agreeable impression on the nervous system, acts both as an anodyne and hypnotic. For this purpose "the operator should sit by the side of the bed, and, introducing the hand under the bedclothes, rub the legs or the arms (or other parts) gently, with equally lengthened but slow movements. When the invalid is a child, its influence is more powerful when aided by a monotonous, but a soft tune, which, although it operates upon a distinct sense, yet, by combination, renders the friction more soporific." (Griffith.)

When the friction is accompanied with the use of any acrid or irritating substance, or is intended to introduce any active remedy into the system, the rubbing should be brisk, and of sufficient force to slightly abrade and in-

flame the cuticle; and should be continued until the substance, which is usually in the form of an ointment, either wholly or partially disappears, owing to its absorption by the skin, The hand of the operator should, in most cases, be guarded by a glove; otherwise he is likely to share with the patient the effects of the medicine, a result not always agreeable or even safe.

FRIGORIFIC MIXTURES. See REFRIGERATION.

FRIT. The pulverulent materials of glass, heated until they coalesce without melting. See ENAMEL, GLASS, &c.

FRIT'TERS. Fried batter. A species of pancake, containing fruit, sweetmeats, poultry, meat, or fish.

Prep. 1. (M. Alexis Soyer.) "The following is thirty recepts in one:"— Soak crum of bread, 1 lb., in cold water, q.s.; take the same quantity of any kind of boiled or roasted meat (a little fat), and chop it into fine dice; press the water out of the bread; put into the pan butter, lard, or dripping, 2 oz., with chopped onions, two teaspoonfuls; fry two minutes, add the bread, stir with a wooden spoon until rather dry, then add the meat, and season with salt, 1 teaspoonful, pepper, ½ do., and a little grated nutmeg, if handy; stir till quite hot; then further add two eggs, one at a time, mix very quickly, and pour it on a dish to cool; next roll it into the shape of small eggs, then in flour, 'egg' them, and bread-crum them; lastly, fry in abundance of fat to a nice yellow colour, and serve either plain, or with any sharp or other savoury sauce you fancy. Innumerable dishes can be made in this way; in fact, from everything that is eatable, and at any season of the year—from the remains of meat, poultry, game, fish, vegetables, &c. The same can be done with chopped, dried, or preserved fruits, simply using a ¼ lb. more bread, and sifting powdered sugar and cinnamon over them. Cream may also be used for fruit, or curds.

Fritters are also (and more commonly) fried in ordinary batter, instead of bread-crums. "There is no end to what may be done with these receipts." "They can be ornamented and made worthy the table of the greatest epicure, if the bread be soaked in cream, and spirits or liquor introduced into them." (Soyer.)

2. Mrs. Rundell:—*a.* (APPLE FRITTERS.) See FRUIT FRITTERS.

b. (BUCKWHEAT FRITTERS, B. CAKES, BOCKINGS.) Made by beating up buckwheat flour to a batter with some warm milk, adding a little yeast, letting it rise before the fire for 30 or 40 minutes, then beating in some eggs and milk or warm water, as required, and frying them like pancakes. Buckwheat fritters, when well prepared, are excellent. Made without eggs, and served up with molasses, they form a common dish in almost every breakfast in North America.

c. (CURD FRITTERS.) From dried curd, beaten with yolk of egg and a little flour, and flavoured with nutmeg.

d. (FRENCH FRITTERS.) Common pancakes, beaten up with eggs, almonds, and flavouring sugar, orange-flower water, and nutmeg), and the paste dropped into a stew- or frying-pan half full of boiling lard, so as to form cakes the size of large nuts, which are cooked till brown.

e. (FRUIT FRITTERS.) From the sliced fruits, with rich batter.

f. (SOUFFLÉ FRITTERS.) Rich pancakes, flavoured with lemon.

g. (SPANISH FRITTERS.) From slices of French rolls soaked in a mixture of cream, eggs, sugar, and spices, and fried brown.

FROG. The esculent variety, in Europe, is the common green or gibbous frog, the *Rana esculenta* of Linnæus. As an aliment, it is much esteemed on the Continent. Its liver is among the simples of the Ph. L. 1618, and was once considered a usefnl remedy in certain forms of ague.

FROST-BITES. When those parts of the body in which the circulation of the blood is most languid are exposed to extreme cold, they quickly become frozen, or, as it is called, 'frost bitten.' The fingers, toes, ears, nose, and chin, are most liable to this attack. The remedy is long-continued friction with the hands or cold flannel, avoiding the fire, or even a heated apartment.

FRUIT. *Syn.* FRUCTUS, L. Among botanists, this is the mature ovary or pistil, containing the ripened ovules or seeds. In familiar language, the term is applied to any product of a plant containing the seed, more especially those that are eatable.

Fruits are extensively employed as articles of diet by man, both as luxuries and nutriment. The fruit of the cereals furnishes our daily bread; that of the vine gives us the well-known beverage, wine, whilst other varieties enrich our desserts, and provide us with some of our most valuable condiments and aromatics. The acidulous and subacid fruits are antiseptic, aperient, attenuant, diuretic, and refrigerant. They afford little nourishment, and are apt to promote diarrhœa and flatulency. They are, however, occasionally exhibited medicinally, in putrid affections, and are often useful in bilious and dyspeptic complaints. The farinaceous fruits (grain), as already stated, furnish the principal and most useful portion of the food of man. The oleofarinaceous (nuts, &c.) are less wholesome and less easy of digestion than those purely farinaceous. The saccharine fruits, or those abounding in sugar, are nutritious and laxative, but are apt to ferment and disagree with delicate stomachs when eaten in excess. Stone fruits are more difficult of digestion than the other varieties, and are very apt to disorder the stomach and bowels.

As a rule, fruit should never be eaten in

matic oil produced. The cup is then filled with hot water, and the steam conveyed to the affected side of the mouth.

FU'MING LIQUORS. See AMMONIUM SULPHYDRATE, ARSENIC TRICHLORIDE, TIN BICHLORIDE, &c.

FUNG'I. In *botany*, a natural order of cellular plants, producing their fructification in the air; growing in or upon decaying or living organic substances, and nourished through their vegetative structure called the spawn or mycelium. Fungi have very variable properties. Some are medical, others edible, others are deadly poisons. The various diseases of plants known as blight, mildew, rust, smut, vine-mildew, potato-disease, ergot, &c., are either caused by or accelerated by the agency of fungi. See AGARIC, MUSHROOM, &c.

FUR'NACE. An enclosed fireplace for obtaining a high degree of heat. Furnaces vary much in construction and size, according to the particular manufacture in which they are employed. They may be broadly divided into two classes—WIND-FURNACES and BLAST-FURNACES. In the former a high temperature is produced without the aid of bellows by means of a powerful draught. In the latter heated air is blown in through a pipe or pipes at the bottom. For many metallurgic and large chemical operations REVERBERATORY FURNACES are employed. A furnace of this kind is usually long, with a low roof to keep down the flame and hot air upon the 'hearth' or space between the fireplace and the flue.[1] For the smaller operations in chemistry, a variety of furnaces have been invented, and the introduction of coal gas as a fuel by Deville, Griffin, Gore, and others, has wrought a complete change in the arrangements of the laboratory. The GAS-FURNACES of Mr. J. J. Griffin are adapted for almost every operation performed by the aid of heat. Those more recently introduced by Mr. W. Gore are very compact and portable, and will rapidly produce a 'white heat,' without the help of bellows or high chimney, by means of ordinary coal gas and atmospheric air. The first and smallest size consumes 33 cubic feet of gas (value seven farthings) per hour, and is suitable for assayers, jewellers, analytical chemists, experimentalists, dentists, and others. It is capable of fusing eight ounces of copper or six ounces of cast iron; copper begins to melt in it in about twelve minutes from the time of lighting. The second-sized one consumes about twice that quantity of gas, is suitable for manufacturing jewellers generally, and for a great variety of practical persons who require to melt small quantities of gold, silver, copper, german silver, brass, cast iron, glass, and other substances, or require a small crucible heated to high temperatures. It is capable of melting 45 ounces of copper, or 40 ounces of cast iron, and with its heat up it melts one pound of copper in eight minutes; copper begins to melt in about twenty minutes from the time of lighting. See ASSAYING, CHIMNEYS, COPPER, CRUCIBLE, FUEL, &c.

[1] For an illustration of this kind of furnace, see SODIUM, Carbonate of.

FUR'NISHING. It is essential for the sake of neatness, and for a pleasing effect to the eye, that there should be a harmony of colours, and also a similarity of style, in the main articles of furniture. The tints of the carpet, of the paper or paint of the walls, and of the window-curtains, should be all in harmony in each room; that is, either possess a general resemblance of colour, or various colours in pleasing contrast and harmony with each other. If the preponderating colour of the curtains is scarlet, and the colour of the walls or carpet blue, a most inharmonious and unpleasing effect is produced; but brown and green, or green and gold, will be in harmony, and may, therefore, be placed together. Carpets being the most expensive articles, it is safest to buy them first, and then to let their colour guide us in the tone and style of the curtains, paper-hangings, chair-covers, hearth-rugs, and the various minor articles. It is also economical to buy carpets of the same pattern for several rooms, because in the event of removal to a house with different sized apartments, a piece of one carpet may be taken to alter the size of another.

FUR'NITURE. See FRENCH POLISHING, OIL, POLISH, VARNISH, &c.

FURS. Of these the most valuable are Ermine and Sable. Fur skins, when unprepared, or merely dried, go under the name of 'Peltry.' (Brande.)

Furs may be preserved from moths and other insects by placing a little colocynth pulp (bitter apple), or spice (cloves, pimento, &c.), wrapped in muslin, among them; or they may be washed in a very weak solution of corrosive sublimate in warm water (10 or 15 grs. to the pint), and afterwards carefully dried. As well as every other species of clothing, they should be kept in a clean, dry place.

FU'SEL-OIL. *Syn.* FOUSEL OIL, POTATO-OIL, OIL OF POTATO SPIRIT, GRAIN OIL, GRAIN-SPIRIT OIL, MARC-BRANDY OIL, CRUDE HYDRATED OXYDE OF AMYL. *Source.* An offensive, strong-smelling oil, produced along with alcohol during the fermentation of grain, potatoes, &c., on the large scale, and which gives the peculiar and disagreeable flavour and odour to raw whiskey. It is found chiefly in the last portion of the spirit which passes over, called the 'faints,' to which it imparts its characteristic odour and flavour. By rectifying the faints at a very gentle heat, most of the alcohol and water first pass over together with only a little fusel oil, whilst the latter forms the residuum in the still. Various names (as *above*) are given to the crude oil thus obtained, according to its source. In each case it essentially consists of hydrated oxide of amyl, but trifling and variable quantities of other organic compounds are mixed with it, which slightly

modify its character, more particularly its odour and flavour. The oil of potato spirit is the purest form of crude fusel oil.

Obs. The exertions of the distiller are directed, as much as possible, to lessen the formation of fusel oil during the fermentation of his 'worts,' and to eliminate, during the distillation and rectification of his liquors, the greatest possible proportion of that with which they may be contaminated.

Prop., &c. Fusel oil is a nearly colourless volatile liquid, with a rather high boiling-point, a durable, penetrating, offensive smell, and an acrid, burning taste; when swallowed, it occasions nausea, giddiness, headache, &c.; in slightly larger quantities, vomiting, delirium, oppressive respiration, and lessened sensibility to pain; its vapour also produces these effects. In quantity, it is a narcotic poison. The greater intoxicating power of whiskey, more especially that from raw grain, than other spirit, is due to the larger quantity of fusel oil which it contains. This appears to be well known to the lower class of whiskey drinkers in these countries, and to the consumers of corn brandy in some of the northern parts of Europe. The last are said to frequently demand to be served with "a glass of good fusel." In England fusel oil is chiefly used for lamps and varnishes.

Purific. The AMYLIC ALCOHOL (ALCOHOL AMYLICUM) of the Dublin College is thus prepared. Introduce the ordinary fusel oil of the distilleries into a small still or retort, connected with a condenser, and apply heat; as soon as the oil begins to flow over, unmixed with water, the receiver should be changed, and the distillation resumed, and carried nearly to dryness; the product in the second receiver, and the oily matter which separates from the water in the first receiver, are to be reserved for use. It is employed in the preparation of VALERIANATE OF SODA. See AMYL, HYDRATE.

FU'SIBLE ALLOY'. *Syn.* FUSIBLE METAL.

Prep. 1. Bismuth, 2 parts; lead, 5 parts; tin, 3 parts. Melts in boiling water.

2. (D'Arcet's.) Bismuth, 8 parts; lead, 5 parts; tin, 3 parts. Melts below 212° Fahr.

3. (Walker.) Bismuth 8, tin 4, lead 5 parts; antimony, 1 part. The metals should be repeatedly melted and poured into drops, until they are well mixed.

4. (Onion's.) Lead, 3 parts; tin, 2 parts; bismuth, 5 parts. Melts at 197° Fahr.

5. To the last, after removing it from the fire, add of quicksilver (warm), 1 part. Liquid at 172°, solid at 140° Fahr.

Obs. The first four of the above are used to make TOY-SPOONS, to surprise children by their melting in hot liquors. A little mercury may be added to lower their melting-points. Nos. 2 and 3 are specially adapted for making ELECTROTYPE MOULDS. The beautiful casts of the French medals known to all electrotypers as Clichée moulds are in the alloy No. 3. The above alloys are also used to form PENCILS for writing on asses' skin, or paper prepared by rubbing burnt hartshorn into it, &c.; also as a METAL BATH in the laboratory. The last is used for ANATOMICAL INJECTIONS.

FU'SION. *Syn.* FUSIO, L. The liquefaction of solid bodies by the action of heat. The term AQUEOUS FUSION has been applied to the melting of salts in their combined water when heated; and the term IGNEOUS FUSION, to the liquefaction of bodies by heat alone.

The vessels in which substances are fused are formed of various materials and shapes, according to the properties of the solid operated on, and principally with reference to the degree of heat required for its fusion. In every case the containing vessel should be capable of sustaining the proper degree of heat, without either melting or cracking, and should also be unacted on by the substances melted in them. See CRUCIBLE, FURNACE, &c.

FUS'TIC. *Syn.* FUSTIC WOOD. Two distict dye-stuffs are known by this name, but are distinguished by the adjectives 'old' and 'young.'

Old Fustic. *Syn.* BOIS JAUNE, Fr. The wood of the *Maclura tinctoria*. Its decoction dyes woollens yellow of different shades, according to the 'mordant.' Alum, tartar, and spirits of tin brighten the tint; acetate and sulphate of iron and common salt darken it; with sulphate of iron it gives olives and browns; with the indigo vat and sulphate of indigo green. These colours are very permanent. Its yellow turns on the lemon when pale, and on the orange when darker. 1 lb. of old fustic will dye 3 to 5 lbs. of wool.

Young Fustic. *Syn.* YELLOW FUSTIC; FUSTET, Fr. The wood of the *Rhus Cotinus* or Venice sumach. It gives a yellow turning on the green, but its colours are not very permanent. It is chiefly used in combination with other dye-stuffs.

GAL'BANUM. *Syn.* GUM GALBANUM; GALBANUM (B. P.), L. "A gum-resin derived from an unascertained umbelliferous plant. In irregular tears about the size of a pea, usually agglutinated into masses; of a greenish-yellow colour, translucent, having a strong disagreeable odour, and an acrid bitter taste." (B. P.) Its properties are similar to the other fetid antispasmodic gum-resins. It ranks between ASSAFŒTIDA and AMMONIACUM.

Strained Galbanum. *Syn.* PREPARED GALBANUM; GALBANUM COLATUM, G. PRÆPARATUM (Ph. L.), L. From crude galbanum, as PREPARED AMMONIACUM. Formerly the common practice was to melt it in the dry state, by heat cautiously and quickly applied, and to strain it through a piece of coarse canvas stretched across a wooden frame or 'horse.' The 'strained galbanum' of the shops is seldom pure. The following forms are current in the trade for its 'reduction,' as this species of adulteration is technically termed:

1. Galbanum (true), 9 lbs.; strain as above, then add, towards the end, black resin (clean), 3 lbs.; and when the whole is melted, further add of Venice turpentine, 2 lbs.—*Product.* 12 lbs.

2. Strained galbanum and black resin, of each, 6 lbs.; melt, and add, of strained assafœtida, 2 oz.; Venice turpentine, 3 lbs.—*Prod.* 14½ lbs.

Facti"tious Strained Galbanum. *Syn.* GALBANUM COLATUM FACTITIUM, L. *Prep.* 1. From black resin, 4 lbs.; melt, and add of Venice turpentine, 2 lbs.; assafœtida, 2½ oz.; oils of juniper and fennel, of each, 1½ dr.; water, ½ pint.

2. As the last, adding soft soap, 5 oz. Sometimes the small and 'waste' of the chests are added to the above to improve them.

GALL. *Syn.* BILE; BILIS, CHOLE, FEL, L. A bitter fluid secreted by the liver; in part flowing into the intestines, and in part regurgitating into the gall-bladder. Its uses in the animal economy appears to be—to separate the chyle from the chyme, to promote digestion of oleaginous substances, and to assist in exciting the peristaltic action of the intestines. The fæces appear to owe their colour chiefly to the presence of bile, since, without, they appear of a dirty pipe-clay colour.

The gall of various animals was formerly used in medicine. From whatever source it was obtained, it was believed to be calefacient, desiccant, detergent, discutient, and parturifacient; but besides these properties, each variety was conceived to possess virtues peculiarly its own. Thus, bear-gall (fel ursi) was reputed anti-epileptic; eel-gall (fel anguillarum) parturifacient; hare-gall (fel leporis), "good in cataract;" and ox-gall (fel bovis), "sovereign against stiff joints, rheumatics, angry ulcers, and stomach colics." The gall of the bat, goat, hen, hog, partridge, siluris, &c., were also employed as remedies. At the present time ox-gall is the only one used in medicine and the arts.

Ox-gall has been recently reintroduced into medicine by Dr. Allnatt and others, and in certain cases of dyspepsia and biliary derangement appears to be a valuable remedy.

Crude ox-gall is extensively employed by the scourers of woollen cloth, clothes renovators, &c. It rapidly extracts grease and oil from textile fabrics, without injuring the colour. See CONSTIPATION, DYSPEPSIA, OX-GALL, &c.

Gall, Glass. See SANDIVER.

GAL'LATE. *Syn.* GALLAS, L. A salt of gallic acid. The alkaline gallates are soluble. They rapidly suffer decomposition in the presence of excess of the base, and the liquor gradually acquires a blackish colour. The gallates of most of the other metallic oxides are insoluble.

GAL'LIC ACID. $H_3C_7H_3O_5$. Aq. *Syn.* ACIDUM GALLICUM (B. P.), L. "A crystalline acid prepared from galls." (B. P. L.) It may be also obtained from other vegetable substances. It appears to be a product of the oxidation of tannic acid, and probably does not exist ready formed in recent vegetables.

Prep. 1. (Dumas.) Nut-galls, reduced to powder, are moistened with water, and exposed to the action of the air, in a warm situation (say 70° to 80° Fahr.), for two or three months, adding more water, from time to time, to make up for that lost by evaporation. At the end of the above period the mouldy, dark-coloured mass is strongly pressed in a cloth, and the solid portion boiled in a considerable quantity of water. The solution (filtered whilst hot) deposits, on cooling, crystals of gallic acid, which, after being thoroughly drained and pressed dry between bibulous paper, are purified by boiling them along with about ⅛th of their weight of prepared animal charcoal, in 8 parts of water, and filtering, &c., as before.

2. (Graham.) A strong infusion or decoction of galls is precipitated with sulphuric acid, in the cold; the resulting thick mass is mixed with dilute sulphuric acid (cold), and the liquid expressed; the 'marc' is next treated with sulphuric acid, diluted with twice its weight of water, and after boiling the mixture for some minutes, the whole is allowed to cool; the resulting crystals are purified as before.

3. (Liebig.) A strong aqueous solution of tannic acid (tannin) is added to sulphuric acid, as long as a precipitate falls; the powder is collected, washed, and dissolved by the aid of heat in dilute sulphuric acid; the solution, after being boiled for a few minutes, deposits, on cooling, crystals of gallic acid in considerable quantity.

4. (Scheele.) A filtered decoction of galls is exposed for some months in an open vessel; after a time it grows mouldy, and becomes covered with a thick, glutinous pellicle; in two or three months the sides of the vessel and the under portion of the pellicle are found to be covered with small yellow crystals of gallic acid, which are purified as directed above. (See No. 1.)

5. (Ph. D., B. P.) The Dublin Ph. contains two formulæ for gallic acid, the one being based on that of Dumas or Scheele, the other on that of Graham or Liebig.—*a.* From galls (in coarse powder), 1 lb.; water, q. s. to make a stiff paste; a porcelain dish is ordered, and the exposure in the moistened condition is to be continued for 6 weeks; the solution of the first crop of crystals is to be made in 10 fl. oz. of boiling water, and when the filtrate has cooled to 80° Fahr., it is to be poured off from the crystals which have formed, which are then to be washed with ice-cold water, 3 fl. oz., and dried—first in blotting-paper, and finally by a steam or water heat. By boiling the undissolved portion of the galls with 45 fl. oz. of fresh water, more crystals may be obtained.

b. Powdered gall-nuts, 1 lb., are steeped for 24 hours in water, 1 pint, and after being placed in a porcelain displacement apparatus, are treated with water, 1½ pint, added in successive portions; oil of vitriol, 5 fl. oz., diluted with an equal volume of water, and allowed to cool, is now added to the percolated infusion, and after thorough admixture, the liquid is filtered from the viscid precipitate which forms; oil of vitriol, 5 fl. oz. (diluted as before), is then added to the filtrate; the precipitates, enveloped in calico, are submitted to powerful pressure, and subsequently dissolved in oil of vitriol, 16 fl. oz., previously diluted with water, 56 fl. oz.; the solution is boiled for 20 minutes, and set aside for a week; at the end of this time the deposit which forms is dissolved in three times its weight of boiling water, and the solution treated as before.

Prop. Gallic acid forms small, feathery, and nearly colourless crystals, which have a beautiful silky lustre; that of commerce is usually of a pale-yellow colour; it is soluble in 100 parts of cold water, and in 3 parts of boiling water; it is also soluble in alcohol, and slightly so in ether; the aqueous solution is decomposed by exposure to the air; dissolved in hot oil of vitriol, it forms a deep, rich, red solution, which, when thrown into water, drops the gallic acid, deprived of some of its water. This substance is soluble in the alkalies, and dyes cloth like madder. When strongly heated, gallic acid is converted into metagallic acid, or into pyrogallic acid, according to the manner in which the heat is applied.

Tests. Gallic acid is distinguished from tannic acid by not affecting solutions of gelatin, the protosalts of iron, or the salts of the alkaloids, and by giving a deep bluish-black precipitate with the sesquisalts of iron, which disappears when the liquid is heated. It is distinguished from pyrogallic acid by its inferior solubility in water, and by its not affecting the solutions of the protosalts of iron. To detect gallic acid mixed with tannic acid, the latter should be removed, either by digesting the substance in ether, or by immersing for some time in its solution a piece of skin depilated by lime, previously to applying the tests.

Pur. Free from colour; decomposed by heat; soluble in water and in rectified spirit. It turns preparations of the sesquioxide of iron, dissolved in water, of a bluish-black colour, but throws down nothing from a solution of isinglass.

Uses, &c. The principal use of pure gallic acid is in the art of *photography*. It has recently been employed in *medicine*, as an internal astringent, in doses of 3 to 10 grs., thrice a day, or oftener; in hæmorrhage and fluxes, as well as for checking the night sweats in phthisis. Dr. Todd says, that in all cases of internal hæmorrhage, or hæmorrhagic tendency, it is the best astringent or styptic we possess. As an external astringent, it is greatly inferior to tannic acid. It has been given in doses of 15 to 30 grs. in tape-worm, "but without any benefit." (Pereira.)

Purification. Gallic acid, as obtained by either of the above forms, is never quite pure; but it may be rendered absolutely pure by combining it with oxide of lead, and decomposing the compound (gallate of lead) by sulphuretted hydrogen. The sulphuret of lead acts like animal charcoal in removing the colour. (Liebig.) Commercial gallic acid "may be rendered nearly white by dissolving it in 20 times its weight of boiling distilled water, and causing the solution to traverse a stratum of prepared animal charcoal, spread upon a calico filter. When the liquid passes through colourless, it should be evaporated to 1-6th its volume, and then suffered to cool, in order to the separation of the crystallised acid." (Ph. D.)

GALLIC FERMENTATION. This name has been given to the peculiar process by which tannic acid is converted into gallic acid, under the joint influence of moisture and atmospheric oxygen. According to the researches of M. Antoine Larocque, the peculiar ferment of nut-galls which operates this change also converts sugar into alcohol and carbonic acid, in the same way as yeast does; whilst beer yeast, muscular flesh, and caseous matter, change tannin into gallic acid. The similarity of the gallic and vinous fermentation may hence be reasonably inferred.

GALLS. *Syn.* GALL-NUTS, NUT-GALLS; GALLA (B. P.); GALLÆ (Ph. E.). "Excrescences on *Quercus infectoria* caused by the puncture and deposited ova of *Diplolepis Gallæ tinctoriæ*." The best galls are bluish-black, heavy, and not yet perforated; intensely astringent. They are imported from Aleppo, and are known in commerce as black or blue galls (GALLÆ NIGRÆ, G. CŒRULÆ). The next quality is termed, from their colour, green galls (GALLÆ VIRIDES). Both are gathered before the insect has escaped, and are styptic and powerfully astringent. White galls (GALLÆ ALBÆ) are lighter, less astringent, and inferior.

Uses, &c. Galls are extensively employed in the art of dyeing, and constitute one of the principal ingredients in all the shades of black, and are also employed to fix or improve several other colours. A decoction of galls, to which a little green copperas and gum arabic has been added, forms common writing ink. In *medicine*, they are used as an astringent, in hæmorrhages and fluxes, in doses of 10 to 20 grs.; and topically, under the form of infusion or decoction, as a gargle in relaxation of the uvula; as an injection in gleet and leucorrhœa; as a lotion or fomentation in flabby ulcers, prolapsus ani, &c.; and as an ointment in piles, watery ulcers, &c. The infusion or decoction is also used as an antidote to poisoning by the alkaloids, and was formerly given

as a tonic in intermittents. See GALLIC ACID, INK, &c.

GALL'STONE. *Syn.* CALCULUS BILIOSUS, C. CYSTICUS BOVINUS, L. Formed in the gall-bladder of neat cattle in winter, when they are fed upon dry food. *Used* as a yellow pigment, and in medicine.—*Dose.* 1 gr.; in dyspepsia and flatulency. See CALCULUS.

GAL'VANIZED IRON. See IRON and ZINCING.

GAM'BOGE. *Syn.* (CAMBOGE; CAMBOGIA, L. B. P.) GAMBOGIA, L. "A gum-resin obtained from *Garcinia Morella*." (B. P.) Gamboge is an active hydragogue and drastic purgative, which occasionally proves useful in torpor of the abdominal and pelvic viscera; but which is highly dangerous in an irritable or inflammatory state of the stomach or bowels, and during pregnancy. It is very apt to induce nausea and vomiting. In large quantities it is a violent poison. "The deaths which have occurred from the use of enormous quantities of Morrison's pills, are mainly ascribable to the gamboge contained in those medicines." (Pereira.)—*Dose.* 1 to 5 grs., made into pills or mixture, every 4 to 6 hours; in obstinate constipation, in dropsies, in apoplexy and like cerebral affections, and in worms (especially tape-worm), either alone or combined with other cathartics. See COMPOUND EXTRACT OF COLOCYNTH.

GAN"GRENE. See MORTIFICATION.

GAN'TEINE. A composition used to clean kid and other leather gloves.

Prep. 1. (M. Buhan.) Curd soap (in small shavings), 1 part; water, 3 parts; mix with heat, and stir in of essence of citron, 1 part.

2. (SAPONINE,—Duvignau.) Soap (in powder), 250 parts; water, 155 parts; dissolve with heat, cool, and add, of *eau de javelle*, 165 parts, solution of ammonia, 10 parts, and rub the whole to a smooth paste. Patent. A small portion of either of the above is rubbed over the glove with a piece of flannel (always in one direction), until it is sufficiently clean. See GLOVES.

GARAN'CINE. See MADDER RED.

GAR'DENING. See HORTICULTURE.

GAR'GLE. *Syn.* GARGARISM, THROAT-WASH; GARGARISMA, GARGARISMUS, GARGARISMUM, L. A liquid medicine applied to the back part of the mouth or upper part of the throat. Gargles are applied by allowing a small mouthful to run as much as possible over the affected part, by holding the head backwards, and breathing through it, by which means the liquid is agitated and its action promoted.

Gargles are not to be swallowed. It often happens, however, that patients, either by accident or from negligence, do swallow a certain quantity, notwithstanding the instructions given them to the contrary. Care should therefore be taken to avoid making gargles of such substances as may occasion unpleasant symptoms in small doses, though they may not, perhaps, amount to poisoning.

Gargles usually have for their basis either simple water, or milk, wine, or vinegar, diluted with water, to which, in both cases, sugar, honey, or syrup, is generally added. Their other ingredients vary with the indication, but must, in all cases, be either in the liquid form, or soluble in the liquid used as the excipient.

Gargles are commonly dispensed in mixture bottles. The quantity used at a time, under ordinary circumstances, may be about 2-3rds of a wine-glassful.

Gargle. *Syn.* GARGARISMA, G. COMMUNE, G. SIMPLEX, L. *Prep.* 1. (St. B. Hosp.) Honey or honey of roses, 1½ fl. oz.; strong vinegar, 2½ fl. oz.; barley water, 1 pint.

2. (St. George's.) Oxymel, 1 fl. dr.; decoction of barley, 5 fl. drs. In common sore throats, &c. The formulæ of several other hospitals are similar.

Gargle of Ac'etate of Ammo"nia. *Syn.* GARGARISMS AMMONIÆ ACETATIS, L. *Prep.* (Wendt.) Solution of acetate of ammonia and honey of roses, of each, 1 fl. oz.; elder-flower water, 8 fl. oz.; mix. In the ulcerated sore throat of scarlet fever.

Gargle of Ace'tic Acid. *Syn.* OXYMEL GARGLE; GARGARISMA ACIDI ACETICI, L. *Prep.* 1. (St. B. Hosp.) Acetic acid, 1 dr.; oxymel, 2 fl. drs.; water to make up 4 fl. oz.

2. Barley water, 12 fl. oz.; acetic acid, 1½ fl. oz.; honey, 6 drs. Antiseptic. For sore throat.

Gargle of Al'um. *Syn.* GARGARISMA ALUMINIS, L. *Prep.* 1. (Augustin.) Oak-bark (in powder), 1 oz.; water, 1½ pint; boil to a pint, filter, cool, and add, of alum, ½ dr.; brandy, 2 fl. oz. In inflammation of the mouth and throat.

2. (Cavarra.) Alum, 3 drs.; water, 6 fl. oz.; dissolve. In offensive breath.

3. (Foy.) Alum, 1 dr.; tincture of myrrh, 2 fl. drs.; tincture of bark, 4 fl. drs.; honey of roses, 2 oz.; laudanum, 20 drops; wine, ⅔ pint. In scurvy.

4. (Grant.) Alum, 1 oz.; tincture of myrrh, ½ fl. oz.; peppermint water; 7 fl. oz. In relaxation of the uvula, &c.

5. (Mid. Hosp.) Alum, 1 dr.; honey, 2 drs.; water to make 6 fl. oz. As No. 4.

6. (P. Cod.) Alum, 40 grs.; honey of roses, 1 oz.; infusion of roses, 6 fl. oz. As the last.

7. (Ratier.) Alum, 1 oz.; infusion of red roses and barley water, of each, 3 fl. oz.; honey of roses, 2 oz. As No. 4.

8. (Westm. Hosp.) Alum, 1 dr.; dilute sulphuric acid, 1 fl. dr.; treacle, 4 drs.; water to 15 fl. oz.

9. (Ph. Wirtem.) Alum and nitre, of each, 3 oz.; cream of tartar, 4 oz.; dilute acetic acid, 4 lbs.; dissolve, evaporate to dryness, and powder the residuum. For use, ½ oz. of the powder is dissolved in water, 8 fl. oz. Highly recommended in inflammation of the fauces

and tonsils. This forms Zobel's 'SPECIFIC FOR QUINSY.'

Gar'gle, Antiscorbu'tic. *Syn.* GARGARISMA ANTISCORBUTICUM, L. *Prep.* (P. Cod.) Bitter species, 1 dr.; boiling water, 8 oz.; macerate 1 hour, strain, and add, syrup of honey, 2 oz.; antiscorbutic tincture, 1 oz.

Gargle, Antisep'tic. *Syn.* GARGARISMA ANTISEPTICUM, L. *Prep.* (Fr. Hosp.) Decoction of bark, 6 oz.; camphor, 20 grs.; sal-ammoniac, 12 grs. In putrid sore throat, &c.

Gargle, Astrin'gent. *Syn.* GARGARISMA ASTRINGENS, L. *Prep.* 1. (Collier.) Tincture of galls, 2 fl. drs.; honey, ½ oz.; water, 6 fl. oz. In relaxation of the uvula and fauces.

2. (Collier.) Honey, 4 drs.; tincture of myrrh, 3 drs.; powdered alum, 40 grs.; compound infusion of roses, 5½ fl. oz. As the last, and in fetid sore throat.

3. (Sir A. Cooper.) Alum, 2 drs.; decoction of bark, 12 oz.; honey of roses, 1½ oz.

4. (Dr. A. T. Thomson.) Infusion of roses, 7 fl. oz.; dilute sulphuric acid, 1 fl. dr.; tincture of catechu, 6 fl. drs.; laudanum, 1½ fl. dr. For relaxation of the uvula. See GARGLE OF ALUM.

Gargle of Bo"rax. *Syn.* GARGARISMA BORACIS, L. *Prep.* 1. (Ellis.) Borax, 1 dr.; tincture of myrrh, 4 fl. drs.; clarified honey, 1 fl. oz.; rose water, 4 fl. oz.

2. (Fr. Hosp.) Borax, 2 drs.; honey or capillaire, 1 oz.; rose water, 7 fl. oz.

3. (Guy's Hosp.) Borax, 2 drs.; honey of roses, 1 oz.; barley water, 7 fl. oz.

4. (Mid. Hosp.) Borax, 1 dr.; simple oxymel, 2 drs.; water, to make 3 fl. oz. The above are used in thrush or aphthous sore mouth, ptyalism, &c.

Gargle of Cap'sicum. *Syn.* GARGLE OF CAYENNE PEPPER; GARGARISMA CAPSICI, L. *Prep.* 1. (Dr. Griffith.) Tincture of capsicum, ½ fl. oz.; rose water, 8 fl. oz.

2. (St. B. Hosp.)—*a.* Capsicum, 3 drs.; common salt, 1 oz.; boiling water, 1 pint; macerate for 12 hours, strain, and add of distilled vinegar, 1 pint.

b. Tincture of capsicum, 1 fl. dr.; compound infusion of roses, 8 fl. oz.

3. (U. C. Hosp.) Tincture of capsicum, 1 fl. dr.; honey 6 drs.; water to 4 fl. oz. *Used* in ulcerated sore throat, scarlet fever, &c.

Gargle of Chlo"rate of Potas'sa. *Syn.* GARGARISMA POTASSÆ CHLORATIS, L. *Prep.* (Beasley.) Chlorate of potassa, 1 dr.; honey of roses, 1 oz.; water, 7 oz. *Used* in malignant sore throat, scarlatina, &c.

Gargle of Chlo"ride of Lime. *Syn.* GARGARISMA CALCIS CHLORINATÆ, L. *Prep.* From chloride of lime, 1 dr.; water, ½ pint; agitate together for 10 minutes, filter through linen, and add of simple syrup, 1 fl. oz. *Used* in putrid sore throat, scarlet fever, &c.

Gargle of Chloride of So'da. *Syn.* GARGARISMA SODÆ CHLORINATÆ, L. *Prep.* 1. (Copland.) Liquor of chloride of soda, 12 fl. drs.; honey, ½ oz.; water, 6 fl. oz.

2. (Hosp. Form.) Chlorinated solution of soda, 4 fl. drs.; water to 4 fl. oz. *Used* as the last.

Gargle of Chlo"rine Water. *Syn.* GARGARISMA CHLORINII, L. *Prep.* 1. (Fr. Hosp.) Chlorine water, ½ fl. oz.; syrup, 1 fl. oz.; water, 4½ fl. oz.

2. (Mid. Hosp.) Chlorine water, 2 fl. oz.; distilled water, 10 fl. oz. *Use.* As the last.

Gargle of Cincho'na Bark. *Syn.* GARGARISMA CINCHONÆ, L. *Prep.* 1. From decoction of cinchona, 7 fl. oz.; simple oxymel, 1 fl. oz. Antiseptic and astringent in relaxation, &c.

2. (Acidulated; GARGARISMA CINCHONÆ ACIDUS, L.) Hydrochloric acid, 1½ fl. dr.; honey, 1½ oz.; decoction of bark to make up 8 fl. oz.

Gargle, Com'mon. *Syn.* GARGARISMA COMMUNE, L. *Prep.* 1. (Ed. Hosp.) Water, 6 fl. oz.; nitre, 1 dr.; honey of roses, 1 oz. For ordinary sore throat, &c.

2. (Lond. Hosp.) Alum, 1 dr.; dilute sulphuric acid, 2 fl. drs.; tincture of myrrh, 4 fl. drs.; water to 12 fl. oz.

Gargle of Cy'anide of Mercury. *Syn.* GARGARISMA HYDRARGYRI CYANIDI, L. *Prep.* 1. (Brera.) Cyanide of mercury, 10 grs.; honey of roses, 1 oz.; barley water, 1 pint.

2. (Cullerier.) Cyanide of mercury, 10 grs.; linseed tea, 1 pint. *Used* in the same cases as mercurial gargle.

Deter'gent Gargle. *Syn.* GARGARISMA DETERGENS, L. *Prep.* 1. (P. Cod.) Alcoholised sulphuric acid, 1 fl. dr.; honey of roses, 2 oz.; barley water, 8 oz.

2. (Dr. A. T. Thomson.) Nitre, 2 drs.; honey of roses, 4 fl. drs.; infusion of roses, 5½ fl. oz. In inflammatory sore throat.

Emol'lient Gargle. *Syn.* GARGARISMA EMOLLIENS, L. *Prep.* 1. (Buchan.) Marshmallow root, 1 oz.; figs, 2 oz.; water, 1 quart; boil to a pint and strain. Demulcent, soothing.

2. (Trousseau & Reveil.) Barley water, 8 oz.; honey, 1½ oz. Both are used in inflammatory affections of the throat and mouth.

Gargle of Horserad'ish. *Syn.* GARGARISMA ARMORACIÆ, L. *Prep.* (Collier.) Compound spirit of horseradish, 1 fl. oz.; honey, 2 oz.; water, 4 fl. oz. A good gargle for scurvy of the fauces and pharynx, vulgarly called the 'inward scurvy.'

Gargle of Hydrochlo"ric Acid. *Syn.* MURIATIC ACID GARGLE; GARGARISMA ACIDI HYDROCHLORICI, L. *Prep.* 1. (Guy's Hosp.) Hydrochloric acid, 30 drops; honey of roses, 2 oz.; barley water, 6 fl. oz.

2. (Ratier.) Hydrochloric acid, 2 fl. drs.; clarified honey, 2 fl. oz.; barley water, 1 pint.

3. (St. B. Hosp.) Red-rose leaves, 2 drs.; boiling water, 1 pint; hydrochloric acid, 1½ fl. dr.; digest 1 hour, and strain. In inflammatory sore throat, ulcerations of the mouth, scarlet fever, &c.

Gargle of I'odine. *Syn.* GARGARISMA IODINII,

L. *Prep.* 1. Iodine, 10 grs.; iodide of potassium, 12 grs.; rectified spirit and simple syrup, of each, 1 fl. oz.; water, 5 fl. oz. In chronic enlargement of the tonsils, in scrofulous habits.

2. (Dr. Ross.) Tincture of iodine, 1½ fl. dr.; tincture of opium, 1 fl. dr.; water, 6 fl. oz.

3. (St. T. Hosp.) Compound tincture of iodine, 2 fl. drs.; water, 5 fl. oz. In ulceration of the tonsils.

Mercu"rial Gargle. *Syn.* GARGARISMA HYDRARGYRI, G. MERCURIALE, L. *Prep.* 1. (G. HYD. BICHLORIDI.) Corrosive sublimate, 2 to 5 grs.; barley water, 1 pint; honey of roses, 2 fl. oz. For syphilitic ulcers in the throat.

2. (Plenck.) Calomel, 6 grs.; quicksilver, 30 grs.; powdered gum, 3 drs.; syrup of poppies, ½ oz.; triturate till the globules of metal disappear, and add of decoction of clematis, 26 fl. oz.; honey of roses, 1 oz.; essence of myrrh, 1 dr. (or tincture of myrrh, 1 fl. oz.). In syphilitic and putrid sore throat.

Gargle of Myrrh. *Syn.* GARGARISMA MYRRHÆ, L. *Prep.* 1. (Ainslie.) Tincture of myrrh, 6 fl. drs.; vinegar, 1 fl. dr.; honey of roses, 1½ fl. oz.; barley water, 12 fl. oz.

2. (Ph. Chirur.) Tincture of myrrh, ½ oz.; honey of roses, 1½ oz.; lime water, 6 fl. oz. In scarlatina and putrid sore throat. See ASTRINGENT GARGLE, &c.

Gargle of Ni'tre. *Syn.* GARGARISMA SALIS NITRI, G. POTASSÆ NITRATIS, L. *Prep.* 1. Nitre, 2 drs.; honey or syrup, ½ oz.; rose water, 5½ fl. oz.

2. (Brande.) Nitre, 2 drs.; oxymel, 1 fl. oz.; barley water, 7 fl. oz. In inflammatory sore throat. See COMMON GARGLE.

Gargle of Oak-Bark. *Syn.* GARGARISMA CORTICIS QUERCÛS, L. *Prep.* 1. Oak-bark, 2 drs.; boiling water, 6 fl. oz.; macerate 1 hour, and strain.

2. (Ellis.) Decoction of oak-bark, 1 pint; alum, ½ dr.; brandy, 2 fl. oz. In chronic sore throat, relaxation of the uvula, &c.

Gargle of Pel'litory. *Syn.* GARGARISMA PYRETHRI. *Prep.* 1. Pellitory root, 4 drs.; water, 16 fl. oz.; boil to 8 fl. oz., and add of liquor of ammonia, 2 fl. drs.

2. (Swediaur.) Infusion of pellitory, 1 pint; vinegar, 3 fl. oz.; sal-ammoniac, 3 drs. To promote the maturation and healing of throat ulcers.

Gargle of Ro"ses. *Syn.* GARGARISMA ROSÆ, G. ROSARUM, L. *Prep.* (Kendrick.) Conserve of roses, 3 oz.; boiling water, 16 fl. oz.; infuse 1 hour; add of dilute sulphuric acid, 2 fl. drs., and strain. Antiseptic, astringent; *used* in several indications.

Spirit Gargle. *Syn.* GARGARISMA SPIRITUOSUM, G. SPIRITÛS VINI, L. *Prep.* 1. (Dr. Watson.) French brandy, 1 fl. oz.; water, ¼ pint.

2. (St. George's.) Proof spirit, 1 fl. oz.; oxymel, 5 fl. drs.; decoction of barley, to make up 6 fl. oz. In relaxations and salivation.

Stim'ulant Gargle. *Syn.* GARGARISMA STIMULANS, L. *Prep.* (Dr. Copland.) Infusion of roses, 6½ fl. oz.; dilute hydrochloric acid, 40 drops; tincture of capsicum, 1½ fl. drs.; honey, 3 drs. See GARGLE OF CAPSICUM.

Gargle of Tan'nin. *Syn.* GARGARISMA ACIDI TANNICI, L. *Prep.* 1. (Beral.) Tannin, 1 dr.; honey of roses, 2 oz.; rose water, 2 fl. oz.; distilled water, 8 fl. oz.

2. (Jannart.) As the last, but using only half the quantity of tannin. In salivation and aphthous ulcerations.

Gargle of Verd'igris. *Syn.* GARGARISMA ÆRUGINIS, G. CUPRI ACETATIS, L. *Prep.* (Guy's Hosp.) Oxymel of verdigris, 4 drs.; honey of roses, 2 oz.; barley water, 3½ fl. oz. *Used* as a detergent for ulcers in the throat. If swallowed, it produces violent vomiting. The addition of 2½ oz. of water to the above produces a gargle sufficiently strong for most cases.

Gargle of Vin'egar. See GARGLE OF ACETIC ACID.

Gargle of Zinc. *Syn.* GARGARISMA ZINCI, G. Z. SULPHATIS, L. *Prep.* (Dr. Copland.) Sulphate of zinc, 20 grs.; oxymel, 1 fl. oz.; rose water, 7 fl. oz. In aphthous sores, relaxations, ulceration of the tonsils, &c.

GAR'LIC. *Syn.* ALLIUM, L. The *Allium sativum* of botanists. It is diaphoretic, diuretic, expectorant, stimulant, and tonic; and externally, irritant, rubefacient, and even vesicant.—*Dose.* ½ dr. to 1½ dr.; in enfeebled digestion, chronic diarrhœa, old chronic coughs, atonic dropsies, and worms. An antispasmodic and counter-irritant liniment is made of the juice, which was formerly esteemed in chest diseases and infantile convulsions. A small clove of garlic, or a few drops of the juice, was formerly introduced into the ear in certain forms of deafness. As a condiment, its properties resemble those of the onion, than which it is much more powerful.

GAR'NET. In *mineralogy*, one of the precious stones or gems. The finest specimens of noble garnet (SYRIAN or ORIENTAL GARNET) are brought from Pegu. According to chemical analysis, the garnet is a double silicate of alumina and lime, coloured with iron and manganese.

Garnet, Facti"tious. See PASTES.

GA'RUM. [L.] A species of pickle or sauce prepared of fish, in a state of incipient putrefaction, strongly salted and seasoned with aromatics. According to Pliny, the Romans used a species of lobster for this purpose.

GAS. *Syn.* Gaz, Fr. A permanently elastic aëriform fluid. In English, the term 'air' is now usually restricted to the gaseous mixture forming the atmosphere, but it was formerly used as a synonym for 'gas.' The principal gases are the elementary bodies hydrogen, chlorine, oxygen and nitrogen, and the compounds ammonia, carbonic acid, carbonic

oxide, carburetted hydrogen, hydrochloric acid, phosphoretted hydrogen, protoxide of nitrogen, sulphuretted hydrogen, and sulphurous acid. See these substances under their respective heads.

Gas. *Syn.* COAL GAS, ILLUMINATING G. The term 'gas' is popularly applied to the important mixture of hydrocarbons produced by the destructive distillation of pit-coal, and now employed as a source of artificial light in most of large towns of Europe and America. The apparatus used in the manufacture of gas on the large scale consists essentially of a system of closed retorts of cast iron or fire-clay, the exit pipes from which communicate with an hydraulic main, in which the crude gas deposits part of its tar and ammoniacal-liquor. It passes thence into a series of condensing pipes, wherein it deposits more of those impurities; and thence into another series of vessels, called 'scrubbers,' in which its mechanical purification is completed. It is then deprived of its carbonic acid and sulphuretted hydrogen in lime-purifiers, and finally is drawn by exhausting apparatus into the gas-holders, passing on its way through beautiful and delicate apparatus, whereby the pressure and amount of gas are regulated and registered.

Coal gas consists of a mixture of the following bodies:

Marsh gas (light carbonetted hydrogen).
Olefiant gas (heavy „ „).
Hydrogen.
Carbonic oxide.
Nitrogen.
Vapours of liquid hydro-carbons.
Vapour of bisulphide of carbon.

The yield of gas, and also the illuminating power of the product, vary greatly with different kinds of coal. The average yield may be roughly estimated at 10,000 cubic feet of gas per ton of coal.[1]

The late Charles Mansfield proposed to increase the illuminating power of ordinary coal gas, and to render water gas or even atmospheric air luminiferous, by passing them through sponges or over trays containing mineral naphtha or benzole; and a patent was taken out for this purpose. The gas so treated imbibes or dissolves a portion of the liquid, and burns with increased brilliancy. The method of saturating the gas with the liquid hydrocarbon is as follows:—"The apparatus consists of a brass reservoir or chamber attached to the end of the gas-pipe, near the burner. This reservoir may be in the shape of an oil-flask, made air-tight, with a screw-joint, or other means of supplying any highly volatile oil, turpentine, or mineral naphtha, and should be kept about half full. Into this reservoir the gas-pipe ascends a little above the surface of the oil; a very small jet-pipe of gas, regulated by a stop-cock, is branched off below this chamber, to supply a minute flame, so as to cause a sufficient evaporation from the oil to unite with the gas in the flask receiver. The whole is, of course, surmounted with the usual burner and lamp-glass."

The naphthalising of gas did not work well on a large scale. Recently, however, an attempt was made to get up a company in England to work a French patented process, which differed only from that of Mansfield's in the substitution of another hydrocarbon (probably a petroleum product) for benzol. The chemical and technical journals exposed M. Mongruel's invention, and prevented the sinking of capital in a worthless undertaking. On a small scale, simple 'naphthalisers' appear to work very well.

The illuminating power of gas, as well as of other sources of light, may be directly ascertained by what is termed the 'comparison of shadows,' or indirectly, and more conveniently, by chemical analysis.[2] See ILLUMINATION.

GAZ'OGENE. [Fr.] *Syn.* AËRATING MACHINE. A portable apparatus for aërating water and other liquids. Many forms have been given to this instrument, but in all the principle is the same. Powders for generating carbonic acid gas are placed in a separate compartment, and the liquid to be aërated in another. The two compartments are connected by a suitable tube, and a second tube, furnished with a spring tap, affords an exit for the aërated liquid. By the aid of the gazogene, water, wine, ale, &c., may in a few minutes be fully saturated with carbonic acid gas, and so rendered brisk and piquant. By using fruit syrups, manufactured from English and foreign fruits, the most delicious aërated summer beverages can be made, resembling those so much esteemed by travellers in the South of Europe and the sea-board cities of the Western world.

GEL'ATIN. *Syn.* GELATINE; GÉLATINE, Fr.: GELATINA, L. Animal jelly, obtained by the action of heat on the organic tissue of the bones, tendons, and ligaments, the cellular tissue, the skin, and the serous membranes, whilst in contact with water. Glue and size are coarse varieties of gelatin, prepared from hoofs, hides, skins, &c.; and isinglass is a purer kind, obtained from the air-bladders and some other membranes of fish.

Prop, &c. Gelatin is insoluble in cold water, but dissolves with greater or less readiness on the application of heat, according to the source whence it is obtained, and in this state forms a tremulous and transparent jelly on cooling; it is insoluble in both alcohol and ether, and is decomposed by the strong alkalies and acids; with tannic acid it forms an insoluble compound of a buff colour, which is the basis of leather; when acted on by cold

[1] For practical details respecting the manufacture of this product, see the article COAL GAS in 'Ure's Dictionary of Arts, Manufactures, &c.'

[2] See 'Watts's Dictionary of Chemistry,' vol. i.

concentrated sulphuric acid, it yields glycocoll or gelatin sugar; and when boiled with strong alkalies, it yields glycocoll and leucine. Chlorine passed into a solution of gelatin occasions a dense white precipitate (chlorite of gelatin), which ultimately forms a tough, elastic, pearly mass, somewhat resembling fibrin.

Tests. Its aqueous solution is recognised as follows:—1. It gelatinises on cooling.—2. It is precipitated by alcohol.—3. Bichloride of mercury gives a whitish flocculent precipitate.—4. Tannic acid or infusion of galls gives a copious yellowish-white, curdy precipitate, which, on being stirred, coheres into an elastic mass, insoluble in water, and incapable of putrefaction, and which, when dried, assumes the appearance of over-tanned leather.—5. The gelatinising property is destroyed by nitric acid.—6. It is not affected by either alum or acetate of lead. In this respect it differs from chondrin.

Qual. The goodness of commercial gelatin intended for food is readily proved by pouring boiling water over it, and digesting the two together for a short time. If it is pure and wholesome, its colour remains unaltered, and during its solution it continues entirely free from smell. The resulting solution and jelly are also odourless, neutral to test-paper, free from unpleasant taste, and perfectly transparent. If it forms a yellow gluey-looking mass, and evolves an offensive odour, it should be rejected as of inferior quality, and unfit for culinary purposes.

Uses, &c. Gelatin is largely employed as an article of food, as in soups, jellies, &c.; but its value in this respect has been, perhaps, overrated. Animals fed exclusively on gelatin die of starvation. But when mixed with other food, especially with substances abounding in albumen, casein, or fibrin, gelatin may be useful as an aliment, and serve directly to nourish the gelatinous tissues. (Liebig.) Hence gelatin is a fitting substance to form part (but only a part) of the diet of convalescents, as it conveys nutrition directly to these tissues, without tasking the diminished powers of life for its conversion; but its use should be accompanied by a proper quantity of azotised animal food, to supply the elements to the blood, for the support and increase of the muscular tissue, or fleshy portion of the body. In France the gelatin of bones is extracted and employed as a part of the diet in hospitals with the best effect, materially abridging the period of convalescence; but when given alone, all animals soon become disgusted with it, and die if not supplied with other food. (D'Arcet.) See GLUE, ISINGLASS, and *below*.

Bone Gelatin. Obtained from crushed bones by coction with water, or by the action of steam and water successively, either with or without pressure; or by maceration in dilute hydrochloric acid, to extract the phosphate of lime, the remaining gelatinous mass being well washed in cold water, and afterwards dissolved in boiling water in the usual manner. A little carbonate of soda is commonly added to the last water. Gelatin has even been extracted from fossil bones. "A soup was prepared from one of the bones of the great mastodon, by the préfet of one of the departments of France." (Pereira.) Butcher's meat contains, on an average, 24% of dry flesh, 56% of water, and 20% of bone. The last will yield, by proper treatment, nearly 1-3rd of its weight of dry gelatin, or a quantity equal to about 6% of the meat from which it is cut. This, as well as other varieties of gelatin, is frequently blanched by sulphurous acid or animal charcool, and tinged of various colours with the ordinary vegetable dyes. Thus, blue is given with sulphate of indigo or the juice of blue berries; green, with the juice of spinach; and red, with juice of red-beet.

French Gelatin. *Syn.* CAKE GELATIN. Gelatin done up into small thin cakes, like the finer sorts of glue. A good deal of it is prepared in Paris from the cuttings of the skins used in making kid gloves and slippers.

Patent Gelatin. Various qualities of gelatin are manufactured from glue-pieces, or cuttings of the hides of beasts and skins of calves, and from inferior isinglass. According to Mr. Nelson's specification, the crude materials, freed from hair, wool, flesh, and fat, after being thoroughly washed and 'scored,' are macerated for 10 days in a ley of caustic soda; and are then placed in covered vessels at a temperature varying from 60° to 70° Fahr., until they become tender; they are next washed to free them from alkali, and are then exposed to the vapour of burning sulphur until they acquire a sensibly acid reaction; they are now dissolved in water contained in earthen vessels heated to 150° Fahr., and the solution, after being strained, is put into 'settling vessels,' and heated to 100° to 120° Fahr., for 8 or 9 hours; at the end of this time the clear liquor is drawn off, and poured on the 'cooling slabs' to the depth of about ½ an inch. As soon as the jelly is cold, it is cut into pieces, and washed in water until perfectly free from acid. It is then redissolved in water at about 85°, the solution poured out on slabs as before, and when cold, it is cut up, and, lastly, dried on nets.

According to another specification (Rattray's Patent) glue-pieces are steeped in water until they begin to putrefy, then washed with water, drained, and put from 12 to 24 hours into water strongly soured with sulphurous acid; they are afterwards washed first with cold water, and then in water at 120° Fahr., and are lastly converted into size by digestion for 24 hours in water at 120° Fahr., the resulting solution being filtered through bags of double woollen-cloth.

Patent gelatins are often sold cut up in imitation of 'picked isinglass,' to which, for

the preparation of jellies, soups, and blancmanges, they are not much inferior.

Rough Gelatin. *Syn.* GELATINE BRUT, Fr. From the skulls of oxen, the spongy insides of the horns and ribs, and from several other soft bony parts (deprived of fat), by washing them in water, digesting in an equal weight of hydrochloric acid of 6° Baume, in cold weather, and 4° or 5° in summer, for 10 days, then in acid of only 1° Baume for 24 hours longer; afterwards soaking and washing in successive portions of cold water until all the acid is washed out, adding an ounce of carbonate of soda to the last water. Used to make glue, &c. A similar article is prepared from the bones of sheep. The pieces, after being treated as above, are steeped in boiling water for a few minutes, wiped dry, and shaken together in a bag to remove the internal pellicle; after which they are cut into squares or dice to disguise them, and finally dipped into a hot solution of gelatin to varnish them. In this state the article is called 'GELATINE BRUT FIN.' Used to make soup. It keeps better than the cakes of portable soup. When less carefully prepared, it is also used to make glue for fine work. See BONE GELATIN.

GELÉE (pour le Goitre). See LINIMENT OF IODIDE OF POTASSIUM.

GEMS. *Syn.* JEWELS; GEMMÆ, L. "Gems are precious stones, which, by their colour, limpidity, lustre, brilliant polish, purity, and rarity, are sought after as objects of dress and decoration. They form the principal part of the crown jewels of kings, not only from their beauty, but because they are supposed to comprise the greatest value in the smallest bulk; for a diamond, no larger than a nut, or an acorn, may be the representative sign of the territorial value of a whole country, the equivalent in commercial exchange for a hundred fortunes, acquired by severe toils and privations." "Among these beautiful minerals mankind have agreed in forming a select class, to which the title of gems or jewels has been appropriated; while the term precious stone is more particularly given to substances which often occur under a more considerable volume than fine stones ever do. Diamonds, sapphires, emeralds, rubies, topazes, hyacinths, and chrysoberyls, are reckoned the most valuable gems;—crystalline quartz, pellucid, opalescent, or of various hues, amethyst, lapis lazuli, malachite, jasper, agate, &c., are ranked in the much more numerous and inferior class of ornamental stones." (Ure.)

Tests. The only tests applicable to gems and precious stones are the determination of their relative hardness and their specific gravity. By the first test, pastes or factitious gems are readily detected; but beyond this, owing to the difficulty of applying it, it ceases to be useful to persons unconnected with the trade. The determination of the specific gravity is, however, of more general application, as gems are generally dismounted when offered for sale, or are so set that they may be removed from their 'mountings' without injury or inconvenience. See SPECIFIC GRAVITY, and *below*.

Obs. The relative hardness of the different substances is measured by the power they possess of cutting or scratching the other substances having a smaller number attached to them in the table. Thus, no gem but the DIAMOND (20) will scratch either the RUBY (17) or the SAPPHIRE (16); and, for the same reason, a blue stone that will cut the EMERALD or the TOPAZ can be no other than the SAPPHIRE. The sp. gr. is ascertained in the usual manner, and will be found sufficiently indicative of the true nature of the stone when considered in connection with its other characteristics. The index of refraction is a certain key to the quality of the stone, in the hands of those who are capable of determining it, and may be applied to either mounted or unmounted gems. The most convenient instrument for the purpose is Wollaston's 'REFLECTING GONIOMETER.'

Gems, Facti''tious. These, with few exceptions, are made of very pure, fusible, highly transparent, and dense glass, usually termed 'PASTE' or 'STRASS,' which is generally formed of oxide of lead, potassa, and silica, with small quantities of other ingredients to increase the brilliancy and clearness. The characteristic tints are imparted by the addition of metallic oxides. The beauty of artificial stones and gems depends, chiefly, upon the tint of the real stones being exactly imitated, and upon proper care and skill being exercised in the cutting, polishing, and mounting them. All the coloured glasses, and enamels, may be worked up into artificial gems. See ENAMELS, PASTES, &c.

TABLE *of the Hardness, Specific Gravity, and Refractive Power, of the principal* GEMS *and* PRECIOUS STONES, *and some other* MINERALS; *compiled expressly for this work.*

Name.	Relative Hardness.	Specific Gravity.	Index of Reflection
Agate	12	2·6	
Amethyst (occidental)	11	2·7	
Calcareous spar	6	2·7	
Chalk	3	2·7	
Chrysolite	10	3·7	
Cornelian	11	2·7	
Crystal	11	2·6	
Diamond (bluish)	19	3·3	2·13?
„ (cubic)	18	3·2	
„ (from Ormus)	20	3·7	
„ (pink)	19	3·4	
„ (yellowish)	19	3·3	
„ (average colourless	19 to 20	3·3 to 3·55	
Emerald	12	2·8	
Fluor spar	7	3·5	1·434
Garnet	12	4·4	1·815
Glass	} various {	2·3 to 3·62	1·525 to 2·028
„ (crystal or flint)		3·0 „ 3·6	1·830 „ 2·028
„ (plate)		2·5 „ 2·6	1·514 „ 1·542
Gypsum	5	2·3	
Jasper (green)	11	2·7	
„ (reddish yellow)	9	2·6	
Onyx	12	2·6	
Opal	10	2·6	
Quartz	10	2·7	1·548
Ruby	17	4·2	1·779
„ (pale, from Brazil)	16	3·5	
„ (spinelle)	13	3·4	1·764
Sapphire (deep blue)	16	3·8	1·794
„ (paler)	17	3·8	
Sardonyx	12	2·6	
Schoerl	10	3·6	
Topaz	15	4·2	
„ (Bohemian)	11	2·8	
„ (whitish)	14	3·5	
Tourmaline	10	3·0	
Zeolite	8	2·1	
Zircon	—	—	1·961

GENE'VA. See GIN and HOLLANDS.

GEN'TIAN ROOT. *Syn.* GENTIANÆ RADIX, L. The dried root of *Gentiana lutea*, or yellow gentian." *Dose.* 10 to 30 grs.; as a simple bitter, tonic, and stomachic, in dyspepsia, loss of appetite, gout, &c. It was formerly a favourite remedy in agues. "Joined with galls or tormentil, and given in sufficient quantity, it has not failed in any intermittents in which I have tried it." (Dr. Cullen.) In excessive doses it is apt to relax the bowels and disturb the system. When taken for some time, it imparts its bitter flavour to the perspiration and urine. See DECOCTION, EXTRACT, &c.

GEN'TIANIN. *Syn.* GENTIANINE; GENTIANINA, L. A substance obtained by MM. Henry and Caventou from the root of common gentian.

Prep. 1. Gentian root (in powder) is digested for 2 or 3 days in cold ether, with agitation, and the filtered tincture evaporated to dryness; the residuum is dissolved in rectified spirit, and the solution is again evaporated; the semi-crystalline mass is, lastly, redissolved in either alcohol or ether, and crystallised by careful evaporation.

2. (Magendie.) The ethereal extract is exhausted with cold alcohol (rectified spirit), as before, and the resulting tincture is evaporated to dryness; the residuum is dissolved in water, calcined magnesia added in excess, and the whole boiled and filtered; the sediment is digested in ether, and the ethereal tincture allowed to crystallise by slow evaporation.

Prop., &c. Gentianin forms golden-yellow needles, scarcely soluble in cold water, but very soluble in alcohol and ether. It is a

GRECIAN GILDING. In this variety sal-ammoniac and corrosive sublimate, equal parts, are dissolved in nitric acid, and a solution of gold made with this menstruum; after slight concentration the liquid is applied to the surface of silver, which immediately becomes black, but on being heated exhibits a rich gilded surface.

JAPANNER'S GILDING. The surface is covered with oil size thinned with spirits of turpentine, and gold, in powder, is gently dabbed on with a puff of wash leather. This gives the appearance of 'frosted gold.' A coating of varnish is next given, followed by exposure to a gentle heat in the 'stove.'

LEAF GILDING. This term is commonly applied to the gilding of paper, vellum, &c., by applying leaf gold to the surface, previously prepared with a coating of gum water, size, or white of egg. It is usually burnished with an agate or a dog's tooth.

MECHANICAL GILDING. See CHEMICAL GILDING (*above*).

MERCURIAL GILDING. See WASH GILDING (*below*).

OIL GILDING. This species of gilding may be divided into several operations. The following are the abridged instructions of a Parisian artist on the subject:—1. The surface is prepared by a coating of white lead in drying oil.—2. Another coat is given, made with calcined white lead or massicot, ground in linseed oil and turpentine. 3 or 4 coats of this mixture are often given, at intervals of at least 24 hours, observing to carefully smooth off each coat with pumice stone or shave grass before the application of the following ones.—3. The 'Gold Colour,' or paint, is next applied. It is usually very adhesive gold size, or the bottom of the pot or dish in which painters wash their brushes. For this purpose it is thoroughly ground and strained.—4. When the gold colour becomes partially dry and sufficiently tenacious, the gold leaf is applied, and pressed on with a wad of cotton-wool or a soft brush. It is now left for several days to harden.—5. A coat of spirit varnish is next given, and the object is cautiously passed over a chafing-dish of charcoal, observing to avoid stopping the motion of the piece whilst doing so, as the work would then become discloured and blistered.—6. The work is 'finished off' with pale oil varnish. For out-door gilding and common work, the varnishing process is generally omitted. This species of gilding is applied to woodwork, plaster, metal, &c.

VARNISH GILDING. This is a mere variety of oil gilding, applied to equipages, furniture, mirror and picture frames, &c., the surface being highly varnished and polished before it receives the size or gold colour; and after the gilding has become quite dry, a coat of spirit varnish, fumed with the chafing dish as above, is applied, followed by 2, 3, or more coats of the best copal varnish, at intervals of 3 or 4 days each. The whole is, lastly, carefully polished with tripoli and water.

WASH GILDING, AMALGAM G., MERCURIAL G., WATER G. This consists in the application of a thin coating of amalgam of gold to the metallic surface (brass, bronze, or copper) to be gilded, and the subsequent volatilisation of the mercury by heat. It is the usual method of gilding articles of copper and its alloys, and possesses great beauty and durability when skilfully executed. The occupation is, however, an unhealthy one, owing to the continual exposure of the workman to the fumes of mercury. The furnace invented by M. D'Arcet obviates this evil, as the whole of the volatilised mercury is carried off, and again condensed for further use. It should, therefore, be adopted by every water-gilder who studies economy and the health of those in his employ.

The process of water gilding consists in several distinct operations, and can only be successfully performed by those who have been schooled in the art by an apprenticeship to the trade. It would, therefore, be waste of space to enter into details here. Formulæ for several of the articles employed for the purpose will be found in their alphabetical places in this work.

WATER GILDING. See *above*.

Among the applications of the process of gilding that deserve a separate notice are the following:—

The gold letters and figures on the covers of BOOKS are thus formed:—Gum mastic, in fine powder, is dusted over the surface to be gilded; an iron or brass tool bearing the design upon its face is then heated to a proper temperature, and gently pressed upon a piece of leaf gold, which slightly adheres to it; the two are then transferred to the cover, and the tool is gently pressed on it, by which means the mastic softens and retains the gold. The loose gold and powdered mastic are then dusted off with a brush. Gold leaf will adhere to leather without the use of mastic, but not so firmly as when it is employed.

The edges of the leaves of books and paper are first cut perfectly smooth, and then washed over with a solution of isinglass in weak spirit, or with a varnish made of Armenian bole, 4 parts, and powdered sugar-candy, 1 part, mixed up to a proper consistence with strained white of egg. The coating is allowed to dry, and is then smoothed with a wet rag, after which the gold leaf is applied and polished with the burnisher.

BRASS BUTTONS, formerly so much in demand, are covered by a rough species of wash gilding. The buttons are polished in the lathe, and thrown into a pan with a little amalgam of gold, and as much aquafortis diluted with water as will wet them all over. Here they are well stirred up, until they assume a silvery appearance, when they are washed with clean water. They are then submitted to a

sufficient heat in a suitable apparatus, until the mercury is volatilised. The buttons are next cooled, and well tossed and rubbed about with a painter's brush; and are, lastly, burnished by washing them well with beer or ale grounds.

Twelve dozen (1 gross) of buttons, of 1 inch in diameter, may be perfectly gilded on both sides with only 5 grs. of gold. By an Act of Parliament, which is still unrepealed, this is the smallest quantity of gold permitted to be used for a gross of buttons of the above size.

GLASS, PORCELAIN, and EARTHENWARE, are gilded by blending powdered gold with gum-water and a little borax, and applying the mixture by means of a camel-hair pencil; the article is then heated in an oven or furnace, by which means the gum is burnt, and the borax, vitrifying, cements the gold to the surface. It is afterwards polished with a burnisher. Names, dates, or any fancy device, may thus be permanently and easily fixed on glass, china, earthenware, &c.

JAPANNED WORK is gilded by the method explained as 'Japanner's gilding' (*above*).

LEATHER is gilded in the same way as the covers of books. (See *above*.) For common work, silver leaf, or even tin foil, is applied to the surface, previously covered with size or white of egg, and after being burnished down and dried, is washed over with gold-coloured lacquer.

The LETTERS of sign-boards and the ornamental gilding for out-door work are done by first covering the design with yellow paint, then with oil gold-size, and when this is nearly dry applying the leaf-gold, observing to shield it properly from the wind, lest it be blown away or become crumpled before being properly attached. The work is, lastly, varnished.

POLISHED METALS may be gilded by one or other of the methods already noticed. Articles in silver, copper, brass, and bronze, are usually coated by the process of wash or water gilding; or, directly, by the application of gold leaf, as follows: — The piece or article is heated to a bluish tint, and gold leaf pressed gently and carefully on it with the burnisher; heat is again applied, and the process repeated with fresh leaves of gold until the gilding has acquired the proper thickness and tone. The surface is lastly polished with the burnisher, or is coloured in the usual manner at the stove. This succeeds with iron, steel, silver, copper and its alloys, &c. Another method for polished articles in iron and steel, which, however, is less durable than the preceding, is to apply an ethereal solution of gold to the surface with a camel-hair pencil. The ether flies off and leaves the surface coated with gold, which is then polished as before. In this way, any fancy device or writing may be executed on steel or iron with extreme facility.

SILKS, SATINS, WOOLLENS, IVORY, BONE, &c., may be readily gilded by immersing them in a solution of neutral terchloride of gold (1 of the salt, and 3 to 6 of water), and then exposing them to the action of hydrogen gas The latter part of the process may readily be performed by pouring some dilute sulphuric acid on zinc or iron filings, in a wide-mouthed bottle, and placing it under a jar or similar vessel, inverted, at the top of which the articles to be gilded are suspended. Flowers or other ornamental designs may be produced by painting them on the surface with a camel-hair pencil dipped in the solution. The design, after a few minutes' exposure to the hydrogen, shines with all the splendour of the purest gold, and will not tarnish on exposure to the air, or in washing.

GILDED THREAD or GOLD THREAD is merely a thread of yellow silk covered with a very thin flatted wire of gold, by means of a revolving wheel.

WIRE (copper, silver, or brass) is occasionally gilded, in coils, by a similar process to that adopted for BUTTONS; but more frequently as follows:—Rods (usually of silver) are covered with gold foil of a thickness proportionate to the quality of the intended wire, and the compound bar is then drawn into wire, in the usual way. 100 grs. of gold was formerly the lowest legal quantity that could be employed for 1 lb. of silver.

Patents. Among the varieties of chemical gilding may be mentioned—

1. (Elkington's patent—GERMAN GILDING, Bonnet's GILDING PROCESS.) The articles to be gilded, after being perfectly cleaned from scale or grease, and receiving a proper 'face,' are suspended, by means of wires, in the gilding liquid (boiling hot), and moved about therein for a period varying from a few seconds to a minute, or longer; the precise time required depending on the newness and strength of the liquid. When sufficiently gilded, the articles are withdrawn from the 'solution of gold,' washed in clean water, and dried; after which they undergo the usual operation of 'colouring,' &c. A dead gold appearance is produced by the application to the articles of a weak solution of nitrate of mercury previously to the immersion in the gilding liquor; or the deadening may be given by applying a solution of the nitrate to the newly gilded surface, and then expelling the mercury by heat.

The gilding liquor.—Take of fine gold, 5 oz. (troy); nitro-muriatic acid, 52 oz. (avoirdupois); dissolve by heat, and continue the heat until red or yellow vapours cease to be evolved; decant the clear liquid into a suitable vessel; add of distilled water, 4 galls.; pure bicarbonate of potassa, 20 lbs.; and boil for 2 hours. The nitro-muriatic acid is made with pure nitric acid (sp. gr. 1·45), 21 oz.; pure muriatic acid (sp. gr. 1·15), 17 oz.; and distilled water, 14 oz.

This process, though patented by Mr. Elkington in England, was in reality discovered and first practised by M. Bonnet, a foreigner. Articles thus gilded do not bear friction and

the operations of being put in colour (*mise en couleur*) so well as those gilded by the mercurial process, or by the methods of cold or leaf gilding as applied to polished metals.

2. (Talbot's patent.) By this process polished metallic articles are gilded by simple immersion in a solution of gallic acid in water, ether, or alcohol, to which a solution of gold has been previously added. SILVERING and PLATINISING may be effected in the same manner, by using a solution of either of these metals instead of one of gold.

*** These and other chemical processes have been almost completely superseded by the certain and economical process of ELECTRO-GILDING. See ELECTROTYPE.

Gilding Amalgam. See AMALGAM.

Gilding Liquor. This name has been given to various solutions of gold, and to other liquids employed in gilding. The former are noticed elsewhere. Among the latter are the following:

DEADING AQUAFORTIS. From mercury, 1 part, aquafortis (sp. gr. 1·33), 3 parts; dissolve, and add of soft water, 7 parts. Used to produce a dead-gold effect. It is applied (diluted) to the articles, before spreading the amalgam over them, in water gilding; or before placing them in the 'gilding liquor,' in the chemical processes.

MERCURIAL SOLUTION. From mercury, 10 parts, dissolved in aquafortis (sp. gr. 1·33), 11 parts, and the solution diluted with 25 times its weight of water. Used to moisten the scratch brush before drawing it over the amalgam, in mercurial gilding; also to deaden the gilded surface, by moistening the latter with it, and then exposing the piece to a heat sufficiently high to drive off the mercury.

GILDER'S PICKLE. From alum and common salt, of each, 1 oz.; nitre, 2 oz.; dissolved in water, ½ pint. Used to impart a rich colour to gold surfaces, especially of trinkets. Its application should not be too long continued, as it dissolves a small portion of the gold. For common purposes it is best used largely diluted with water.

VERMEIL, VERMEIL COATING, OR-MOLU C. From annotta and salt of tartar, of each, 1 oz.; dragon's blood, ½ oz.; water, 1 quart; simmer down to about one fourth, add saffron, 20 grs., and when merely tepid, strain through fine muslin into a bottle. Used to give lustre and fire to distemper gilding. A little is floated over the surface with a very soft, flat, camel-hair brush.

Gilding Metal. The metal employed as a base for gilding is usually brass, or a mixture of brass and copper. The following proportions have been recommended:—

1. Copper, 6 parts; brass, 1 part.
2. Copper, 4 parts; Bristol brass, 1 part.
3. Copper, 13 parts; old Bristol brass, 3 parts; tin, 14 parts.

Gilding Powder. *Prep.* 1. Pure gold, 5 drs.; pure copper, 1 dr.; aqua regia, 10 oz.; dissolve, moisten clean linen rags with the solution, dry them, and burn them to ashes. The latter contain the gold in a state of minute division, and must be carefully collected.

2. Grain gold, 1 dr.; rose copper, 15 grs.; aqua regia, 2 fl. oz.; proceed as last. Used in 'Gold Gilding.'

3. See Gold (in powder).

Gilding Shells. See GOLD SHELLS.

Gilding Size. See GOLD SIZE.

Gilding Wax. *Syn.* GILDING VARNISH, GILDER'S WAX. *Prep.* 1. From bees' wax, 4 oz.; verdigris and sulphate of copper, of each, 1 oz.; melted together.

2. Bees' wax, 4 oz.; verdigris, red ochre, and alum, of each, 1 oz. Used to give a red gold colour to water gilding.

GIN. *Syn.* GENE'VA. Corn spirit flavoured with either oil of juniper or oil of turpentine.

Gin was originally and, for some time, wholly imported from Holland, and was a rich, soft spirit, flavoured, chiefly, with juniper berries; on which account it had obtained the name of 'GENEVA,' from 'GENIÈVRE,' the French for juniper. After a time the distillation of an imitation geneva sprung up in this country, when the foreign spirit came to be called 'HOLLANDS,' or 'HOLLANDS GENEVA,' to distinguish it from the spirit of home manufacture. The English monosyllable 'GIN' is a corruption of geneva, the primary syllable of which, as in numerous other instances, was seized on by the vulgar, and adopted as a short and convenient substitute for the whole word.

The liquor at present known by the name of 'gin' in this country is a very different article to that imported from Holland, and consists of plain corn-spirit, flavoured with oil of turpentine and small quantities of certain aromatics. The thousand and one receipts for this article, which have from time to time been printed in books, produce a flavoured spirit bearing no resemblance to the more esteemed samples of English gin; and, if possible, the products are even more unlike genuine Hollands. Any person may easily satisfy himself of the truth of this assertion by actual experiment on the small scale. The cause of this incongruity has arisen chiefly from the writers not being practically acquainted with the subject, and from the disinclination of well-informed practical men to divulge, gratuitously, what they conceive to be valuable secrets. Hence the utter failure of any attempts to produce either gin or Hollands from the receipts usually published. The authors appear to have all imbibed a juniper-berry mania—probably from the imbibition of their favourite beverage. Oil of juniper, in the hands of these gentlemen, appears to be a perfect aqua mirabilis, that readily converts whiskey into gin, and imparts the rich creamy flavour of 'Schiedam Hollands' to crude corn or molasses spirit. But theory and experiment sometimes disagree. In prac-

tice, it is found that the true flavour of foreign geneva cannot be imparted to spirit by juniper alone, and that the English gin of the present day depends for its flavour on no such a substance. The following formulæ are merely given as specimens; and it is proper to remark, that every distiller has his own receipt for this notorious beverage. Hence it is that the gins of no two distillers are of precisely the same flavour; and this difference is still more marked when the distillers reside in parts of the country remote from each other. Booth's, Smith's, and Nicholson's gins have each a characteristic flavour, readily perceived by their respective votaries; whilst the difference between 'Plymouth' or 'Bristol gin,' and the 'gin of the metropolis,' is as remarkable as that between 'Barclay's XXX' and 'Guinness's bottled stout.' These variations in flavour generally depend on the use of more or less flavouring matter, or of a spirit more or less clean or free from taint; and, less frequently, on the addition of a small quantity of some peculiar aromatic, which exercises a modifying influence on the chief flavouring ingredient. In many cases the flavour has originated from accident, but the consumers having become accustomed to, and hence relishing, that particular 'palate,' it is found to be unwise or commercially impossible to alter it. Any change in these matters is therefore looked upon in every distillery as a dangerous innovation, which would prove more prejudicial to the prosperity of its exchequer than the repeal of the duty on French wines and brandy, or even a frightful conflagration. The distillers, like the brewers, are thorough conservatives in all matters connected with the flavour of their liquors.

In the preparation of gin, both sweetened and unsweetened, and indeed of liquors generally, the greatest possible care must be taken to avoid an excess of flavouring. The most esteemed samples are those that consist of very pure spirit, slightly flavoured.

Prep. 1. Clean corn spirit, at proof, 80 galls.; newly rectified oil of turpentine, 1¼ pint; mix well by violent agitation, add culinary salt, 14 lbs., dissolved in water, 40 galls.; again well agitate, and distil over 100 gallons, or until the faints begin to rise. *Product.* 100 galls. of gin 22 u. p., besides 2 galls. contained in the faints. If 100 galls. at 17 u. p. are required, 85 galls. of proof spirit, or its equivalent at any other strength, must be employed.

2. Proof spirit (as above), 8 galls.; oil of turpentine, 1 fl. oz.; salt, 1½ lb., dissolved in water, 4 galls.; draw over 10 galls., as before. 22 u. p.

3. Clean corn spirit, 80 galls.; oil of turpentine, 1 pint; pure oil of juniper, 3 fl. oz.; salt, 21 lbs.; water, 35 galls.; draw over 100 galls., as before. 22 u. p.

4. To the last, before distillation, add, of oil of caraway, ½ fl. oz.; oil of sweet fennel, ¼ fl. oz.; cardamoms (ground), 8 oz.

5. To No. 3, add, of essential oil of almonds, 1 dr.; essence of lemon, 4 drs.

6. To No. 1, before distillation, add of creasote, 3 fl. drs.

7. To No. 3, add of creasote, 2 drs.

8. Proof spirit, 80 galls.; oil of turpentine, ¾ pint; oil of juniper, ¼ pint; creasote, 2 drs.; oranges and lemons, sliced, of each, 9 in no.; macerate for a week, and distil 100 galls. 22 u. p.

9. To No. 1, add of rectified fusel oil, ½ pint.

10. To No. 1, add of oil of juniper, ½ pint.

Concluding remarks. The oil of turpentine for this purpose should be of the best quality, and not that usually vended for painting, which always contains resin and often fixed oil. Juniper berries, bitter almonds, and the aromatic seeds, may be used instead of the essential oils; but the latter are the most convenient. Turpentine conveys a plain-gin flavour,—juniper berries or oil gives a Hollands flavour,—creasote imparts a certain degree of smokiness, or whiskey flavour,—lemon and the other aromatics, a creaminess, fulness, and richness. The flavour imparted by cardamoms, when used judiciously, is peculiarly agreeable and appropriate. That from caraways is also in general esteem. Cassia in extremely small proportions also tells well. Fusel oil gives a whiskey-gin flavour; and in conjunction with creasote or crude pyroligneous acid, a full whiskey flavour. The only danger in the employment of all these articles is using too much of them. When this misfortune happens, the remedy is to add sufficient plain spirit to reduce the flavour to the proper standard. The creaminess and smoothness so much admired in 'foreign geneva' results chiefly from age. The English rectifier endeavours to imitate this by the addition of a little sugar. A rich mellowness, that combines well with gins turning on the 'Hollands flavour,' is given by a very small quantity of garlic, and with Canadian balsam or Strasburg turpentine. The peculiar piquancy, or the property of 'biting the palate,' regarded as a proof of strength and quality by the ignorant gin-drinker, is imparted to the liquor by the addition of a little caustic potassa. Sliced horseradish gives piquancy as well as mellowness. Grains of paradise, cayenne pepper, and sulphate of zinc, are also commonly added by fraudulent dealers.

Although gin is always prepared on the large scale by distillation, it may also be made by the simple solution or digestion of the flavouring ingredients in the spirit; but it is, of course, better for distillation. If made in the former way, no salt must be employed. The gin produced by the above formulæ is that denominated in the trade 'UNSWEETENED GIN,' 'GROG GIN,' &c.; but the gin usually sold in the metropolis is a sweetened spirit, and hence is technically dis-

tinguished by the terms 'SWEETENED,' or 'MADE UP.' The generality of London gin-drinkers prefer the latter article, even when weaker and inferior, which it usually is, as the addition of sugar permits adulteration and watering to an enormous extent with absolute impunity. Sweetened spirit cannot be easily tested for its strength, and is taken by the Excise at the strength which it is declared to possess by the dealer. To ascertain whether gin is sweetened or not, a little may be evaporated in a spoon, over a hot coal or a candle, when, if it is pure, it will leave the spoon scarcely soiled; but if, on the contrary, it has been sweetened, a small quantity of syrupy liquid, or sugar, will be obtained, the sweetness of which may be easily recognised by tasting it.

The whole of the casks and utensils employed for gin should be perfectly clean, and properly prepared, so as not to give colour; as, if this spirit acquires the palest coloured tint, its value is lessened, and if much coloured it is rendered unsaleable. When gin has once become much stained, the only remedy is to re-distil it; when it is only slightly stained, the addition of a few lbs. of acetic acid (B. P.) to a pipe or butt, a spoonful or two to a gallon, or a few drops to a decanterful, will usually decolour it, either at once or as soon as it is mixed with water to make grog. See ALCOHOLOMETRY, CASKS, DISTILLATION, HOLLANDS, SPIRITS, &c., and *below*.

Gin, Cor'dial. This is gin sweetened with sugar, and slightly aromatised.

Prep. Good gin (22 u. p.), 90 galls; oil of almonds, 1 dr.; oils of cassia, nutmeg, and lemon, of each, 2 drs.; oils of juniper, caraway, and coriander, of each, 3 drs.; essences of orris root and cardamoms, of each, 5 fl. oz.; orange-flower water, 3 pints; lump sugar, 56 to 60 lbs.; dissolved in water, 4 galls. The essences are dissolved in 2 quarts of spirit of wine, and added gradually to the gin until the requisite flavour is produced, when the sugar (dissolved) is mixed in, along with a sufficient quantity of soft water, holding 4 oz. of alum in solution, to make up 100 galls. When the whole is perfectly mixed, 2 oz. of salt of tartar, dissolved in 2 or 3 quarts of hot water, are added, and the liquor is again well rummaged up; after which the cask is bunged up, and allowed to repose. In a week, or less, it will have become brilliant, and may be either 'racked,' or drawn from the same cask. *Product.* 100 galls., about 30 u. p.

Gin, Sweetened. *Prep.* From unsweetened gin (22 u. p.), 95 galls.; lump sugar, 40 to 45 lbs., dissolved in clear water, 3 galls.; mix well, and fine it down as above. *Product.* 100 galls., at 26 u. p. This, as well as the last, is usually 'permitted' at 22 or 24 u. p., which is also done when the gin has been further lowered with water so as to be even 30 or 35 u. p. See SPIRITS, and *above*.

GIN'GER. *Syn.* GINGER ROOT; ZINGIBERIS RADIX, ZINGIBER (B. P.), L. "The scraped and dried rhizome" (rootstock or underground stem) of "*Zingiber officinale.*"—(B. P.). Ginger is an aromatic stimulant and stomachic, very useful in flatulence and spasms of the stomach and bowels, and in loss of appetite and dyspepsia, arising from debility, or occurring in old or gouty subjects. A piece chewed an hour before dinner tends to provoke the appetite; as a masticatory, it often relieves toothache, relaxation of the uvula, tender gums, and paralytic affections of the tongue. Made into a paste with warm water, and spread on paper, it forms a useful and simple 'head-ache-plaster,' which frequently gives relief when applied to the forehead or temples. As a condiment and flavouring ingredient, it is perhaps one of the most wholesome of the aromatic kinds, and is less acrid than the peppers. *Dose.* 10 grs. to ½ teaspoonful, stirred up in any simple liquid.

Pur., &c. The best is that known in commerce as 'UNBLEACHED JAMAICA GINGER,' which is an uncoated pale variety, occurring in large, bold, fleshy pieces ('RACES'), which cut soft, bright, and pale-coloured. The inferior varieties occur in smaller pieces, and are darker-coloured, flinty, and shrivelled. The dealers frequently 'dress up' the common dark-coloured gingers by washing them in water, drying them, and then 'rouncing' them in a bag with a little calcined whiting or magnesia (WASHED GINGER); or they bleach them by dipping them into a solution of chloride of lime, or by exposing them to the fumes of burning sulphur (BLEACHED GINGER); or they dip them into a milk formed of quicklime or whiting and water (WHITE-WASHED GINGER). The last has a chalk-white surface, which cannot be mistaken for the natural one. POWDERED GINGER is with difficulty obtained pure and good. The common adulterants are wheat-flour, or East Indian arrow-root, and plantain meal. The first may be detected by the microscope, the others by the flavour and action of hot water. See LOZENGES, &c.

Preserved Ginger. *Syn.* CONDITUM ZINGIBERIS, L. An excellent stomachic sweatmeat or preserve. It is chiefly imported from the West Indies and China. See CANDYING, &c.

A Factitious Preserved Ginger is sometimes met with, prepared from the stalks of lettuce just going to seed, using a concentrated syrup, strongly flavoured with Jamaica ginger. See CANDY, &c.

GIN'GER BEER. See BEER.

GIN'GERBREAD. *Prep.* 1. (Dr. Colquhoun.) Flour, 1 lb.; carbonate of magnesia, ½ oz.; mix; add, of treacle, ½ lb.; moist sugar, ½ lb.; melted butter, 2 oz.; tartaric acid (dissolved in a little water), 1 dr.; make a stiff dough, then add of powdered ginger and cinnamon (cassia), of each, 1 dr.; grated nutmeg, 1 oz.; set it aside for half an hour or an hour before putting it into the oven. *Obs.* It should not be kept

onger than two or three hours, at the utmost, before being baked.

2. Flour and treacle, of each, 1 lb.; butter, 1½ oz.; carbonate of magnesia, 1 oz.; add spices (ginger, cinnamon, nutmeg, allspice, cayenne, corianders, &c.) to taste; mix as last. *Obs.* Fit for baking in from four to six hours.

3. Flour, 2 lbs.; carbonate of magnesia, ½ oz.; mix; add, treacle, 1½ lb.; butter, 2 oz.; spice, q. s.; tartaric acid, ¼ oz.; mix quickly, and make it into forms. *Obs.* Ripe for the oven in half an hour to one hour.

4. Instead of tartaric acid in the last formula, use cream of tartar (dissolved in water), 2 oz. *Obs.* Ripens in 40 or 50 minutes.

5. Flour or fine pollard, 1 lb.; treacle, ¾ lb.; salt of tartar, ½ oz., dissolved in water, q. s.; butter, 1 oz.; spices, to palate. *Obs.* Takes several days to ripen; sometimes a fortnight.

6. (Extemporaneous.)—*a.* From flour, 1¼ lb.; moist sugar and treacle, of each, ½ lb.; butter, 2½ oz.; baker's salt (carbonate of ammonia), ¼ oz., dissolved in cold water, q. s.; ginger, 3 drs.; nutmeg, 2 drs.; cassia, 1 dr.; cayenne pepper (best), ½ dr.

b. From flour, 6 lbs.; powered ginger, 2½ oz.; caraway seeds, 1 oz. (and other spices to palate); candied lemon and orange peels, of each, 2 oz.; moist sugar and melted butter, of each, ½ lb.; treacle, 4 lbs.; volatile salt, 2 oz.; water, q. s.; mix as above. May be baked at once.

c. From Jones's patent flour, 2 lbs.; treacle, 1 lb.; moist sugar, ¾ lb.; butter, 2½ oz.; spice, q. s.; mix as quickly as possible, and bake it instantly. If the dough is expertly mixed up. the quality of the product is fully equal, if not superior, to that of any of the preceding formulæ.

Obs. Gingerbread is either rolled out into thin sheets and cut into cakes or nuts (GINGERBREAD NUTS) with the top of a wine-glass or canister, or is formed into thick cakes, which are baked in 'batches' (ordinary GINGERBREAD). Both varieties require a pretty brisk oven; the thinner kinds (nuts, &c.), especially, must be baked as crisp as possible, without being burnt. The varieties called LEMON GINGERBREAD, CARAWAY G., &c., have a perceptible predominance of these flavouring ingredients. The addition of a little alum, dissolved in water, makes the bread both lighter and crisper, and causes it to ripen quicker, but at the same time lessens its wholesomeness.

GIN'GER CAN'DY. See CANDYING.

GIN'GER DROPS. See DROPS (Confectionery).

GLAIRE. White of egg. See ALBUMEN and EGG.

GLAN'DERS. *Syn.* FARCINOMA, L. A contagious disease, generally confined to the horse, ass, and mule, but communicable to man, in whom it assumes a highly malignant and often fatal character. This disease appears under two forms—1. SIMPLE ACUTE GLANDERS, marked by copious discharge of foul mucous matter from the nostrils and adjacent parts; and—2. FARCY, FARCIN, or FARCY GLANDERS, when it attacks the lymphatics of the skin, either generally, producing a distended appearance of the vessels, like moles or buttons (LEAD or BUTTON FARCY), or locally, when it takes the form of dropsical accumulations in the legs (WATER FARCY).

Treat. Mr. Youatt considers it useless to attempt the cure of glandered horses; but that farcy in its earlier stages and milder forms may be often successfully treated. "All the mercurials have been used with benefit in farcy; but they must be discontinued as soon as the mouth is sufficiently affected, or sickness, loss of appetite, and like symptoms, are produced." (Blaine.) Feeding the animal entirely on green food appears to be the best mode of treatment in both varieties. The buttons are generally removed with caustic or a red-hot iron.

GLASS. *Syn.* VITRUM, L. This well-known substance is essentially a mixture of silicates with an excess of silica or silicic acid. It generally contains the silicates of potassa, soda, lime, baryta, magnesia, alumina, and lead, coloured by small portions of iron, manganese, cobalt, uranium, copper, or gold. In its usual form, it is brittle, transparent, non-crystalline, insoluble, and fusible; but it sometimes exhibits other properties.

The manufacture of glass is one of the highest beauty, and considering the comparative worthlessness of the materials of which it is made, and the various purposes of a useful, ornamental, and scientific nature which it subserves, it may be regarded as, perhaps, the most important in the history of inventions. The principle of its production is very simple, although great skill and experience are necessary to ensure its excellence. Silica (commonly under the form of sand) is heated with carbonate of potassa or of soda, and slaked lime or oxide of lead, until the mixture fuses, and combination takes place. After a time the melted mass becomes perfectly limpid and free from air-bubbles, when it is allowed to cool until it assumes the peculiar tenacious condition proper for working. The operation of fusion is conducted in large crucibles of refractory fire-clay, which, in the case of 'lead-glass,' are covered with a dome, at the top, and have an opening at the side by which the materials are introduced, and the melted glass withdrawn.

The manufacture of glass is only conducted on the large scale, and the precise character and proportions of the ingredients used by the glass-maker, must necessarily greatly depend upon the nature of the raw materials furnished by his locality, or otherwise at his command. The attention of the manufacturer should be directed to the use of his materials in such proportions as will furnish, in the melting-pot, the proper quantities of the essential ingredients, as determined from the known composition of the best commercial samples. The purity of the raw materials and the accuracy

of his proportions and quantities are proved or disproved by the excellence of the product; and the cause of error (if any) may be at once determined by carefully ascertaining the quality of the ingredients employed, and the composition of the defective glass.

Prep. The following formulæ exhibit the composition of the leading commercial glasses, as shown by chemical analysis, together with the proportions of the raw materials used in their production.

BOTTLE GLASS. Sp. gr. 2·700 to 2·735.—

a. Composition by analysis:—

1. Silica, 53·55%; lime, 29·22%; mixed alkali, 5·48%; alumina, 6·01%; oxide of iron, 5·74%. Dark green.

2. Silica, 52%; baryta, 21·6%; soda, 26·1%; oxides of iron and manganese, ·3%. Pale green; very superior.

b. Raw materials used:—

1. Yellow sand, 20%; kelp, 8%; lixiviated wood-ashes, 30%; fresh wood-ashes, 8%; pale clay, 16%; 'cullet' (broken glass), 18%. This is the common mixture for coarse bottles, in Belgium, France, and Germany.

2. To the last add of black oxide of manganese, 2½ to 3%. Has a rich yellowish colour; used for Rhenish-wine bottles.

3. Pale sand, 51%; lixiviated wood-ashes, 33%; pearl-ashes (dried), 8%; common salt, 7½ %; white arsenic, ½ %; charcoal, q.s. Very pale green.

4. Siliceous sand (pale), 68½ %; potash (or its equiv.), 4%; lime, 23½ %; heavy spar, 2½ %; peroxide of manganese, 1½ %. This forms the celebrated 'flask-glass' of St. Etienne.

BROAD GLASS, SPREAD WINDOW GLASS. Sp. gr. 2·642.—

a. By analysis:—

Silica, 69·70%; lime, 13·30%; soda, 15·25%; oxide of iron (and loss), 1·75%.

b. Materials used:—

1. White sand, 50%; dried sulphate of soda, 22%; charcoal (in powder), 9%; 'cullet,' 41%; peroxide of manganese, a little. Pale.

2. White sand, 60%; potashes (good), 24%; common salt, 10%; nitre, 5%; white arsenic, 1%; peroxide of manganese, a little (1/10 to 1/12 %); pale 'cullet,' at will (10 to 30%). Very pale. This is the 'spread' or 'sheet window-glass' in common use.

CHEMICAL GLASS. Sp. gr. 2·390 to 2·396.—

a. By analysis:—

1. Silica, 72·80%; potassa, 16·80%; lime (with a trace of alumina), 9·68%; magnesia, 40%; traces of oxide of manganese and iron (and loss), ·32%. This is the difficultly fusible 'Bohemian tube-glass,' so valuable in chemical manipulations.

2. Silica, 69·3%; potassa, 15·8%; soda, 3%; lime, 7·6%; alumina, 1·2%; magnesia, 2%; oxide of iron, ·5%; oxide of manganese (and loss), ·6%. English chemical glass (without lead). More fusible than the last.

b. Materials used:—

1. Quartz (hyalin, in powder), 60%; calcined purified pearlash, 30%; fresh-burnt lime (very pure), 9%; nitre (dried), ¾ %; arsenious acid or peroxide of manganese, ¼ %. Said to be the proportions used in the production of *a*, 1 (*above*).

2. (M. Peligot.) Quartz, 71½ %; carbonate of potassa (or its equiv., dry), 20%; quicklime, 8½ %; (manganese, a little). Said to be the formula for the hardest and least fusible 'Bohemian tube-glass.' It is very intractable and infusible, except at a very high temperature; but the addition of an exceedingly small quantity of boracic acid, borax, or arsenious acid, causes it to flow into a glass possessing great brilliancy and hardness, and capable of being wrought at the highest heat of the ordinary furnace.

CROWN GLASS, WHITE WINDOW-GLASS. Sp. gr. 2·486 to 2·488.—

a. By analysis:—

1. Silica, 62·8%; potassa, 22·1%; lime, 12·5%; alumina (with traces of oxide of iron and manganese), 2·6%. Crown-glass of Bohemia, according to Dumas. Very beautiful.

2. Silica, 72·5%; soda, 17·75%; lime, 9·75%. English crown-glass; excellent quality, but not so white as the last.

b. Materials used:—

1. Finest white siliceous sand, 64%; purified potashes (dry), 23%; lime, 12%; white arsenic, ¾ %; oxide of manganese, ¼ %. Said to be used in Bohemia.

2. (Schweigger.) Pure sand, 57%; dry sulphate of soda, 28½ %; quicklime, 11½ %; powdered charcoal, 3 or 4%. Corresponds to *a*, 2, *above* (nearly).

3. Pure sand, 40%; soda ash, 24%; lime, 5%; white 'cullet,' 31%. Rather superior to the last.

CRYSTAL, CRYSTAL GLASS. The 'crystal glass' of England is flint glass' of superior quality; that of Bohemia is noticed under TABLE GLASS.

FLINT GLASS, CRYSTAL. Sp. gr. 3·000 to 3·620.—

a. By analysis:—

1. (Berthier.) Silica, 59·19%; oxide of lead, 28·68%; potassa, 12·13%; oxides of iron and manganese, traces. Finest colourless English crystal.

2. (Brande; Faraday.) Silica, 52%; oxide of lead, 34%; potassa, 34%. Crystal.

3. (Faraday.) Silica, 44·30%; oxide of lead, 43·05%; potassa, 11·75%; alumina, ·50%; oxides of iron and manganese, ·12%; (loss 28%). Heaviest of three samples of flint glass examined.

b. Materials used:—

1. Finest Lynn-sand (calcined, sifted, and washed), 51%; litharge (purest), 28% (or red lead, 29%), refined pearlashes (calcined before being weighed), 16%; nitre (purified), 4½ %; arsenious acid and peroxide of manganese, of each, ⅛ %. Very fine crystal.

2. (M. Payen.) Fine sand, 46%; red lead, 31%; purified carbonate of potash, 23%. French crystal.

3. (Geddes.) White Lynn-sand, 51%; red

lead or litharge, 33%; refined pearlashes, 13%; nitre, 3%; a very little arsenious acid and peroxide of manganese. Ordinary English flint-glass. Crystal 'cullet' may be added at will to the above. This glass was originally prepared from powdered flints, a fact to which it owes its common name.

OPTICAL GLASS. 1. (Crown glass.) Purest siliceous sand, 55%; carbonate of soda (dry), 12%; chalk (dry), 11%; carbonate of baryta, 22%.

2. (Flint glass.)—

a. By analysis:—

Silica, 44·30%; oxide of lead, 43·05%; potassa, 11·75%. This is Guinand's 'dense optical glass.'

b. Materials used:—

1. Purest quartz, 42%; red lead (finest), 42%; purified potash, 14$\frac{1}{2}$%; purified nitre, 1$\frac{1}{4}$%. These are the proportions used for the last.

2. (Korner.) Finest quartz (reduced to powder, treated with hydrochloric acid, washed, and dried), 47$\frac{1}{2}$%; red lead, 38$\frac{1}{4}$%; cream of tartar, 14$\frac{1}{2}$%. The above are used by opticians in the construction of achromatic object-glasses.

PLATE GLASS. Sp. gr. 2·488 to 2·600.—

a. By analysis:—

1. (Dumas.) Silica, 75·9%; soda, 17·5%; lime, 3·8%; alumina, 2·8%. French mirror-glass.

2. (Mitscherlich.) Silica, 60%; potassa, 25%; lime, 12·5%; (loss, 2·5% ?). Finest Bohemian plate.

b. Materials used:—

1. Finest siliceous sand, 45%; dried carbonate of soda, 25%; lime, 5%; nitre (purified), 2%; plate-glass cullet, 23%; peroxide of manganese and cobalt azure, a very little. Ordinary English plate.

2. Whitish quartz sand, 60%; purified carbonate of soda (dried), 20%; lime (slaked by exposure to the air), 9%; plate-glass cullet, 11% (or more). Sometimes as much cullet as sand is used; but in all cases 1% to 1$\frac{1}{2}$% of its weight in carbonate of soda is added with it, besides that ordered in the formulæ, to compensate for loss of alkali by remelting. *Used* at the celebrated plate-glass works at Saint-Gobain, France. The product possesses an amount of excellence which British manufacturers have yet failed to equal.

TABLE GLASS, BOHEMIAN CRYSTAL. Sp. gr. 2·6 to 2·8.—

a. By analysis:—

1. (M. Berthier.) Silica, 71·7%; potassa, 12·7%; soda, 2·3%; lime, 10·3%; alumina, ·4%; oxides of iron and manganese (and loss), 2·6%. Very white, hard, and beautiful table glass.

2. (Dumas.) Silica, 70%; potassa, 20%; lime, 4%; alumina, 5%; oxide of iron, ·6%; peroxide of manganese, ·4%. A beautiful white wine-glass.

b. Materials used:—

1. Finest sand, 50%; purified potashes, 25%; chalk, 10%; nitre, 2%; crystal cullet, 27%; manganese, a little (say $\frac{1}{16}$%). *Used* in England recently for table glass.

2. Quartz (hyalin, in powder), 63%; purified potashes, 26%; slaked lime (carefully sifted), 11%; manganese, a little; crystal cullet, at will. *Used* in Bohemia.

3. (M. Perdonnet.) Powdered quartz, 44%; carbonate of potassa, 33%; quicklime (in fine powder), 22%; nitre, 1%; and a very small quantity of arsenious acid and peroxide of manganese. Said to be the formula used at Neuwelt for the glass *a*, 1 (*above*).

Qual., &c. These are denoted by its hardness, transparency, homogeneity, strength, and power of resisting the action of water, air, light, and the stronger acids and alkalies. The power of glass to resist the action of menstrua is readily tried by exposing it to boiling oil of vitriol, and hot but dilute solution of caustic potassa. Neither of these tests should cause the glass to lose its transparency or to become dim.

Swallowed glass. Glass and enamel, both in fragments and in powder, have occasionally been swallowed, with different results. These bodies are insoluble in the fluids of the body, and, consequently, any injurious action they may exert upon the system whilst they are retained in it must entirely depend upon mechanical attrition or irritation. As treatment, we must administer an emetic, and assist its action by thick mucilaginous liquids, and afterwards have recourse to antiphlogistics, if necessary.

Anal.—a. A portion of the sample for examination is heated to dull redness, and then suddenly thrown, whilst still hot, into a vessel of cold water. It is next dried, and reduced to fine powder in an agate or hardened-steel mortar.

b. 100 grs. of the prepared powder is thoroughly mixed with 200 grs. of pure potassic hydrate, and the whole is exposed to heat in a silver or platinum crucible or capsule until perfect fusion takes place; when cold, the crucible and its contents are boiled in about half a pint of distilled water; nitric acid is added to the resulting solution, in excess, and the mixture, together with any sediment, is evaporated to dryness, after which the heat is gradually increased to 400° or 500° Fahr.; the dry residuum is next reduced to powder, and digested in water acidulated with nitric acid, until exhausted of soluble matter; the insoluble portion is then carefully dried, gently ignited, and weighed. The weight in grains represents the per-centage of silica in the sample examined.

c. The mixed liquid and washings of (*b*) is next acidulated with nitric acid, and treated to a stream of sulphuretted hydrogen, which, if it produces a precipitate, is continued for some time; the precipitate is collected on a very small filter, washed, and dried; the filter with the precipitate next placed in a beaker

glass, and strong fuming nitric acid is cautiously added, drop by drop, until complete solution takes place; after boiling the solution for a few minutes, diluting with distilled water, and allowing it to cool, it is precipitated with sulphuric acid, in excess; this precipitate (sulphate of lead) is washed, dried, slightly ignited in a porcelain crucible, and weighed. The weight in grains, multiplied by ·7369, gives the per-centage of oxide of lead or litharge.

d. The filtered liquid from (*c*) is evaporated to dryness, and redissolved in water acidulated with hydrochloric acid, and treated with a solution of ammonium chloride, and afterwards with ammonia, in excess; the precipitate (alumina and oxide of iron) is collected, washed, and boiled in a solution of potassium hydrate; the undissolved portion is collected on a filter, washed with boiling water, ignited, and weighed. This gives the per-centage of peroxide of iron.

e. The liquid filtered from the oxide of iron holds the alumina (if any) in solution; a solution of carbonate of ammonium is dropped in; the resulting precipitate is washed, dried, ignited, and weighed. This gives the per-centage of alumina.

f. The filtrate from the alumina and oxide of iron (see *d*), after being evaporated to dryness, is redissolved in a large quantity of distilled water, and is treated with a solution of oxalic acid (a solution of oxalate of ammonium is preferable when no baryta is present); the precipitate is washed, dried, gently ignited, and weighed. The weight of the resulting carbonate of calcium, in grains, multiplied by ·56292, gives the per-centage of lime required.

g. The filtrate from (*f*) is now mixed with carbonate of potassium, in considerable excess, and boiled for a long time; the resulting precipitate (if any) is then collected on a filter, slightly washed with hot water, dried, and exposed to a full red heat for some time (say 2 hours); the residuum of the calcination is then weighed. This furnishes the per-centage value of the sample in magnesia.

h. The filtrate from (*f*) is treated with dilute sulphuric acid or the solution of a sulphate, as long as a precipitate falls; the precipitate (sulphate of barytium) is washed, dried, gently ignited, and weighed. The weight, in grains, multiplied by ·6589, gives the per-centage of baryta in the sample.

The above may be varied by gently concentrating the liquid filtered from the precipitate of alumina and oxide of iron (see *d*), and precipitating it with dilute sulphuric acid; the mixed precipitate is exhausted by digestion in water holding chloride of ammonium in solution; the undissolved residuum (sulphate of barytium) is washed, dried, and otherwise treated as before; whilst the solution with the washings is treated with a solution of carbonate of ammonium; the precipitate is carbonate of calcium, which is to be washed, &c., as directed under (*f*). The liquor, &c., filtered from the lime, is lastly tested for magnesia. (See *g.*)

i. A second 100 grs. of the powdered glass (see *a*) is mixed with 200 grs. of fluor spar, also in powder; the compound is placed in a platinum or leaden capsule, 500 grs. of strong sulphuric acid are added, and the whole cautiously stirred together with a silver stirrer or spoon, care being taken to avoid inhaling the fumes; the heat of a spirit lamp is next applied, and at first is kept at about 212° Fahr., but towards the conclusion of the process is raised to 300° Fahr., or even higher, and is continued for at least 2 hours, or until fumes entirely cease to be evolved; 5 or 6 fl. oz. of distilled water are next poured on the residuary mass, and, after thorough agitation, the whole is thrown on a filter, more water being at last poured on to wash out any remains of soluble matter; to the filtrate, carbonate of ammonium is added in excess, and after a time the earthy salts are removed by filtration; the filtered liquor is now evaporated to dryness, and ignited to dull redness for 2 or 3 minutes; the residuum (sulphate of potassium or sodium), or of both), after being weighed (the weight being carefully noted down), is redissolved in distilled water; a solution of chloride of barium is then added as long as it disturbs the liquor, and after a time the whole is again filtered; the filtrate is concentrated by evaporation, and solution of bichloride of platinum added in excess; the whole is now gently evaporated to dryness, mixed with alcohol, collected on a filter, carefully washed with weak alcohol, dried at a temperature under 212° Fahr., and weighed. The weight, in grains, multiplied by ·1940, gives the per-centage of potassa sought.

k. The weight of sulphate of potassium in the ignited residuum in (*i*) is calculated from that of the potassium last found (47 parts of the one being equal to 87 parts of the other), and this weight is deducted from the gross weight of the ignited sulphates; the remainder represents the quantity of sulphate of sodium present. The weight of the latter, in grains, multiplied by ·4367, gives the per-centage of pure soda required.

Concluding remarks. One of the chief points to which the skilful glass manufacturer directs his attention, is the quality of the materials. Great care is exercised in the selection of the sand for all the finer varieties of glass. The usual practice is to test it before using it, by exposing it to a very high temperature. The purest sand is that which is the whitest and freest from iron, and which, consequently, suffers the least alteration by this treatment. The alkalies (potash, soda) employed are purified by solution and crystallisation. The red lead and litharge must be pure and absolutely free from oxide of copper (a common contamination), which gives a green tint to the

glass. The former, which is the most costly, is preferable to the finest crystal. Care must also be taken that the lime, clay, &c., are respectively of proper purity; and that the 'cullet,' or broken glass, which is almost always remelted with the other materials, is of proper quality, and of the same kind as that to which it is added. Potassa produces a better glass than soda, although the latter is now very generally employed, from its lower price. It is, however, quite inadmissible as an ingredient in the manufacture of the better class of crystal and plate glass, as, however pure it may be, it imparts to the product a slight greenish tinge more or less destructive of its beauty. When sulphate of soda (Glauber salt) is used as a source of soda, it is gently calcined to dissipate its water of crystallisation, and requires the addition of about 8% of charcoal to effect its reduction in the melting-pot. Common salt is also employed as a source of soda in the same manner. Sometimes native sulphide of lead (galena) is used to decompose the sulphate of soda, and in lieu of part of the oxide of lead; in which case about 5 parts of the sulphuret are taken for every 9 parts of the calcined sulphate.

To anticipate the results of his processes, and to carry out with certainty his various intentions, the glass manufacturer, perhaps more than any other person, requires the aid of science and experience. All his most essential operations depend on chemical principles. The products of his furnaces are not formed by the mere mechanical admixture of their several ingredients whilst in the state of fusion, but result from the play of delicate affinities which only act under certain conditions, and when the materials are presented to each other in uniform and definite proportions. Chemically speaking, the glasses are mixed supersilicates of the respective bases which enter into their composition (potassium, calcium, lead, &c.), and, like all other compounds which are formed by elective attraction, obey the common laws of combination, as developed by Dalton, and now so successfully applied in almost every department of industrial art. It has been shown by the most careful analysis, that in all the more valuable and beautiful commercial glasses the relative proportions of the materials are conformable to these laws, and that several of them are true atomic compounds, as perfect in this respect as the crystalline bodies commonly denominated salts. In some of the harder glasses of Bohemia the number of atoms or equivalents of silica are to each of the bases with which it is united, nearly as 5 to 1; whilst in a softer glass of German manufacture the proportions of the two are found to be as 4 to 1. The celebrated plate glass of St. Gobain is an atomic compound formed of 1 equivalent of trisilicate of soda united to 1 equivalent of trisilicate of lime, with a small per-centage of alumina in combination with silicic acid, also in atomic proportion. Glasses in which the ingredients bear no atomic ratio to each other are never homogeneous, but always more or less striated and of unequal colour and refractive power. The absence of atomic proportion between the substances entering into its composition appears to be the only reason why the best English plate and mirror glass is so greatly inferior to that of France and Germany, that comparison of the two becomes absurd. The only variety of glass in the production of which the English manufacturer excels is flint glass or crystal, and here he certainly surpasses all his numerous competitors. The subject is doubtless involved in difficulty, owing to the precise temperature necessary to effect the perfect combination of the bases with the silicic acid, varying with the character of the compound, and not being satisfactorily settled by observation or experience. The modifying influence of temperature is shown by the fact that the lower the heat employed in the process, the smaller the quantity of silica which enters into the composition of the resulting glass; whilst at higher temperatures a part of the base is dissipated in fumes, until such proportions of base and acid result as are required to produce a permanent atomic compound corresponding to the temperature employed. If the heat is excessive or improperly continued, the loss of base produces an opposite effect, and an opaque, semi-vitrified mass is formed, resembling 'Reaumur's porcelain.' The quality of the resulting glass depends on this change being more or less complete. If the furnace yields the right temperature, and the duration of the exposure to its action is neither too short nor too prolonged, nature makes up for the unskilful conduct of the operative, and removes the stumbling blocks which his ignorance had placed in the way of his own attempts at excellence. The proceedings and their results are accidental; but being once obtained, the first are repeated without further trouble or inquiry. This accounts for the same mixture of materials yielding products of different qualities at different times, and in different works, which the operative contents himself with referring to the 'going of the furnace.' The common plan in this country is to regulate the proportions and firing by experience only, rather than by theory and practice combined. Now, although the chemist has much yet to learn on the precise constitution of the glasses, and although theory may not be able to ensure unvarying success, it is nevertheless certain that, in all cases, it can afford much valuable assistance in that direction. Indeed, it has been asserted by one of the leading Continental chemists, that ingredients that will yield the proper equivalent proportions in the melting pot cannot produce a bad glass, if exposed to such a temperature as to permit of perfect combination taking place.

It is found that those glasses which contain

quantity of gliadin. It is prepared by washing paste made of the flour of wheat or rye in successive waters until all starchy matter is removed. The paste may be conveniently enclosed in a bag of fine linen during the washing.

Prop., Uses. Gluten is believed to be eminently nutritious. It is the presence of gluten in wheaten flour that imparts to it its viscidity or tenacity, and confers upon it its peculiar excellence for the manufacture of MACARONI, VERMICELLI, and similar pastes. The superiority of wheaten over other bread depends upon the greater tenacity of its dough, which during the fermentation is puffed up by the evolved carbonic acid, and retained in its vesicular texture so as to form a light loaf.

Gluten is grayish coloured, and extensible whilst fresh and moist, like caoutchouc. It turns blue when mixed with guaiacum resin.

Gluten Bread. *Prep.* 1. From wheat flour which has been deprived of about 2-3rds of its starch by washing it with water.

2. From gluten flour. Recommended in diabetes.

Gluten Choc'olate. (Gentile's.) A mixture of cocoa and gluten flour. As a nutritious and appropriate food in diabetes.

Gluten Flour. *Prep.* 1. From the waste gluten of the starch works, washed, dried, and ground.

2. (Gentile's.) From the last, mixed with about an equal weight of wheat flour.

GLYC'ERIN. $C_3H_8O_3$. *Syn.* GLYCERINE, HYDRATED OXIDE OF GLYCERYL; GLYCERINUM, L. A sweet syrupy liquid formed during the saponification of oils and fats.

Prep. 1. Olive oil (or other suitable oil), protoxide of lead, and water, are heated together until an insoluble soap of lead (lead plaster) is formed. The glycerin remains in the aqueous liquid. As this crude solution of glycerin is produced in great quantities in the manufacture of lead plaster, the operative chemist has only to purify it. This may be done as follows:—

The water and washings from lead plaster are mixed together, filtered, and submitted to the action of a stream of sulphuretted hydrogen, to throw down the lead; the supernatant liquor is decanted from the precipitate, filtered, and evaporated to the consistence of a syrup in a water bath. To render it quite pure it is diluted with water, decoloured with a little animal charcoal, filtered, and again evaporated to the consistence of a thin syrup, after which it is further evaporated in vacuo, or over sulphuric acid, until it acquires the sp. gr. 1·265.

2. (M. Bruère-Perrin.) From the sweet liquor of the stearine works (a product of the process of lime-saponification). The quantity of lime present in the sample is first determined by means of oxalic acid, and the proportion of sulphuric acid necessary for its saturation at once calculated and added; the crude liquor is then concentrated in a tinned-copper vessel, evaporation being promoted by brisk agitation, until the sp. gr. sinks to 10° Baumé; it is next cooled and filtered, and accurately neutralised (if it is required) with carbonate of potassa, after which it is evaporated to the sp. gr. 24° Baumé; on cooling, it deposits gelatinous sulphate of potassa; the whole is now filtered, the deposit on the filter washed with a little very weak spirit and water, the filtrate and washings mixed together, and evaporated, as before, with agitation, until the sp. gr. 28° Baumé, whilst hot (36° cold), is attained, when the whole is allowed to cool; the clear liquid is, lastly, decanted and filtered. In this state it has an amber colour, but may be rendered colourless and odourless by rediluting it with water, treating it with animal charcoal, filtering, and again evaporating to a proper consistence.

3. By saponifying olive oil with caustic alkali, decomposing the resulting soap with dilute sulphuric or tartaric acid, evaporating the aqueous portion to dryness (nearly), dissolving out the glycerine with cold rectified spirit, and filtering and evaporating the solution as before.

4. The residuary liquor of a soap manufactory is evaporated, and treated with alcohol to dissolve out the glycerin. The spirit is then evaporated off, the glycerin diluted with water, and finally boiled repeatedly with animal charcoal until all colour and odour are removed.

Obs. The products of the above processes are nearly pure, but that of Price's patent process, described below, is to be preferred to any of them.

5. (Commercial.) From sweet stearin-liquor, by precipitating the lime by a stream of carbonic acid gas, or by a solution of carbonate of soda, carefully avoiding adding the latter in excess; the liquor is then boiled a little, filtered, evaporated to a syrupy consistence, and again filtered. This is the common glycerin of the shops. It may be further purified as above.

6. (PRICE'S GLYCERIN—Patent dated 1854.) Superheated steam of from 550° to 600° Fahr. is introduced into a distillatory apparatus containing palm oil or other fatty body. The action of the steam effects the decomposition of the fat, and glycerin and the fatty acids distil over together, but no longer in combination. In the receiver the condensed glycerin, from its higher specific gravity, sinks below the fatty acids. Sufficient steam must be supplied, and the temperature nicely regulated. The glycerin is concentrated by evaporation, and if discoloured, it is redistilled. It is usually prepared with sp. gr. 1·24, and then contains 94% of anhydrous glycerin. It can, however, be concentrated to sp. gr. 1·26 when it contains 98%.

Prop. Pure glycerin is a colourless, odourless, uncrystallisable liquid, sweet to the taste, and of a syrupy consistence; it mixes with

water in all proportions; it is unctuous and emollient, and softens bodies, like oil, but without greasing them; it does not evaporate or change in the air at ordinary temperatures, and is not susceptible of rancidity or spontaneous fermentation; mixed with yeast and kept in a warm place, it is gradually converted into propionic acid; a strong heat decomposes it, with the production of acrolein; it is neutral to test-paper, and possesses neither basic nor acid properties; it is easily charged with the aroma of the essential oils, and may be combined with soap, and many other substances, without undergoing change. Sp. gr., 1·27 (see *above*).

Uses, &c. Glycerin is extensively employed as an excipient for medicines (see GLYCEROLES), also, either alone, or in lotions, baths, &c., as a soothing emollient, and is added to poultices and dressings, instead of oil, to prevent their hardening. Diluted with water, it often succeeds in allaying itching and irritation of the skin when all other means fail. As a cosmetic, either made into a lotion or added to soap (glycerin soap), or used in small quantities along with the water employed in washing, it imparts a healthy clearness and a sensation of softness and coolness to the skin, which is very agreeable and refreshing. It is the best remedy known for chapped nipples, hands, lips, &c.; all of which may be prevented by its use as an article of the toilet. Glycerin is sometimes used as a sweetening agent, as a substitute for syrup.

Glycerin Cream for Chilblains. Equal parts of glycerin, soft soap, and cherry-laurel water, mixed together.

Glycerin Cream with Camphor. Glycerin, 2 parts; camphor, 1 part; rectified spirit, 1 part. Mix. For chilblains.

Glycerin Ointment. Glycerin, 8 parts; spermaceti, 4 parts; white wax, 1 part; oil of almonds (fixed), 16 parts. Add the glycerin to the melted ingredients, and stir briskly till cold. For chaps and excoriations.

GLYCEROLE. A pharmaceutical preparation, in which glycerin is employed as the excipient.

Glycerole of Borax. (B. P.) *Syn.* GLYCERINUM BORACIS, L. 1 of borax in 4½ of glycerin.

Glycerole of Carbolic Acid. (B. P.) *Syn.* GLYCERINUM ACIDI CARBOLICI, L. 1 of acid in 4½ of glycerin.

Glycerole of Gallic Acid. (B. P.) *Syn.* GLYCERINUM ACIDI GALLICI, L. 1 of acid in 4½ of glycerin.

Glycerole of Starch. (B. P.) *Syn.* GLYCERINUM AMYLI, L. 1 of starch in 8½ of glycerin.

Glycerole of Tannic Acid. (B. P.) *Syn.* GLYCERINUM ACIDI TANNICI, L. 1 of acid in 4½ of glycerin.

GLYCYR'RHIZIN. *Syn.* LIQUORICE SUGAR. An uncrystallisable variety of sugar obtained from the root of common liquorice (*Glycyrrhiza glabra*). It is yellow, transparent, soluble in both water and alcohol, and is not susceptible of the vinous fermentation.

GLYSTER. See ENEMA.

GNATS and MOS'QUITOES. Smoke and strong fumes of any kind will drive away these insects. If you only burn a piece of brown paper in an enclosed space where they are, they soon after 'settle,' and appear to become so stupefied as to remain inactive for some time after. In those parts of the New World where mosquitoes abound, tobacco smoke is commonly had recourse to in-doors, and large fires made of brush-wood or under-wood out-of-doors. Old travellers, when compelled to bivouac during the season in which they are troublesome, are very careful to keep close on the 'lee' of these fires.

GOITRE. *Syn.* DERBYSHIRE NECK; BRONCHOCELE, TRACHEOCELE; HERNIA BRONCHIALIS, L. A tumour on the fore part of the neck. It sometimes occurs in Derbyshire, and is endemic in the Alps and several other mountainous districts. Iodine and the iodides appear to be the only substances capable of curing or even arresting the progress of this disease.

GOLD. Au. *Syn.* AURUM; OR, Fr.; GOLD, Ger. Gold is the most valuable and, probably, the longest known of all the metals. From the remotest period it has been esteemed for its beauty and permanence, and has been taken as the standard measure of value amongst all civilised nations. An account of the uses of gold in the arts, and its influence on society in all ages, as a symbol of wealth and an article of ornament and utility, would embrace the whole history of mankind. At the present day it alike contributes to the conveniences, comforts, and luxuries of life, as often exciting the baser passions of the human heart as promoting the cause of benevolence and virtue.

Gold is found almost invariably in the metallic state. It occurs as gold dust in the sands of various rivers, and in the alluvial soil of auriferous districts, from both of which it is obtained by the simple process of washing. Traces of it are constantly found in the iron and other pyrites of the more ancient rocks. Sometimes it occurs beautifully crystallised in the cubic form, associated with quartz, oxide of iron, and other substances, in regular veins. In the gold fields of California and Australia lumps of nearly pure gold have been discovered in abundance during the last few years. In the former country a mass of gold weighing 28 pounds was found, whilst in our own colonies one weighing 106 pounds was dug out of a quartz rock, near Bathurst. The latter contained upwards of 91⅔ of pure gold, and nearly 8⅓ of silver; being as pure as the English sovereign, or, in trade language, '22 carats fine.'

Prep. This consists merely in the separation of the gold and its subsequent purification. Formerly, the auriferous sulphides, if very poor, were first roasted, then fused into 'mattes' and again roasted; they were next melted with lead, and the alloy thus obtained was refined by cupellation. When the ores were very rich, the preliminary calcination

and fusion were omitted, and the alloy of lead at once formed. This method (by fusion) does not answer well with auriferous copper pyrites or ores very poor in gold. At the present time the method of amalgamation is principally followed. When a 'vein-stone' is to be wrought for gold, it is reduced to powder (on the small scale by hand, on the large scale in stamping mills), and is shaken in a suitable apparatus with water and mercury; an amalgam of gold is formed, which is then separated from the mixture, and its mercury removed by distillation. The gold is next cast into 'ingots.'

Refining. Gold obtained by the first method usually contains a little copper and silver, and frequently tin or iron. Tin may be removed by adding a little corrosive sublimate or nitre to the gold melted in a crucible. The process by amalgamation commonly leaves no other alloy than silver. This metal is removed either in the 'dry way,' by fusing the gold with sulphur or sulphide of antimony; or in the 'wet way,' by 'quartation' and 'parting.' At the Royal Mint, "when gold ingots contain a certain quantity of silver" (say 2% or 3%), "instead of leaving it, as formerly, to constitute a part of the standard alloy, it pays to extract it, and to substitute copper in its place. To get the silver out of the said ingots, they are melted with about 3 parts of silver—the resulting alloy is granulated and boiled with sulphuric acid—the gold remains untouched, and all the silver is dissolved and converted into sulphate. . . The sulphate of silver is then decomposed by the immersion of copper plates; the silver is precipitated in a fine, crystalline powder, washed, pressed into masses, and melted, and so affords PURE SILVER, which is afterwards made standard by alloying it with copper, and is used for coinage. The resulting sulphate of copper (which exists in the solution) is then crystallised, and sold." (Brande.) "By first exhausting the gold with nitric acid, and then boiling it in sulphuric acid, some two or three thousandth part of silver which escaped the action of the nitric acid is dissolved out, and perfectly pure gold is obtained." (Ure.)

By a foreign invention, patented in 1851 by Mr. W. E. Newton, the operations of 'separation' and 'refining' are conducted by one process. The argentiferous substance, whether in the state of ore or bullion, is reduced to a granulated or spongy state, by fusion along with zinc, or some other metal cheaper than silver, and the zinc is subsequently removed, by digesting the resulting granulated, laminated, or pulverulent alloy, in dilute sulphuric acid, or other acid. The zinc, &c., is recovered by the usual means. This process, carefully conducted, produces metal of great ductility and purity, containing 99% to 99⅞ % of pure gold.

Chemically pure gold is obtained by dissolving the metal in nitro-hydrochloric acid, adding a solution of protosulphate of iron, and collecting and washing the precipitate. In this state it is a brown powder, which acquires a metallic lustre by friction or heat.

Prop. The most marked properties of gold are its rich yellow colour, its ductility, malleability, insolubility in all menstrua except 'aqua regia' (nitro-hydrochloric acid), aqueous chlorine, and hydrofluoric acid, and its very slight affinity for oxygen. It melts at a bright red heat (2016° Fahr;—Daniell), and the fused metal has a brilliant green colour. It forms compounds with chlorine, iodine, oxygen, sulphur, &c. Sp. gr. of native gold, 13·3 to 17·7; of pure gold, 19·3 (average); its greatest density is 19·5.

Tests. Metallic gold is characterised by its yellow colour, insolubility in nitric acid, and its ready solubility in aqua regia, forming a rich yellow or amber-coloured liquid, which stains the skin purple. Solutions of gold exhibit the following reactions:—Protosulphate of iron gives a brown precipitate, which acquires a metallic lustre when rubbed;—Protochloride of tin (preferably containing a little perchloride) gives a violet, purple, or blackish precipitate, insoluble in hydrochloric acid;—Sulphuretted hydrogen and hydrosulphide, of, ammonia give a black precipitate, insoluble in simple acids;—Ammonia gives a reddish-yellow precipitate ('fulminating gold'), with tolerably concentrated solutions, either at once or on boiling the liquid;—Liquor of potassa gives a reddish-yellow precipitate with neutral solutions of gold, insoluble in excess.

Estim. 1. In the dry way;—

The quantity of gold in an ALLOY is usually estimated by 'assaying' the sample. Before proceeding to the assay, it is necessary to form some estimate of the quantity of other metals (copper or silver, or both) in the specimen to be examined, in order to employ the proper proportion of lead in the 'cupellation.' The experienced assayer commonly does this by the 'assay of the touch,' and, in certain cases, by a rough preliminary assay. The quantity of lead employed may be about 16 times the weight of the copper present in the sample, and when the alloy contains silver an additional allowance of lead, equal to $\frac{1}{10}$th of its weight, is made on that account. When no silver is present, or it is not required to be estimated, a much larger proportion of lead may be employed. The weight taken for the assay ('assay pound') is usually 12 or 6 grs. The alloy and dose of lead being accurately weighed and separately wrapped in small pieces of paper, the assay may be at once proceeded with.

α. CUPELLATION. This operation, the most important of the whole, has been already described. Unlike silver, gold will bear the highest heat of the furnace without 'vegetating,' 'fuming,' or being absorbed by the cupel. The loss of weight gives the amount of copper in the alloy.

β. QUARTATION. The cupelled sample is

fused with three times its weight of pure silver (called the 'witness'), by which the gold is reduced to one fourth of the mass, or less, and in this state may be easily removed.

γ. PARTING. The alloy, after quartation, is hammered or rolled out into a thin strip or leaf, curled into a spiral form, and boiled for a quarter of an hour, in a small flask, with about 2½ to 3 oz. of nitric acid (sp. gr. 1·3); and the fluid being poured off, it is again boiled in a similar manner with 1½ to 2 oz. more of nitric acid (sp. gr. 1·2), after which the gold is carefully collected, washed in pure water, and dried. When the operation of 'parting' is skilfully conducted, and the acid not too strong, the metal preserves its spiral form; otherwise, it falls into the state of flakes or powder. The second boiling or digestion is technically termed the 'reprise.' The loss of weight by 'parting,' after deducting that of the 'witness,' corresponds to the quantity of silver originally in the specimen.

δ. ANNEALING. This consists in putting the pure gold obtained by the last process into a small porous crucible or cupel, and heating it to redness in the muffle.

ε. WEIGHING. This must be done with the utmost accuracy. The weight, in grains troy, doubled or quadrupled, as the case may be, gives the number of carats fine of the alloy examined, without calculation.

According to the 'OLD FRENCH METHOD' of assaying gold, the following quantities are taken:—For the assay pound, 12 grs.; fine silver, 30 grs.; lead, 108 grs. These having been cupelled together, the (perfect) button is rolled into a leaf (1½ × 5 inches), twisted on a quill, and submitted to parting with 2½ oz. and 1½ oz. of nitric acid, sp. gr. 1·16 (20° Baumé). The remainder of the process is similar to that above described. Two assays are made in the same manner, with a third on pure gold or gold of a known fineness; and no conclusion is drawn, unless the assay of the latter comes out accurately, and that of the first two correspond to each other.

For alloys containing platinum, which usually consist of copper, silver, platinum, and gold, the method of assaying is as follows:—The alloy is 'cupelled' in the usual way, the loss of weight expresses the amount of copper; and the button, made into a riband and treated with sulphuric acid, indicates, by the portion dissolved, that also of the silver present. By submitting the residuum to quartation, the platinum becomes soluble in nitric acid. The loss after digestion in this menstruum expresses the weight of that metal, and the weight of the portion now remaining is that of the pure gold. Gold containing palladium may be assayed in the same manner.

2. In the wet way:—

The richness in gold of any substance, whether liquid or solid, when the quantity is small (and indeed in all other cases), is most simply and economically performed by the common method of chemical analysis. The gold may be thrown down from its solution by adding a solution of protosulphate of iron; the precipitate, after being washed, dried, and gently heated, may be weighed as pure gold.

Pois., &c. The soluble preparations of gold (chlorides) are violent poisons. The symptoms resemble those occasioned by corrosive sublimate, but are somewhat less violent. Metallic gold in a minute state of division is also capable of producing very unpleasant consequences, and even endangering life. The antidote is iron filings or a solution of sulphate of iron, given conjointly with an emetic.

Uses. The numerous applications of gold in the arts and the daily transactions of life need only be alluded to here. In *medicine*, gold has been given in the form of powder, in scrofula and syphilis, by Chrestien, Niel, and others, with apparent advantage.—*Dose.* ¼ gr. to 1 gr., 3 or 4 times a day, in pills, or as a friction on the tongue and gums. An ointment made of 1 gr. of powdered gold and 30 grs. of lard has been applied by Niel to the skin deprived of the epidermis (endermically), in the above diseases.

The more important chemical compounds containing gold, the alloys and commercial forms of the metal, together with certain factitious substances popularly called 'gold,' are noticed in alphabetical order *below*:—

Gold, Alloys and Preparations of:—

Gold, Dutch. MANNHEIM GOLD, MOSAIC G., OR-MOLU, PINCHBECK, PRINCE'S METAL, RED BRASS, SIMILOR, TOMBAC. These names are applied to several varieties of fine gold-coloured brass, differing slightly in tint and in the proportions of copper and zinc. The terms tombac, prince's metal, similor, and Mannheim gold, are used by some authors to designate alloys consisting of about 85% of copper and 15% of zinc; whereas, according to other authors, prince's metal and Mannheim gold are synonymous, and are composed of 75% copper and 25% zinc; according to another author, similor consists of about 71½ % copper and 28½ % zinc, and Mannheim gold of 80% copper and 20% zinc; and, again, according to another author, similor and Mannheim gold are synonymous, and are applied to alloys of copper containing from 10 to 12% zinc and from 6 to 8% tin. Seeing that such inextricable confusion exists in the employment of the terms above mentioned, it is desirable to discard them altogether. At the celebrated works of Hegermühl, near Potsdam, the proportions copper, 11 parts, to zinc, 2 parts, are employed to produce a metal which is afterwards rolled into sheets for the purpose of making Dutch leaf-gold. This alloy has a very rich, deep gold colour. Its malleability is so remarkable that it may be beaten out into leaves not exceeding $\frac{1}{280000}$ inch in thickness.

Gold, Factitious. *Prep.* From copper, 16 parts; platinum, 7 parts; zinc, 1 part; fused together. This alloy resembles in colour gold

of 16 carats fine, or $\frac{2}{3}$, and will resist the action of nitric acid, unless very concentrated and boiling.

Gold, Grain. *Syn.* AURUM GRANULATUM, L. *Prep.* From cupelled gold, 1 part; silver, 3 parts; melted together, and poured in a small stream into water; the silver being afterwards dissolved out by digestion in boiling nitric acid, and the grains, after being well washed in water, heated to redness in a crucible or cupel. *Used* to make preparations of gold.

Gold, Jew'eller's. This term is applied to alloys of gold used for trinkets and inferior articles of jewellery, ranging from 3 or 4 carats fine upwards; or which are too inferior to receive the 'Hall mark.' The lowest alloy of this class is formed of copper, 16 parts; silver 1 to 1½ part; gold, 2 to 3 parts; melted together. This is worth only from 8*s.* 6*d.* to 9*s.* 6*d.* the oz.

It has recently been found that gold of the quality of 12 carats, or less, if alloyed with zinc instead of the proper quantity of silver, presents a colour very nearly equal to that of a metal at least 2½ to 3 carats higher, or of 8*s.* or 10*s.* an ounce more value; and the consequence has been that a large quantity of jewellery has been made of gold alloyed in this manner; and the same has been purchased by some shopkeepers, very much to their own loss, as well as that of the public; inasmuch as a galvanic action is produced, after a time, upon gold so alloyed, by means of which the metal is split into several pieces, and the articles rendered perfectly useless.

Gold, Leaf. *Syn.* GOLD-LEAF. Gold reduced to leaves by hammering it between thin animal membrane. Its preparation constitutes the trade of the goldbeater. These leaves are only 1-282,000th of an inch in thickness. Gilt silver is hammered in the same way, but the leaves are thicker. The latter is called party gold. Both are used by artists and gilders, and by druggists to gild pills, &c.

Gold, Powdered. *Syn.* DIVIDED GOLD, GILDING POWDER, GOLD BRONZE, GOLD COLOUR; AURI PULVIS. *Prep.* Gold, 1 part; mercury, 7 parts; form an amalgam, and expose it to heat until all the mercury is volatilised; or the mercury may be dissolved out with hot nitric acid. In either case, the residuum is to be powdered, washed, and dried. If the quantity operated on is considerable, the process should be so conducted as to save the mercury.

From gold leaf and honey ground together, as the last, by means of a stone and muller. This is the plan commonly adopted in the small way by artists.

From a solution of gold in aqua regia precipitated by protosulphate of iron, the resulting powder being washed, dried, and gently heated. This gives pure gold.

Uses, &c. Powdered gold is employed in gilding by japanners and by artists. It is either sold in powder (gold in powder), or made up into shells (gold in shells). Its use in medicine has been already noticed.

Gold, Standard. The standard gold of this country is an alloy of pure gold, 11 parts, with pure copper, 1 part. Formerly the alloy consisted partly of silver, as found in some of the older coins now in circulation. It is often spoken of as 22 carats fine.

Gold, Chlorides of:—

1. **Monochloride.** AuCl. *Syn.* AUROUS CHLORIDE, PROTOCHLORIDE OF GOLD. A yellowish-white mass, formed when a solution of trichloride of gold is evaporated to dryness, and the residuum is exposed to a heat of about 440° Fahr., until fumes of chlorine cease to be evolved. It is insoluble in water, which decomposes it, slowly when cold, but rapidly by the aid of heat, into metallic gold and the trichloride.

2. **Trichloride.** $AuCl_3$. *Syn.* AURIC CHLORIDE, TERCHLORIDE OF GOLD, TRICHLORIDE OF GOLD, AURI CHLORIDUM. *Prep.* Gold, 1 part, dissolved by aid of heat in nitro-hydrochloric acid, 8 parts, and evaporated down to near dryness, and allowed to crystallise.

Prop. Orange-red crystalline needles, or ruby-red prismatic crystals; deliquescent; soluble in water, ether, and alcohol, forming a deep-yellow solution; at the heat of 500° Fahr. it suffers decomposition, chlorine being given off and pure gold left behind. It is reduced by ferrous sulphate, oxalic, sulphurous, formic and phosphorous acids, as well as by most of the metals, to metallic gold. It combines with several of the metallic chlorides, forming a series of double salts, which are mostly yellow when in crystals, and red when deprived of water.

Uses, &c. It has been employed by Duportal, Chrestien, Niel, Cullerier, Legrand, and others, as a substitute for mercury, in scrofula, bronchocele, chronic skin diseases, &c.; also as a caustic.—*Dose.* $\frac{1}{20}$ gr., dissolved in distilled water, or made into a pill with starch; or, in frictions on the gums, in quantities of $\frac{1}{16}$ to $\frac{1}{10}$ gr. Its most important use, however, is as a reagent in photography, large quantities being manufactured for use as a chief agent in toning photographic prints.

To some extent it is also used for electro-gilding, and mixed with excess of bicarbonate of potassium, it forms a good yielding solution for small articles of copper. These are to be first cleaned with dilute nitric acid, and then boiled for some time in the mixture.

The above is the salt generally referred to under the name of the 'chloride of gold,' or in commerce occasionally as the 'muriate of gold.'

Gold, Chloride of, and Sodium. $AuCl_3 . NaCl . 2Aq$. *Syn.* AUROCHLORIDE OF SODIUM; SODII AUROCHLORIDUM. *Prep.* Auric chloride, 85 parts; chloride of sodium, 16 parts; dissolve in a little distilled water, evaporate until a pellicle forms, then put it aside to crystallise. It forms beautiful orange-coloured rhombic prisms.

Dose, &c. $\frac{1}{20}$ to $\frac{1}{12}$ gr., made into a pill

with starch or lycopodium, in the same cases in which the terchloride is ordered. Mixed with 2 or 3 times its weight of orris powder, it has been used in frictions on the tongue and gums; and an ointment, made with 1 gr. of the salt, mixed with 36 grs. of lard, has been applied to the skin deprived of the epidermis by a blister.

Gold, Cyanide of. $AuCy_3$. *Syn.* AURIC CYANIDE. *Prep.* Add a solution of pure cyanide of potassium to a solution of pure auric chloride as long as a precipitate forms, carefully avoiding any excess; wash, and dry the precipitate.

Prop., Uses, &c. This salt is a pale-yellow powder, insoluble in water, but very soluble in a solution of cyanide of potassium, forming the double cyanide of gold and potassium so largely used in the electrotype process. Cyanide of gold is employed to a certain extent in medicine.—*Dose.* $\frac{1}{12}$ to $\frac{1}{10}$ gr., made into a pill, in the usual cases in which gold is administered. The first formula is essentially similar to that of the French Codex.

Gold, Extraction of, by Sodium Amalgam. (Crookes' Method, Patented.) In the extraction of gold by amalgamation serious difficulties are often occurring through the 'flouring' or 'sickening' of the mercury employed, and the prevention of the amalgamation by a coating of tarnish on the gold. So much is this the case that losses of from 30 to 60 per cent. of the gold are usually incurred, and, in many cases, a still more serious loss of mercury.

When certain minerals, as tellurium compounds, pyrites, &c., occur in the gold ore, the mercury is apt, on trituration, to become subdivided into excessively minute globules, which, owing to their tarnished condition, refuse to unite, and are consequently washed away, it being almost impossible to separate them from the heavier portions of the ore. This is technically called 'flouring,' 'granulating,' &c. Besides this, certain of these minerals affect the mercury in another way, that is, by 'sickening' it, or causing it to lose its bright surface and fluidity, and prevents its amalgamating with the gold. Besides the inconvenience and loss thus caused, a further loss of gold takes place from the inability of the ordinary mercury to touch or amalgamate tarnished gold, unless it is ground with it, for a more lengthy period than is found practicable in most cases.

Mr. Crookes, F.R.S., has, by means of the addition of a certain proportion of sodium, in the form of an amalgam, to the mercury, effectually prevented this serious loss of gold and mercury. By adding certain quantities of amalgams B and C, an amount which, differing from each ore, is ascertained by experiment, the 'flouring' and 'sickening' of the mercury is effectually prevented, the mercury remaining throughout in the best condition. The addition of about 1-10th per-centage of amalgam A, at intervals of some hours, increases most powerfully the affinity of the mercury for the precious metals, and secures a more thorough amalgamation.

This invention has met with general approval, and experiments conducted at many mines show its great practical value, giving an increase of from 5 to 30 per cent. in the yield of gold, and, in fact, with many pyrites that yielded no gold to the ordinary amalgamation process, gave a considerable yield of gold to the sodium amalgamation process. This has led to its use in most mines, both silver and gold, in America.

Gold, Iodide of. AuI_3. *Syn.* AURIC IODIDE, TRI-IODIDE OF GOLD, GOLD TERIODIDE, AURI IODUM. *Prep.* Add a solution of trichloride of gold to one of iodide of potassium. The resulting precipitate is at first redissolved on agitation, a soluble double iodide being formed; subsequently the iodide of gold is precipitated, leaving the supernatant liquor free of colour.

Prop., Uses, &c. A dark-green powder, easily soluble in hydriodic acid. It is occasionally employed as a medicine, and, like other preparations of gold, is of an alterative character.—*Dose.* About $\frac{1}{16}$ of a grain.

Gold, Oxides of:—

1. **Monoxide.** Au_2O. *Syn.* AUROUS OXIDE, PROTOXIDE OF GOLD. *Prep.* Formed by treating the aurous chloride with strong potassium hydrate. Green powder, somewhat soluble in potassium hydrate solution, and readily decomposing into metallic gold and auric oxide.

2. **Trioxide.** Au_2O_3. *Syn.* AURIC OXIDE, OXIDE OF GOLD, PEROXIDE OF GOLD, AURIC ACID, AURI OXIDUM. *Prep.* Magnesic oxide, 4 parts; auric chloride, 1 part; water, 40 parts; mix, boil, and wash the precipitate with water, dilute nitric acid, and again with water. It must be dried in the shade.

Reddish-yellow powder, easily decomposed by heat; readily soluble in hydrochloric and hydrobromic acids and strong nitric acid, but insoluble in water and the other acids. Forms unstable salts with the alkalies.

Uses, &c. Trioxide of gold has been given in scrofula, &c., in doses of $\frac{1}{12}$ to $\frac{1}{2}$ gr., or 1 gr., in scrofula, syphilis, &c., made into a pill with extract of mezereon.

Gold, Ammoni'uret of*. *Syn.* AURATE OF AMMONIA, BERTHOLLET'S FULMINATING GOLD; AURUM AMMONIATUM, AMMONIÆ AURAS, L. *Prep.* By adding ammonia to a solution of gold in aqua regia (trichloride), as long as a reddish-yellow precipitate (fulminating gold) forms; the latter must be collected, washed, and dried with the greatest possible caution.

Obs. Ammonia fails to precipitate trioxide of gold from solutions which are not tolerably concentrated, and in those containing free acid or ammoniacal salts the precipitate only forms upon boiling the solution. Before adding the ammonia, it is, therefore, proper to drive off the excess of acid, if any, by the application of heat. See FULMINATING COMPOUNDS.

Gold, Sul'phide of. Au_2S_3. *Syn.* SULPHURET OF GOLD, TERSULPHURET OF G.; AURI

SULPHURETUM, L. *Prep.* Transmit a current of sulphuretted hydrogen gas through a solution of terchloride of gold in water; or add hydrosulphuret of ammonia to the same solution; collect the precipitate, wash it with cold distilled water, and dry it in the shade.

GOLD DETER'GENT. *Prep.* (Upton.) Take quicklime, 1 oz.; sprinkle it with a little hot water to slake it, then gradually add boiling water, 1 pint, so as to form a milk. Next dissolve pearlash, 2 oz., in boiling water, 1½ pint; mix the two solutions, cover up the vessel, agitate occasionally for an hour, allow it to settle, decant the clear, put it into flat half-pint bottles, and well cork them down.

Use. To clean gilding, &c., either alone or diluted with water. It is applied with a soft sponge, and then washed off with clean water. It is essentially a weak solution of potassa, and may be extemporaneously prepared by diluting solution of potassa (Ph. L.) with about 5 times its volume of water.

GOLD SHELLS. Gold leaf or powdered gold ground up with gum-water, and spread upon the insides of shells. *Used* by artists.

GOLD SIZE. *Syn.* GILDING SIZE, GILDER'S S., GOLD COLOUR. *Prep.* 1. (OIL SIZE.) Drying or boiled oil thickened with yellow ochre or calcined red ochre, and carefully reduced to the utmost smoothness by grinding. It is thinned with oil of turpentine. Improves by age. *Used* for oil gilding.

2. (WATER SIZE.) Parchment or isinglass size, mixed with finely ground yellow ochre. *Used* in burnished or distemper gilding.

GOLD-BEAT'ER'S SKIN is prepared from the peritoneal membrane of the cæcum of the ox. It is *used* to separate the leaves of gold whilst under the hammer, as a nearly invisible defensive dressing for cuts, as a fabric for court plaster, &c.

GONG METAL. See BELL METAL.

GONIOM'ETRY. The art of measuring the angles of crystals, by means of a GONIOMETER; a most important matter in *chemistry* and *mineralogy*. The only accurate and simple instrument of this kind is the REFLECTING GONIOMETER invented by Dr. Wollaston. Facility in using this instrument is readily acquired by a few trials.

GOOSE. This bird, the *Anser domesticus*, is a favourite article of food almost everywhere, and may fairly claim a similar position amongst poultry to that occupied by "good Sir Loin" among joints of meat. The vulgar inuendos occasionally heard to its prejudice should be directed against the cook rather than the bird, as it is only when it is unskilfully dressed and too highly seasoned that it is apt to disagree with that "irascible member of the interior," a delicate or overloaded stomach. Undue susceptibility in that quarter may, however, be generally allayed by an oblation, in the shape of a little '*eau de vie*,' used as sauce or gravy. Formerly, almost miraculous virtues were attributed to this bird. Its flesh was said to promote longevity, to cure hydrophobia, and to be aphrodisiac. The fat (GOOSE GREASE; ADEPS ANSERIS), mixed with honey, was supposed to be "good against the bitings of a mad dog." At the present day it is occasionally used in clysters, and, when scented, as a pommade to make the hair grow, for which purpose it is said to be superior to bear's grease. In quantity, it is an emetic of very easy action. The large feathers of the wings (quills) are used for writing. The small feathers form the common stuffing of our beds.

GOOSE'BERRY. The fruit or berry of *Ribes grossularis*. Unripe fruit, cold and acidulous; ripe fruit, wholesome and slightly laxative; but the seeds and skins should not be eaten, as they are very indigestible; the juice of the green fruit is made into wine (ENGLISH CHAMPAGNE); the seeds, washed and roasted, were formerly used as a substitute for coffee (GOOSEBERRY COFFEE). Gooseberries are preserved by simply bottling them, and keeping them in a very cold place. See CHEESE, FOOL, FRUIT, &c.

GOULARD. *Syn.* GOULARD'S EXTRACT. See SOLUTION OF DIACETATE OF LEAD.

GOUT. *Syn.* ARTHRITIS, L. A painful disease that chiefly attacks the male sex, particularly those of a corpulent habit and robust frame. Persons who live temperately and take much exercise are seldom troubled with gout. Indolence, inactivity, luxurious habits of life, and free living, are the chief exciting causes of this disease; but excessive study, grief, watchfulness, exposure to cold, and the too free use of acidulous liquors, also occasionally bring it on. In some persons it is an hereditary disease.

Symp. Gout is generally preceded by unusual chilliness of the feet and legs, and a numbness or a sensation of prickling along the lower extremities; the appetite fails, flatulency, indigestion, torpor, and languor ensue, and extreme lassitude and fatigue follow the least bodily exercise; the bowels become costive, and the urine pallid. The fits usually come on in the night; the patient is awakened by the severity of the pain, generally in the first joint of the great toe, or occasionally in the heel, whole foot, or calf of the leg. The pain resembles that of a dislocated joint, accompanied by a sensation resembling the effusion of cold water; the pain increases, rigors and febrile symptoms ensue, accompanied with local throbbing and inflammation. Sometimes both feet and legs are attacked; at others, only one. Towards morning the patient generally falls asleep, and sinks into a state of copious perspiration, from which he awakes comparatively recovered. This constitutes what is called a 'fit of gout.' These fits or paroxysms are apt to return at intervals, commonly every evening, with more or less violence; and when frequent, the disease usually extends its action, the joints become affected, and concretions of a chalky nature (chalk stones,

gout stones) are formed upon them, and they become stiff and nearly immovable.

Treat. A plain or vegetable diet, moderate exercise, and the use of warm laxatives, gentle tonics, diaphoretics, and diuretics, are among the best preventives. The moderate use of alkaline remedies, as potassa and magnesia, has also been recommended. To relieve the fit of gout, or to check it at its commencement, the affusion of cold water will be often found effective. The use of the '*eau médicinale*,' or the '*vinum colchici*' of the Pharmacopœia, may also be had recourse to; a due dose of which taken at bedtime will frequently carry off the paroxysm, and nearly always mitigate the symptoms. The effect of the above remedies do not greatly differ from each other. The action of both medicines is accompanied with great languor, and a deadly nausea or sickness, which terminates in vomiting or a discharge from the bowels, or both. These symptoms have often reached an alarming extent, and in some constitutions follow even a moderate dose. This method of cure should not, therefore, be unadvisedly and incautiously adopted.

Another remedy which has been recommended for gout is lemon juice, but experience has proved that this agent is not to be depended on. The *dose* proposed by Dr. O. Rees, who originated this treatment, was 2 or 3 fl. oz., twice or thrice a day.

To ensure the efficacy of lemon juice, it must be expressed from the fruit into the glass shortly before being taken. That purchased at the shops is generally stale and disagreeable, and is often worse than useless. In some cases it is advisable to take the juice undiluted, but the more common practice is to mix it with about an equal quantity of water. See RHEUMATISM, COLCHICUM, DRAUGHT (Anti-arthritic), LEMON JUICE, VINEGAR OF COLCHICUM, WINE OF COLCHICUM, &c.

Gout Cor'dial. *Prep.* Rhubarb, senna, coriander seed, sweet-fennel seed, and cochineal, of each, 2 oz.; liquorice root and saffron, of each, 1 oz.; raisins, 2½ lbs.; rectified spirit of wine, 2 galls.; digest for 14 days, press, and filter. *Used* in gout and rheumatism. Aromatic and slightly laxative. *Dose.* 1 to 3 table-spoonfuls.

Gout Med'icine. (Duncan's.) A mixture of wine of colchicum, wine of opium, and tincture of saffron.

Gout Rem'edy. (Alexander's.) According to Dr. Paris, this contains—aniseed, cumin seed, ginger, hermodactyls, pepper, and scammony.

Gout Specif'ic. (Murray's.) A mixture of iodide of potassium, sulphate of magnesia, and wine of colchicum, disguised with an aromatic tincture.

GOUTTES AMERES. [Fr.] See DROPS (Bitter).

GRAD'UATOR. See VINEGAR.

GRAFT'ING COM'POST. Clay tempered with water, to which a little linseed oil is sometimes added. *Used* to cover the joint formed by the scion and stock in grafting.

GRAINS OF PAR'ADISE. *Syn.* GUINEA GRAINS, MALAGUETTA PEPPER. The seeds of the *Ammomum melaguetta.* Grains of paradise are hot, acrid, and aromatic, and in general properties similar to the other peppers. In some parts of the world they are used as a condiment. They are principally employed in these countries to impart a false strength to wine, beer, spirits, and vinegar.

GRANIL'LA. A small inferior variety of cochineal (which *see*).

GRANULA'TION. The act or process of forming, or breaking into, grains or small masses.

The granulation of MEDICINES has of late years received considerable attention from both foreign and British pharmaceutists. In France, granulated powders (POUDRÉS GRANULÉES) are coming into general use in place of impalpable powders, the most unpleasant of all forms of medicine. The French process consists in enveloping the particles of medicines in syrup by means of heat and constant stirring. Mr. Banner, of Liverpool, has lately introduced a method of granulating medicines far preferable to that of the French pharmaceutists. The powder to be granulated is placed in a mortar, and mucilage of gum acacia is gradually added until a crumbly mass is made; this is then rubbed through a wire sieve (about 12 meshes to the inch), and the granules produced are spread out on paper, and left to dry spontaneously, or they are placed in a copper pan, and kept in constant motion over a stove until dry; when perfectly dry, they are placed in a mortar, and sufficient quantity of strong tincture of tolu (3 drs. to 1 oz.) is added to them, until by constant stirring they all appear glossy and shining; they are then dried again by a gentle heat, being kept in constant motion. The granules thus formed keep well, are tasteless, and are much more elegant and agreeable preparations than pills or ordinary powders. Many saline substances are granulated by the simple process of dissolving the salt in water, and evaporating to dryness with constant stirring.

METALS are granulated (reduced to drops, grains, or coarse powder) by pouring them, in the melted state, into water. In many cases they are allowed to run through the holes of a species of colander or sieve to produce minute division; and in order to render the drops spherical, they are allowed to fall from a sufficient height to permit of their acquiring the solid state before striking the water. Lead shot is made in this way. Shot towers are often upwards of 100 feet in height. See COPPER, GUNPOWDER, POWDER, ZINC, &c.

GRAPES. *Syn.* UVÆ, L. The fruit of *Vitis vinifera*, or the common grape vine. Ripe grapes are cooling and antiseptic, and in large quantities diuretic and laxative. They are very useful in bilious affections and dys-

pepsia, and in all febrile, putrid, and inflammatory complaints. The skin and seed, which are indigestible, should be rejected. "Grapes which contain a large quantity of sugar are, if taken without the husks, the safest and most nutritive of summer fruits." (Cullen.) "The subjects of pulmonary affections, who pass the summer in Switzerland, may try the effects of a course of grapes, '*cure de raisins*,' a remedy held in high estimation in several parts of the Continent." (Sir J. Clark.)

Grapes, in bunches, are preserved by wrapping them in silver paper, and packing them in dry bran. Each bunch is suspended by the stem with the fingers of one hand, whilst the bran is poured round it with the other; the jar being occasionally gently shaken as the process of packing proceeds. Some paper is then laid over the top of the jar, the mouth or cover of which is, lastly, tied firmly over with bladder, to exclude the air and moisture. See FRUIT, &c.

GRAPH'ITE. See PLUMBAGO.

GRAV'EL. A collection of small pebbles commonly mixed with sand or clay, or both. Gravel for garden walks is chosen for its fine colour and binding properties. The gravel of Kensington and Wimbledon is esteemed the finest in the world.—Gravel walks, when once in order, may be rendered nearly equal to asphalt by pouring over them tar or a mixture of tar and pitch, absorption being promoted, if required, by the application of a hot iron.

Gravel. In *pathology*, a term popularly applied to calculous matter formed in the kidneys, and passing off in the urine; and sometimes to distinct calculi or concretions in the bladder itself. See CALCULUS.

GRAVIM'ETER. See HYDROMETER.

GRAV'ITY. *Syn.* GRAVITATION. The attractive force by which bodies fall towards the centre of the earth. Weight is the measure of gravity. The determination of the relative weights of bodies with reference to a given standard, is explained under SPECIFIC GRAVITY.

GRA'VY. The juice or liquid matter that drains from dressed meat after it is placed on the dish for serving. The common practice among cooks is to pour a spoonful or two of boiling water or broth over the joint, to increase the quantity. The natural gravy that oozes from the meat after it is cut is the richest and most wholesome. Made gravies are prepared by adding spice and flavouring to the foregoing, or to strong meat soup. See SAUCE.

GRAY. *Syn.* GREY; GRIS, Fr. A mixture of black and white. Delicate grays result from mixtures of the three elementary colours, red, yellow, and blue, in which the blue preponderates to a greater or less extent.

GRAY DYE. *Syn.* TEINTE GRISE. Gray is dyed with the same materials as black, but both the bath and mordant are used in a more diluted state. COTTON goods may be worked in sumach and then in copperas; this gives rather a bluish gray, which may be modified to any particular hue by the addition of suitable colouring matter. To make it yellowish, a small amount of fustic and alum are employed; to make it 'fuller,' peachwood and Lima-wood with alum are used. The methods of obtaining gray on SILK and WOOL are very numerous; they are similar in principle to the above, all depending on the blending of the three primary colours, or on the modification of weak blacks. See BLACK DYE.

GREASE. A general term applied to soft animal fats; as BEAR'S GREASE, GOOSE GREASE, &c.

Grease. An inflammatory affection of the heels of horses, which produces dryness, scurfiness, and stiffness. The *treatment* consists of emollient poultices, accompanied with physic and diuretic balls, to subdue the inflammation, followed by mild astringent lotions or ointments.

GREAVES. *Syn.* GRAVES. The sediment of melted tallow, consisting chiefly of animal membranes mixed with fat, made up into cakes. *Used* as a course food for dogs.

GRE'CIAN WATER. See HAIR DYES.

GREEN. *Syn.* VIRIDIS, L.; VERT, Fr. Of the colour of the leaves of growing plants; *subst.* a green colour.

GREEN DYE. *Syn.* TEINTE VERTE, Fr. All the green dyes in use, with the practically unimportant exceptions of Chinese green and oxide of chromium green, are compounded of blue and yellow. The goods, in practice, are generally dyed blue first, observing to regulate the shade according to that of the intended green; they are then dried, rinsed, and passed through a yellow bath, with the like precautions, until the proper shade is produced. See BLUE DYE, YELLOW DYE, &c.

GREEN PIG'MENTS. Several of the green pigments of commerce are obtained from copper. Oxide of chromium furnishes some which are very beautiful. Many are formed by the mere mechanical admixture of blue and yellow pigments. The bright blues and yellows, when mixed in this way, produce the liveliest greens; orange, or red and blue, and the yellowish browns and blue, the more dingy greens. In this way are produced all the extemporaneous greens of the artist. Nickel and titanium also furnish green colours, but these are not in common use. The following list embraces all the best-known and most useful green pigments:—

Green, Arsen'ical. Arsenite and aceto-arsenite of copper. See SCHEELE'S and SCHWEINFURT GREEN (*below*).

Green, Barth's. From yellow lake, Prussian blue, and clay, ground together.

Green Bice. Same as mountain green.

Green, Bremen. This is properly green verditer, but other preparations are frequently sold under the name.

Green, Brighton. A mixture of impure

acetate of copper and chalk, prepared as follows:—

To sulphate of copper, 7 lbs., add sugar of lead, 3 lbs.; each separately dissolved in water, 5 pints; mix the solutions, stir in of whiting, 21 lbs., set the resulting paste on chalk stones, and when dry grind it to powder.

Green, Brunswick. This is properly a crude chloride of copper, but a mixture of carbonate of copper and alumina or chalk is now commonly sold under the name in the shops.

Prep. 1. A saturated solution of sal-ammoniac, 3 parts, is poured over copper filings or shreds, 2 parts, contained in a vessel capable of being closed up, and the mixture is kept in a warm place for some weeks, when the newly formed green pigment is separated from the unoxidised copper, by washing the mixture on a sieve; it is then edulcorated with water, and slowly dried in the shade. Colour very deep and rich. The lighter shades are produced by the addition of sulphate of baryta.

2. A solution of crude carbonate of ammonia or bone spirit is added to a mixed solution of alum and blue vitriol, as long as it affects the liquor; in a short time the precipitate is collected, washed, and dried. The various shades of green are produced by using different quantities of alum, which pales and cheapens it.

Green, Chrome. The superb green pigment used by enamellers under this name is the green oxide or sesquioxide of chromium. A hydrated oxide of chromium forms the emerald green of Pannetier; it is prepared by melting in a crucible equivalent quantities of anhydrous boracic acid and bichromate of potassium, and treating the fused mass with water. The hydrated oxide thus produced is washed and finely triturated.

The chrome green of the oil and colour shops is a mixture of chrome yellow and Prussian blue.

Green, Cop'per. Green bice or mountain green, Brunswick green, emerald green, verditer, and several other well-known pigments, may be thus named.

Green, Em'erald. This term is commonly applied to the aceto-arsenite of copper, as prepared in England. It is the same compound, chemically speaking, as Schweinfurt green (which *see*).

Prep. A pulp is formed with verdigris, 1 part, and boiling water, q. s., and after being passed through a sieve, to remove lumps, is added gradually to a boiling solution of arsenious acid, 1 part, in water, 10 parts, the mixture being constantly stirred until the precipitate becomes a heavy, granular powder, when it is collected on a calico filter, and dried on chalk stones.

Green, Frise. *Syn.* FRIEZLAND GREEN. This resembles Brunswick green.

Green, Gellart's. A mixture of cobalt blue and flowers of zinc with some yellow pigment.

Green, Impe'rial. Schweinfurt green (see *below*).

Green, Iris. A pigment prepared by grinding the juice of the petals of the blue flag with quicklime. It is very fugitive.

Green Lake. See LAKE.

Green, Min'eral. This is the same as mountain green.

Green, Mitis. Another of the many synonyms of Schweinfurt green.

Green, Mountain. This pigment is properly the native green carbonate or bicarbonate of copper (malachite) ground to powder, either with or without the addition of a little orpiment or chrome yellow. That of the shops is commonly prepared by adding a solution of carbonate of soda, or of potassa, to a hot mixed solution of sulphate of copper and alum. Green verditer is commonly sold for this article. According to Watts, mountain green is the same as Neuwieder green.

Green, Neuwieder. Schweinfurt green mixed with gypsum or sulphate of baryta.

Green, Prussian. The sediment of the process of making Prussian blue from bullock's blood or horns, before it has had the hydrochloric acid added to it. It is also prepared by pouring liquid chloride upon freshly precipitated Prussian blue. As now sold, this pigment is generally a mixture of Prussian blue and gamboge.

Green, Rinman's. This resembles that of Gellert.

Green, Sap. A very fugitive pigment, prepared from the juice of buckthorn berries. The berries are allowed to ferment for a week or eight days in a wooden tub. The juice is then pressed out, strained, a little alum added, and the whole evaporated to a proper consistence; it is next run into pigs' bladders, and hung up in a dry situation to harden. An inferior article is made from the juice of black alder, and of evergreen privet. It is a common practice to add ¼ pint of lime water and ½ oz. of gum arabic to every pint of either of the above juices.

Green, Scheele's. This is arsenite of copper.

Prep. 1. White arsenic (in powder), 1 part; commercial potash, 2 parts; boiling water, 35 parts; dissolve, filter, and add the solution gradually, whilst still warm, to a filtered solution of sulphate of copper (cryst.), 2 parts, as long as a precipitate falls; lastly, wash the newly formed pigment with warm water, and dry it.

2. (Ure.) Powdered arsenious acid, 11 oz.; carbonate of potassa, 1½ lb.; boiling water, 1 gall.; dissolve, filter, and add the solution, as before, to another solution of crystallised sulphate of copper, 2 lbs., in water, 3 galls. *Prod.* 1½ lb. A very fine grass-green colour.

Green, Schweinfurt. This splendid green pigment is the aceto-arsenite of copper.

Prep. 1. Acetate of copper and arsenious acid, equal parts, are each dissolved separately in the least possible quantity of boiling water,

and the solutions mixed whilst still as hot as possible; an olive-green precipitate falls, which, by being boiled in the liquor 5 or 6 minutes, changes to a dense granular powder of a superb green colour.

2. Instead of boiling the solution containing the precipitate, it is allowed to cool and stand for several hours, or until the powder assumes a granular and beautiful tint. Very rich.

3. (Kastner.) Arsenious acid, 8 lbs., is dissolved in water as before, and added to verdigris, 9 or 10 lbs., diffused through water, q. s., at 120° Fahr., the pap of the latter being first passed through a sieve; the mixed ingredients are then set aside till the mutual reaction produces the proper shade.

4. (Dr. Ure.) Sulphate of copper, 50 lbs., and lime, 10 lbs., are dissolved in good vinegar, 20 galls., and a boiling-hot solution of white arsenic, 50 lbs., is conveyed as quickly as possible into the liquor; the mixture is stirred several times, and then allowed to subside, after which it is collected on a filter, dried, and powdered. The supernatant liquor is employed the next time for dissolving the arsenic.

5. See EMERALD GREEN (*above*).

Obs. This is a very fine, permanent green pigment. "A great deal of needless alarm has been excited about its supposed deleterious effects. It is extensively employed for staining wall-papers, and persons inhabiting rooms thus papered are said to have had their health seriously deranged by the arsenical fumes evolved from it. Now, it is utterly impossible that arsenic could volatilize from such a compound at ordinary temperatures; it does not decompose at any temperature below redness." (Watts.) [It is, however, probable that the air of such apartments is sometimes charged with the poisonous pigment through its becoming mechanically detached from the paper. To breathe an atmosphere so impregnated would be dangerous. The use of papers coloured with Scheele's green, especially of the kind called 'flock,' should, therefore, be carefully avoided.—ED.]

Verd'igris. See COPPER (Acetates) and VERDIGRIS.

Green Verd'iter. This is essentially a mixture of oxide and carbonate of copper, in uncertain proportions, with chalk. Factitious green bice and mountain green have a like composition. See VERDITER.

Green, Verona. The mineral called green earth.

Green, Vienna. The same as Schweinfurt green.

GREEN SICKNESS. See CHLOROSIS.

GREEK FIRE. This compound, so much used in ancient warfare, is believed to have had naphtha for its chief ingredient. According to some authorities, it was a mixture of asphalt, nitre, and sulphur.

GREGORY'S SALT. The crude hydrochlorate of morphia, prepared by Gregory's process. It is a double hydrochlorate of morphia and codeia.

GRIND'ING. The operation of reducing substances to powder by attrition or friction. In the laboratory, the term is chiefly applied to powdering by means of a mill or by mechanical power, in opposition to simple pounding or trituration in a mortar or with a slab and muller. All the principal powders, paints, &c., sold by the druggist, drysalter, and colourman, are reduced in the drug or colour mill. Recently machinery has even been applied to the common mortar. An ingenious and very useful contrivance of this kind is the 'mechanical mortar' of Mr. H. Goodhall, of Derby.

GRIND'STONES. (Artificial). Washed siliceous sand, 3 or 4 parts; shell-lac, 1 part; melt together, and form the mass into the proper shape whilst warm, with strong pressure. The fineness of the sand must depend on the work the stone is intended for. The same composition is formed upon pieces of wood, as corn rubbers, and for the purpose of sharpening knives, and cutting stones, shells, &c. See EMERY.

GROATS. *Syn.* GRITS; GRUTELLUM, AVENA DECORTICATA, AVENÆ SEMINA, AVENA (Ph. L.), L. Common oats, deprived of their exterior integuments or husks. This is generally effected in a mill, which, at the same time, cuts them into two or three pieces. When crushed flat, they are denominated EMBDEN GROATS.

GROUT. Mortar reduced to a thin paste with water, used to fill up the joints of masonry and brickwork. A finer kind is used to 'finish off' the best ceilings.

GRUEL. *Syn.* OATMEAL GRUEL, WATER G.; DECOCTUM AVENÆ, L. Oatmeal or groats boiled with water to a proper consistence, and strained. It is variously flavoured to suit the palate; but the addition of a little white sugar, and finely powdered Jamaica ginger, with or without a glass of wine, is the least likely to offend the stomach. Nutmegs, cinnamon, &c., frequently disagree with invalids. Sometimes milk or butter is added. Embden groats require less boiling than the common groats. Of oatmeal, the Scotch is commonly said to be the best.

The following directions for making gruel from oatmeal are given by Dr. A. T. Thomson:—"Oatmeal, 2 oz.; cold water, 1½ pint; rub the meal in a basin, with the back of a spoon, in some of the water, pouring off the fluid after the grosser particles have subsided, but whilst the milkiness remains; repeat this with fresh water, unite the washings, and boil until a soft, thick mucilage is formed."

GUA'IACIN. *Syn.* GUAIACIC ACID, PURE GUAIACUM RESIN. A substance having the nature of an acid, discovered by Trommsdorff in the wood and bark of *Guaiacum officinale*.

Prep. The tincture of guaiacum is treated with hydrate of lime, and the guaiacate of lime thus formed is decomposed with dilute sul-

phuric acid; it is purified by dissolving it in alcohol.

Prop., &c. Insoluble in water; soluble in alcohol and ether; it unites with the caustic alkalies, forming alkaline guaiacates (guaiacum soaps); air and light turn it green; gluten, mucilage of gum arabic, &c., turn it blue; nitric acid and chlorine turn it successively green, blue, and brown; tincture of guaiacin, added to hydrocyanic acid and sulphate of copper, produces an intense blue colour. (Pagenstecher.) A delicate photographic paper may be formed by washing unsized paper with an alcoholic solution of guaiacum resin, and afterwards with one of neutral acetate of lead. (Johnston.)

GUA'IACUM. *Syn.* GUAIAC, GUM GUAIACUM, GUAIACUM RESIN; GUAIACUM (Ph. L.), (GUAIAC RESIN, GUAIACI RESINA, B. P.), The resin prepared by means of fire from the wood of *Guaiacum officinale*, by natural exudation, by incision, or by heat. (B. P.) This substance is often adulterated. When pure, its "fresh fracture is red, slowly passing to green; the tincture slowly strikes a lively blue colour on the inner surface of a thin paring of raw potato." (B. P.) Adulteration with resin may be generally discovered by the odour evolved when the guaiacum is heated. An alcoholic tincture of guaiacum, rendered milky with water, recovers its transparency on the addition of caustic potassa in excess; but this is not the case when resin is present.

Guaiacum is stimulant, sudorific, and alterative.—*Dose.* 10 to 30 grs., either in powder or pills; in chronic rheumatism, gout, obstinate chronic skin diseases, scrofula, syphilis, &c. It forms the active ingredient of the once celebrated 'CHELSEA PENSIONER,' and the 'GOUT SPECIFIC' of Mr. Emerigon. The latter was made by digesting 2 oz. of guaiacum resin in 48 fl. oz. of rum, for 7 or 8 days. The *dose* of this was a table-spoonful every morning, fasting, for a twelvemonth. Its other properties are similar to those of GUAIACIN, but are less marked. Sp. gr., 1·20 to 1·22.

Guaiacum Wood. *Syn.* LIGNUM VITÆ, GUAIACI LIGNUM (Ph. L.), L. The wood of *Guaiacum officinale*. This is employed under the form of shavings, raspings, and sawdust, in decoctions only. See DECOCTION and BALSAM.

GUA'NO. *Syn.* HUANHO, Peruv. This substance, now so extensively used in agriculture, is the partially decomposed excrement of certain aquatic birds, chiefly the common penguin, which congregate in countless numbers on the barren and uninhabited islets and rocks on the western coasts of South America and the coasts of Africa. It abounds in ammonia and the phosphates, and is undoubtedly the richest natural manure known. Under judicious application, the increase of the crops of grain, turnips, potatoes, and grass, consequent upon its use, is said to be about 33⅓. "Guano is peculiarly adapted to horticultural and floricultural improvement, by its relative cleanliness and facility of application." (Ure.)

"According to Denham Smith,[1] South American guano, as imported, presents itself in three distinct states, the three varieties being not unfrequently mixed together in the same bag; the first variety is damp and pulverulent; the second exists as large concretions, presenting various aspects when broken; the third is heavy and crystalline, and is termed 'stone' by the labourers. These three varieties differ widely in composition, as the following comprehensive analysis, by Smith, will show:—

Soluble in Water.	I. Pulverulent.	II Concrete.	III. Saline.
Water	222·00	250·00	97·00
Chloride of ammonium	25·50	—	30·30
Sulphate of potash	80·00	—	—
„ soda	traces	258·44	191·77
Oxalate of ammonia	74·00	93·90	—
„ soda	—	—	105·63
Phosphate of ammonia	63·30	61·24	—
„ potash	—	77·32	49·47
„ soda	1·20	—	3·60
Chloride of sodium	—	29·22	286·31
„ potassium	—	—	41·63
Organic matter	15·00	6·68	25·53
Urate of ammonia	154·18	—	—
Uric acid	25·16	—	—
Ammonia phosphate of magnesia	5·64	7·84	1·33
Animal matter	11·80	8·60	7·56

[1] 'Proceedings of the Chem. Soc,' vol. II.

Insoluble in Water.

	I Pulverulent	II. Concrete.	III. Saline.
Oxalate of lime	25·60	109·58	—
Phosphate of lime	199·30	62·70	132·23
„ magnesia	20·30	8·74	25·80
Oxide of iron	—	—	1·56
Humus and organic matters	60·92	8·00	18·36
Sand	15·60	7·20	4·20
Loss	·50	10·54	7·78
	1000·00	1000·00	1000·00

"Several of the South American guano beds are now exhausted, but new varieties are constantly being introduced; and although the qualities are continually varying, guanos, on the whole, may be divided into two classes, the one characterised by the abundance of ammonia, the other by that of phosphates, the Peruvian and Angamos being characteristic of the former, and the Saldanha Bay and Bolivian of the latter. In selecting a guano, the following points (Anderson) ought to be attended to by the farmer:—

"1st. The guano should be light coloured and dry, colouring very slightly when squeezed together, and not gritty.

"2nd. It should not have too powerful an ammoniacal smell, and should contain lumps which, when broken, appear of a paler colour than the powder.

"3rd. A bushel should not weigh more than from 56 to 60 pounds.

"These characters are, however, imitated with great skill, so that they cannot be implicitly relied upon, and they are applicable to Peruvian guano only."[1]

Purity, Adulteration. Guano, owing to its high price, is very commonly adulterated, or is in an advanced stage of decomposition when sold. Much of what is vended under the name is altogether a fictitious article. These artificial mixtures are made to look so like genuine guano, that the mere practical man, who goes only by their appearance, is very often deceived by them, and, owing to the failure of his crops in consequence, is led to distrust the efficacy of guano as a manure. A sample of pretended guano examined by Johnston was found to contain, in the state in which it was sold, more than half its weight of gypsum, the rest being peat or coal ashes, with a little common salt, crude sul- phate of ammonia, and either dried urine or the refuse of the glue manufactories, to give it a smell. "I could not satisfy myself that it contained a particle of real guano."[2] Vessels which sail hence for the guano stations, are now very commonly ballasted with rough gypsum or plaster of Paris. This substance is mixed with the guano as it is loaded, and enables the importers to deliver from the vessel a "nice-looking, light-coloured article." Purchasers of guano are very desirous of having it delivered from the vessel, as they believe they thus obtain it pure. The favourite material for the adulteration of guano, at the present moment, is a variety of umber, which is brought from Anglesea in large quantities. The rate of admixture is said to be about 15 cwt. of umber to about 5 cwt. of Peruvian guano, from which an excellent-looking article is manufactured, which is sold under the name of 'African guano.'

Pure guano has a pale-brown colour, a more or less offensive odour, and the average sp. gr. of 1·63 to 1·64. If the sp. gr. exceed 1·75, it is either damaged or adulterated; and if it is less than 1·62, it contains an undue quantity of moisture. The best is neutral to test-paper, and sometimes has even an acid reaction; but that of commerce has generally an alkaline reaction, owing to the presence of free ammonia, and, in consequence, turns turmeric paper brown, and gives white fumes when a glass rod dipped in hydrochloric acid is held over it. Triturated with quicksilver or caustic potassa, good guano evolves a powerful odour of ammonia; digested in water, fully one half of it is dissolved; dried by the heat of boiling water, it does not lose more than from 7 to 9% in weight; and burned upon a red-hot shovel, it leaves a white ash, not a red or dark-coloured one, (See directions for selecting guano given *above*, also *below*.)

Analysis or *assay.* The quantitative analysis of guano, so as to exhibit the names and proportions of all its numerous component substances, is an extremely tedious and difficult matter in the hands of persons unaccustomed to chemical manipulations. As, however, its value to the agriculturist depends chiefly on its richness in ammonia, potassa, and phosphoric acid, the analysis of guano for practical purposes may be reduced to an assay

[1] The above particulars are from an elaborate paper by Dr. H. M. Noad, in the 'Chemist and Druggist,' vol. ii.
[2] 'Elem. of Agric. Chem.'

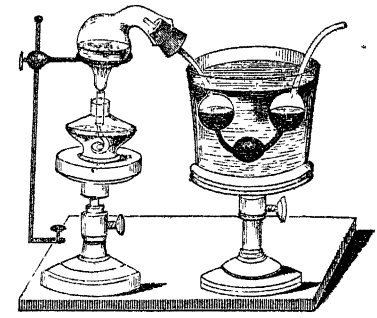
for these articles. Indeed, the presence of ammonia (the most valuable of them), in the proper quantity, may be fairly taken as evidence of the presence of the rest. The following methods of testing guano are both simple and accurate, and are so arranged as to permit its per-centage richness in one or more of its leading constituents to be determined without much trouble or expense.

1.—*a.* 100 grs. of the sample for examination (fairly selected) are crushed to a powder, and placed on a small, weighed, and perfectly dry paper filter, and then desiccated, by exposure for 2 or 3 hours to the heat of boiling water. The loss in weight, taken in grains, after deducting 9, indicates the quantity per cent. of water or moisture which the sample contains in excess of that present in good or pure guano.[1]

b. The paper filter, with its contents, is next suspended for some time over concentrated sulphuric acid (oil of vitriol) contained in a wide-mouthed bottle or jar, by means of a thread attached to the cork or stopper, care being taken to exclude the external air. The exposure in this way is continued until the guano ceases to diminish in weight, which is ascertained by weighing it at intervals after the first 3 or 4 hours. When this point is arrived at, the filter and its contents are very carefully weighed. The difference between its present weight and its original weight (before the desiccation in *a*), taken in grains, gives the gross quantity of water per cent.

c. The dried guano from (*b*) is next placed in a weighed, smooth crucible or capsule, and exposed to a low red heat until all the organic matter is completely destroyed, and the whole is reduced to a white ash, which is weighed as soon as it has become cold. This weight, in grains, gives the gross weight per cent. of non-volatile matter (fixed alkaline and earthy chlorides, phosphates, and sulphates); the total loss of weight by combustion denotes the gross per-centage of combustible and volatile matter (urea, uric acid, ammoniacal salts, and organic matter). The latter should not be less than 55 to 60%.

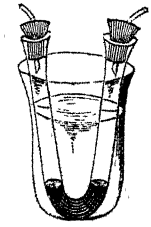
2.—*a.* A second 100 grs. of the guano, selected as before, is distilled along with about 75 grs. of fresh-slaked quicklime, and a little water, in a small matrass connected with a tubular, triple bulb-condenser, containing cold distilled water, and immersed in a basin of ice-cold water. (See *engr.*) The condenser is charged by plunging one of its extremities into the water, and sucking at the other, until the liquid reaches the level indicated in the margin. A very gentle heat only, cautiously increased, need be employed. After the process is over, the strength of the solution of ammonia found in the condenser is tested, either by taking its density in a small specific-gravity bottle, or by determining its saturating power in the manner described under ALKALIMETRY. This furnishes the per-centage



of ready formed ammonia sufficiently accurate for all ordinary purposes, provided proper care is taken.

When extreme accuracy is required, the condenser is charged with a weighed quantity of dilute hydrochloric acid of a known strength, instead of water, and after the process is over, this is tested as before. The quantity of ammoniacal test-liquor (see ALKALIMETRY) now taken to saturate it, deducted from what it would have taken before the exposure in the condenser, gives the per-centage sought.

Another method, giving very accurate results, is to use a rather strong hydrochloric acid (sp. gr. about 1·13) for the condenser; after the operation is over, the contents of the latter are poured into a glass or porcelain capsule, a solution of bichloride of platinum is added, in excess, and the whole is then gently evaporated to dryness; the residuum is rubbed to powder, and exhausted with a mixture of two measures of alcohol and one measure of ether; the undissolved portion is next dried at a heat not exceeding 212° Fahr., and weighed. The weight, in grains, of the ammonio chloride of platinum thus obtained, multiplied by ·0763, gives the per-centage of ready-formed ammonia, as before. When hydrochloric acid is used for the condenser, a simple U tube and beaker glass may be employed, if a bulb-condenser is not at hand. (See *engr.*) The advantages resulting from the use of acid instead of water for the condenser is, that with the former no ammonia can possibly escape being absorbed, whilst little care is required to keep the condenser cool.



b. 25 grs. of the guano are next weighed, and after being slightly moistened with a little dilute hydrochloric acid, are thoroughly dried by the heat of boiling water; the dried sample is then mixed in a warm unglazed porcelain mortar with 10 times its weight of

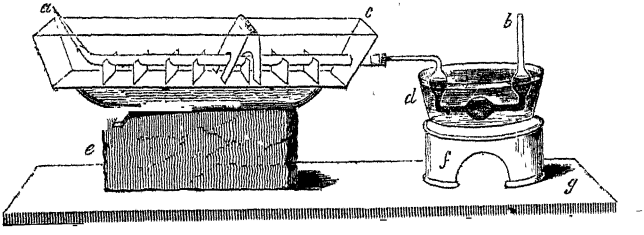
[1] According to Dr. Noad, the proportion of water in genuine guanos ranges from 7 to 20%.

a mixture of 2 parts of quicklime to 1 part of hydrate of soda (both quite dry). This mixture is introduced into a combustion tube of hard Bohemian glass, about 16 or 18 inches long, and $\frac{3}{4}$ of an inch in diameter. (See *engr.*) The mortar is rubbed out with a little of the soda-lime mixture, which is also introduced

into the tube with that already put there; a little plug of ignited asbestos is then loosely placed over the whole, and the tube is immediately connected with a tubular bulb-condenser, containing moderately strong hydrochloric acid, great care being taken that the joints are made air-tight, which may be determined by the operator sucking a few bubbles out of the apparatus. If, after suction, the liquid remains at a higher level in the furthest bulb (*b*), it is a sign that the connection is sound. This being done, heat is applied to the combustion-tube by means of spirit-lamps; or, more conveniently, by means of the furnace now usually employed in organic analysis. (See *engr.*) The tube is next gradually surrounded with red-hot charcoal, by shifting, by degrees, the screen (*e*), and adding more charcoal, so as to gradually expel the ammonia. The disengagement of gas should take place uninterruptedly, but not too rapidly, in order that the acid may not ascend into the combustion-tube and spoil the experiment. The non-condensable volatile matters which pass off furnish a key to the progress of the operation. The heat is at length increased to a full red. When gas ceases to be evolved, and the mixture in the tube has become quite white, the experiment is at an end. The point (*a*) of the combustion-tube is broken off, and the ammonia which remains in the tube is expelled by sucking gently at the extremity (*b*) of the bulb-condenser. The latter is then disconnected with the apparatus, and emptied into a glass or porcelain capsule, in order to be tested, as directed under 2, *a*. The quantity of ammonia, in grains, thus found, multipled by 4, gives the WHOLE QUANTITY of AMMONIA per cent., both actual and potential, producible from the sample of guano examined.

c. The quantity of ready formed ammonia (see 2, *a*) deducted from the quantity last found (see 2, *b*) gives the quantity of LATENT or POTENTIAL AMMONIA that will be slowly developed by the decomposition of the guano in the soil, and become available for the food of plants. This is the most valuable product of this substance as a manure, and can only be obtained in quantity from well-preserved, dry guano.

3.—*a*. A third quantity of 100 grs. of the guano, selected as before, is triturated and digested for some time with 12 times its weight of hot distilled water, and the whole being thrown on a filter, the undissolved portion is



washed with a little warm distilled water; the solution and 'washings' are then mixed together, and acidulated with nitric acid; a solution of pernitrate of iron is next added, and afterwards, solution of ammonia, in excess; the liquid is next heated for a short time, and the bulky reddish-brown precipitate is collected, washed with hot water, dried, ignited, and weighed. The weight, in grains, less the weight of the peroxide of iron in the pernitrate consumed, gives the weight of PHOSPHORIC ACID present in the soluble phosphates contained in the sample. The pernitrate of iron is made by direct solution in hot strong nitric acid, of twice as much pure iron wire as there is phosphoric acid suspected to be present in the liquid. A slight excess will not alter the result. The number of grains of metallic iron used to form the solution, multiplied by 1·4286, gives the weight of the peroxide of iron which is to be deducted from the gross weight of the precipitate.

b. The filtrate and 'washings' left from 3, *a*, are mixed, and treated with a little oxalate of ammonia to throw down any lime, and then carefully evaporated to dryness and ignited; the residuum of the ignition, when cold, after being carefully weighed, is treated with the smallest portion of water that will dissolve it; the solution is acidified with hydrochloric acid, and a solution of bichloride of platinum added, in excess; some strong alcohol is next poured in, the precipitate carefully collected on a filter, washed with rectified spirit, dried at 212° Fahr., and weighed. The weight, in grains, multiplied by ·1940, gives the percentage of POTASSA sought.

c. The weight of the potassa multiplied by

1·852, and deducted from the weight of the ignited residuum in 3, *b*, already found (see *above*), gives the quantity of CHLORIDE OF SODIUM or COMMON SALT (nearly).

4.—*a*. The insoluble residuum from 3, *a*, dried, and ignited, or the ash from 1, *c*, is digested for 10 or 12 hours in 600 times its weight of water (to which a little common salt or sal-ammoniac may be added), after which the whole is thrown upon a filter; a solution of chloride of barium is then added to the filtrate as long as a precipitate (if any) forms; the latter is collected, washed, dried, ignited, and weighed. The weight, in grains, multiplied by ·5843, denotes the quantity of GYPSUM or SULPHATE OF LIME which has been used to adulterate the sample.

b. The insoluble residuum last left on the filter is digested for some time in warm dilute hydrochloric acid; the whole is then thrown upon a filter, and the undissolved portion (SILICA or SAND, with, perhaps, a trace of ALUMINA), is washed, dried, ignited, and weighed. It should not weigh more than 3 to 3½ grs. (3 to 3½ %).

c. The filtrate and 'washings' from *b* are next mixed together; the mixed liquid is acidified with dilute sulphuric acid and heated until all the hydrochloric acid is expelled, and the whole reduced to a soft pasty-mass; rectified spirit is now poured in, and after active stirring for some time, the mixture is thrown on a filter, and the solid portion washed with a little more rectified spirit; it is then dried, ignited, and weighed. The weight, in grains, multiplied by ·7650, gives the quantity of PHOSPHATE OF LIME per cent. required.

d. The filtrate from *c* is diluted with water, and after being boiled for a few minutes, ammonia is added in slight excess, followed by a solution of sulphate of magnesia (previously mixed with as much sal-ammoniac as will prevent ammonia producing a precipitate in it), slowly dropped in as long as it disturbs the liquor; the whole is now allowed to rest for 10 or 12 hours, when the precipitate is collected on a filter, and washed with water alkalised with ammonia, as long as the filtering liquid is rendered turbid by chloride of barium; it is next dried, submitted to intense ignition for some time in a covered platinum crucible, and when cold, carefully weighed. The weight, in grains, multipled by ·6429, indicates the per-centage of PHOSPHORIC ACID in the insoluble phosphates (phosphates of lime, magnesia, &c.) in the sample examined.

5. A fourth 100 grs. of guano is weighed, and exhausted by trituration and digestion with hot water (see 3, *a*); the solution is evaporated to dryness by a gentle heat, and the residuum of the evaporation, after being weighed, is powdered and enclosed in a stout phial with 8 times its volume of alcohol, sp. gr. ·825 (63 o. p.); the plant is next securely corked and guarded, and exposed for some time, with agitation, to the heat of 212° Fahr., the whole is then allowed to cool, the contents of the phial filtered, the undissolved portion washed with hot alcohol, and both the filtrate and the 'washings' gently evaporated to dryness, and weighed. This gives the richness of the sample in UREA, one of the most valuable constituents of the best guano. Its presence is "a certain proof of its entire soundness." (Ure.)

6.—*a*. Another 100 grs. of the guano is taken, and after being exhausted with water, is dried at 212° Fahr., and weighed; it is then digested with heat in 20 times its weight of borax-water (containing 1% of borax), or in a solution of caustic potassa, and after a time the whole is thrown on a weighed filter, washed with a little cold distilled water, dried by a heat not higher than that of boiling water, and again carefully weighed. The loss, in grains, indicates the proportion per cent. of URIC ACID.

The accuracy of the result may be verified by adding dilute hydrochloric acid, in slight excess, to the filtrate, collecting the bulky, crystalline precipitate of uric acid which forms, washing it carefully with a little rectified spirit, drying it, and weighing it, as before. This weight, which in general is a very little under that denoted above, is the more accurate of the two. The precipitate is shown to be uric acid by its assuming a rich crimson colour when treated with a little nitric acid, which turns to a rich purple (*murexide*) when it is moistened with ammonia water.

b. The quantity of uric acid last obtained, multiplied by 1·1012, gives the per-centage of URATE OF AMMONIA.

Obs. Amongst the numerous constituents of guano, none are so valuable in an agricultural point of view as the three substances referred to in the last two sections. Indeed, almost all the ammonia furnished by this substance to the soil, after the latter, manured with it, has been exposed to the air and rain, is derived from the slow decomposition of urea, or urate of ammonia. It is these substances from which the store of latent, or, as Dr. Ure terms it, potential ammonia, is derived. The ammonia existing in the guano under the form of carbonate, or of soluble salts (ready formed ammonia), is either soon dissipated in air or is washed away by heavy rains, and, therefore, forms the least valuable and durable portion of this manure. It may be even added artificially, a matter almost impossible with the former. An assay, therefore, for the latent ammonia, or the urea, or the urate of ammonia, any one of them singly, at once furnishes us, as we have already hinted, with evidence of the quality of the guano examined, without the expense and trouble of a complete analysis of this substance. Urea and uric acid are only to be found in the very best samples of guano, and their presence is a positive proof of entire soundness and superior quality. The other valuable portions of guano are potassa and phosphoric acid (phosphate of lime chiefly);

the rest are of little importance. (See 2, *c*, *above*.)

GUARANA'. *Syn.* PAULLINIA, BRAZILIAN COCOA. An alimentary and medicinal substance prepared from the seeds of *Paullinia sorbilis*, a Brazilian tree. The dried seeds, deprived of their aril, are pounded and kneaded into a mass, which is afterwards made into oblong or rounded cakes (GUARANA BREAD). These cakes are used as we use chocolate—mixed with water and sugar, and drank as a beverage. In Brazil this beverage is largely consumed, both on account of its nutritive qualities, and for its stomachic, febrifugal, and aphrodisiac effects. See CHOCOLATE, &c., also *below*.

GUARANINE'. A crystalline substance discovered by M. Martius, in guarana. It appears to be identical with caffeine, the active principle of coffee and tea.

GUD'GEON. The *Cyprinus gobeo* (Linn.), a small fresh-water fish, common almost everywhere. The white is considered the best. It was formerly used in medicine.

GUM. *Syn.* GUMMI, L. The general term for an important class of vegetable products. Gums are more or less soluble in cold water, but insoluble in alcohol, ether, and oils. They are obtained from certain plants in amorphous masses; most of them exude spontaneously, or on puncturing the bark. The most perfect type of this class is the substance called GUM ARABIC, or GUM ACACIA. The gums are employed as demulcents in medicines, and are used as cements, and for giving stiffness and gloss to textile fabrics. Among the vulgar the term is often incorrectly applied to the resins and gum resins.

Gum Acacia. *Syn.* GUM ARABIC; ACACIÆ GUMMI (B. P.); G. ARABICUM, G. ACACIA, ACACIA (Ph. L.), L. "From various species" (of *Acacia*) "yielding gum" (Ph. L. & E.), chiefly *Acacia arabica* and *A. vera*. "Whitish or yellowish, transparent or cracked on the surface, and opaque; brittle; it dissolves freely in water." (Ph. L.) It is scentless, and may be bleached by exposure to the sun and air, at the temperature of boiling water. Sp. gr. 1·355. (Ure.) The pure soluble principle of gum arabic is termed ARABIN (which *see*). BARBARY or MOROCCO GUM, GUM SENEGAL, and EAST INDIA GUM, are inferior commercial varieties of the same substance from other species of *Acacia* (see *below*).

Powdered gum arabic (PULVIS ACACIÆ) is frequently adulterated with flour or farina, or with Senegal or other inferior gums. The first may be detected by agitating a little of the powder with cold water; the pure gum dissolves rapidly, whilst the starch or flour falls to the bottom of the vessel. Or, a little of the powder may be mixed with boiling water, and when cold, tested with tincture of iodine; if it contains starch or flour, the paste will assume a blue colour. If it contains cherry-tree gum or tragacanth, it will be only partly soluble in cold water, and the paste will be partly coloured, and more or less interspersed with gelatinous clots.

Much of the white gum arabic of the shops is formed by bleaching gum Senegal, by what is called 'Picciotto's process.' The gum is dissolved in water, and sulphurous acid gas passed through the solution. The liquid is afterwards boiled to expel the sulphurous acid, a little of which, however, still remains behind. To obtain the gum in a still whiter state, carbonate of baryta is added, and after agitation, the mixture isfiltered; it is afterwards shaken with gelatinous alumina, again filtered, and evaporated. The product (BLEACHED GUM) is very white, but lacks the peculiar toughness and adhesiveness of the best gum acacia.

Gum, Barbary. *Syn.* MOROCCO GUM. An inferior product, consisting of a mixture of several Acacia gums. It is exported from Mogador

Gum, Bassora. A solution of yellowish gum brought from the neighbourhood of Bassora. It differs from most gums in being nearly insoluble in water. The plant yielding it is believed to be a species of *Mimosa*. It contains the principle, BASSORIN, which also exists in gum tragacanth.

Gum, Bleached. See GUM ARABIC (*above*).

Gum, Brit'ish. *Syn.* DEXTRIN, STARCH GUM. Starch converted by the action of acids, diastase, or heat, into a soluble substance resembling gum.

Prep. 1. Malt (crushed small), 1 lb.; warm water, 2 galls.; mix, heat the whole to 145° Fahr., add of potato starch, 5 lbs., raise the heat to 160° or 165° Fahr., and mash for about 25 minutes, or until the liquid becomes thin and clear; it must then be instantly run off, and raised to the boiling-point to prevent the formation of sugar; after boiling for 3 or 4 minutes, the whole must be filtered, and evaporated to dryness by a steam heat.

2. By exposing dry potato starch, in a stove, to a heat of about 400° Fahr. Yellow and inferior.

3 (M. Payen.) Dry starch, 1 ton, is moistened uniformly with concentrated nitric acid, 4½ lbs., (diluted with) water, q. s., and the paste or dough is made up into small bricks or loaves, and dried in a stove; it is next reduced to coarse powder, and exposed in a stove-room for some time to a current of air at 160° to 165° Fahr.; it is next ground, sifted, and exposed, as before, to a heat of about 228° Fahr.; it is, lastly, ground, and passed through the 'bolting machine.' Very white and superior. This process has been patented in France by M. Henzé.

4. (Pinel.) Water, 100 galls., nitric acid, ½ gall., and hydrochloric acid, ½ pint, are mixed together, and so much potato starch is mixed as will form a thin paste; in two hours the liquid is drained off, and the solid matter is made up into lumps, which are dried by a gentle heat in a stove-room; they are next

coarsely pulverised, and the powder is exposed on three successive days to the respective temperatures of 100°, 150°, and 190° Fahr.; the whole is then sifted, and, lastly, exposed to a heat ranging from 300° to 350° Fahr. Darker coloured than the last. To give it the appearance of gum arabic, it is made into a paste with water containing 1% of nitric acid, and after being spread on copper plates in layers ¾ to 1 inch thick, it is exposed to a stove heat ranging from 240° to 300° Fahr.

Prop., &c. White; insipid; transparent; friable; soluble in cold water, and in dilute spirit; insoluble in alcohol and ether; its solution yields a precipitate with acetate of lead. Iodine commonly turns commercial dextrin blue, but does not affect the colour of pure dextrin. It is distinguished from ordinary gum by its right-handed polarization of light, and by yielding oxalic but not mucic acid, when treated with nitric acid.

Dextrin is nutritive, emollient, and agglutinant. In France it is largely employed by the pastry-cooks and confectioners, and in medicine as a substitute for gum. The French surgeons also commonly employ it as a 'stiffening' for the splints used for fractured limbs. In this country it is chiefly used as a fine dressing for muslins, silk, and other textile fabrics, and in calico printing. Recently it has been made up into tear-like masses, and sold for gum arabic, to which, however, it is vastly inferior as an agglutinant. See DEXTRIN.

Gum, Cherry-tree. *Syn.* FRUIT-TREE GUM, PLUM-TREE G.; GUMMI CERASI, G. PRUNI, L. An exudation from the stems of cherry, plum, and some other of the *Rosaceæ*. It is only partly soluble in water. It contains CERASIN (which *see*).

Gum, East India. This product, which consists of inferior kinds of gum acacia, is chiefly exported from Bombay, having been previously conveyed there from the coast of Arabia. It varies greatly in quality. Some samples are quite unfitted for making gum-water.

Gum, Insoluble. See BASSORA GUM, CHERRY-TREE GUM, and GUM TRAGACANTH.

Gum, Seed. *Syn.* GUMMI SEMINUM, L. A species of soluble gum extracted from the seed of the flax (linseed), quince, &c.

Gum Senegal. This product, which is largely exported from Portendie, Sierra Leone, and the French settlements on the Senegal, ranks next in quality to gum acacia, and for many purposes, as calico-printing for instance, it answers equally well. The transparent and light-coloured pieces are frequently picked out and sold as gum arabic.

Gum Trag'acanth. *Syn.* TRAGACANTH, GUM DRAGON; GUMMI TRAGACANTHA, G. DRACONIS, TRAGACANTHA (Ph. L.), L. The gummy exudation of the *Astragalus verus*, hardened by the air. When digested in water, it swells considerably, a portion is dissolved, and the whole combines to form a thick mucilage. It is totally soluble in boiling water, when some change is supposed to take place in it; a great portion, however, afterwards separates. Sp. gr. 1·384. It is chiefly employed in calico-printing, and by shoemakers and lozenge-makers; by the latter to give toughness to the saccharine mass.

Powdered tragacanth is often adulterated with flour of starch, and not unfrequently with the commoner varieties of gum arabic. According to M. Planche, a mixture of pulverised tragacanth and gum arabic forms, with water, a thinner mucilage than the same quantity of either of these gums alone. This fraud may be detected as follows:—Make a mucilage of the suspected gum, and add thereto a few drops (2 or 3 to the dr.) of alcoholic tincture of guaiacum, taking care to stir it all the while. If the sample contains any gum arabic, the mixture, in the course of a few minutes, assumes a fine blue colour, whilst it does not change colour if the gum tragacanth is pure, 5% of gum arabic can be thus detected. When the quantity is very small, one to four hours may elapse before the colour is developed. Starch and flour are detected in the manner noticed under GUM ARABIC.

Gum, Turkey. Various qualities of gum acacia are sold under this name.

GUM RESINS. *Syn.* GUMMI RESINÆ, L. Vegetable products in which the properties of gum and resin are combined. They are partly soluble in water, and partly in alcohol. Many of them form a species of emulsion when triturated with the former fluid. The principal gum resins are AMMONIACUM, ASSAFŒTIDA, BDELLIUM, GALBANUM, GAMBOGE, MYRRH, OLIBANUM, OPOPONAX, SAGAPENUM, and SCAMMONY.

GUN BAR'RELS. See BROWNING.

GUN COT'TON. See PYROXYLIN.

GUN MET'AL. An alloy containing 90·5% of copper and 9·5% of tin, used for casting pieces of ordnance (erroneously termed 'brass guns'), also those parts of machinery which are subjected to considerable friction. See ALLOYS, BRONZE, STEREO-METAL, &c.

GUN'POWDER. This substance is a mechanical mixture of saltpetre, charcoal, and sulphur. It is seldom prepared on the small scale.

Prep. The saltpetre having been trebly refined, by boiling, skimming, filtering, and crystallising, is melted into cakes, which are then brushed to remove any adhering grit or dirt, broken into pieces with a mallet, ground to a fine powder in a mill, and sifted through a fine bolting sieve of brass wire. The charcoal is that of the alder or willow, and is carefully burnt, as already described, and is then reduced to powder. The sulphur is refined by distillation, and ground to the same fineness as the charcoal and saltpetre. The ingredients are weighed out in the proper proportions, and mixed together in a machine consisting of a wooden drum, having a shaft

passing through its centre, to which numerous 'flyers' in the shape of knife-blades are attached, the drum and flyers revolving in a contrary direction. When mixed, the charge is carried to the 'incorporating mill,' where it is ground under vertical iron 'mill-stones,' with a small quantity of distilled water, until the ingredients are thoroughly incorporated. The product of this operation is then pressed into a hard cake, which is next broken into pieces, granulated by means of sieves, and after being 'glazed' by friction, and the dust separated, is dried, with proper precautions, in a stove heated to about 130° by steam pipes.

The proportions of saltpetre, charcoal, and sulphur, used for different kinds of powder, differ very slightly. In 'sporting powders' the proportion of saltpetre is generally from 1 to 3% greater than in the Government powders. In 'miners' powders' it is about 10% less, an excess of sulphur being used. The following are the proportions adopted by European powers:—

	Saltpetre.	Charcoal.	Sulphur.
England	75	15	10
France	75	12·5	12·5
Austria	75	15	10
Prussia	75	13·5	11·5
Russia	73·78	13·59	12·63
Spain	76·47	10·78	12·75
Sweden	76	15	9

(Capt. Jervis-White Jervis.)

Obs. The quality of gunpowder is best estimated by actual trial of its power and cleanliness in use. It should be dry, hard, and free from dust; the grains should be of a uniform size, and glossy, and the colour a dark-gray or brownish-gray, not perfectly black. A very little placed on a piece of paper and fired should instantly explode with a flash, and neither leave an appreciable residue on the paper nor burn it. Dried by the heat of boiling water, or in vacuo, it should not lose more than ½ to 1% of its weight. Damp powder rapidly 'fouls' the gun. Gunpowder, containing more than 7% of water, does not recover its strength by simply drying it. The sp. gr. ranges between 1·795 and 1·800.

Gunpowder, White. *Syn.* BLASTING POWDER. *Prep.* 1. See BLASTING POWDER, No. 3.

2. Yellow prussiate of potash and white sugar, of each, 1 part; chlorate of potassa, 2 parts; powder each separately, and mix them well, but carefully, with a bone or wooden knife. It may be granulated like gunpowder, by making the powder into a paste with a little water, and pressing the mass through a parchment sieve.[1]

GUN'JAH. See HEMP (Indian).

GUT. *Syn.* FISHING GUT, SILKWORM G. This is obtained from the *Bombyx mori* (Linn.) or silkworm caterpillar. *Prep.* The silkworms, when just ready to spin, are steeped in strong vinegar for 12 hours in warm weather, or 2 or 3 in cold weather, and are then broken in half, and stretched out as far as possible on a board, furnished with slits or pegs to hold them; in this state they are allowed to dry in the sun or a warm place.

Obs. Used by anglers. The worms may be known to be going to spin by refusing food, and by having a fine silken thread hanging from the mouth.

GUTTA PERCHA. The concrete juice of the *Isonandra Gutta*, a tree growing only in the Malayan Archipelago, and of other species of the same genus. The stem of the gutta-percha tree grows to the diameter of 5 or 6 feet, and on being notched yields a milky juice, which, after exposure to the air for some time, solidifies, forming the gutta percha of commerce. It arrives in this country in irregular blocks of some pounds in weight, usually containing a large portion of impurities in the form of pieces of wood, stones, and earth. To prepare this crude product for manufacturing into useful articles, the blocks are first cut into slices, and then torn into shreds. These are softened by hot water, and kneaded in a 'masticator,' the stones, earth, and other impurities, being gradually washed away by water. After several hours the gutta percha is found to be kneaded into a perfectly homogeneous mass, which is rolled or drawn into sheets, bands, or tubes, as required.

Prop., &c. Gutta percha is a tough, inelastic substance, becoming soft and plastic at 212° Fahr., at which temperature two pieces may be firmly welded together. It is one of the best insulators of electricity, is impervious to moisture, and resists the action of acids and alkalies to a great extent. Its best solvents are benzol, chloroform, bisulphuret of carbon, rectified mineral naphtha, and rectified oil of turpentine. All these dissolve it readily. According to the analysis of Payen, the purified gutta percha of commerce consists of 75 to 82% of chemically pure gutta percha, which is insoluble in ether and alcohol, and a white and a yellow resin, soluble in boiling alcohol.

Uses. These are numerous and varied. No substance, perhaps, with the exception of caoutchouc, has been 'tortured' to so many different purposes. Its perfect plasticity when warm, and its capability of receiving the most delicate impressions, render it invaluable in many cases where India rubber would be useless. Beautiful mouldings, picture-frames, and a number of ornamental articles, are made from it. To the chemist and photographer it is of great use as a material for making bottles, carboys, photographic baths, and voltaic battery cells. One of the most important uses to which it has been applied

[1] See the precautions noticed under BLASTING POWDER *page* 230.

is for enclosing the metallic wires used for telegraphic purposes. Its indestructibility by water, its plasticity, and high insulating power, have rendered it particularly valuable for this purpose. At the International Exhibition of 1862 the Gutta Percha Company exhibited one mile of covered wire perfectly insulated, which was hardly thicker than common sewing cotton. Gutta percha may be rolled into thin transparent sheets, which, being perfectly impervious to moisture, are well adapted for surgical purposes. Again, a solution of gutta percha in chloroform forms an excellent dressing for incised wounds, and a protection for abraded surfaces, burns, &c. It is used in the same way as collodion.

Purified Gutta Percha. Dr. Cattell, of London, has succeeded in purifying gutta percha so perfectly from all extraneous matter, that it presents the appearance of ivory. The raw material is dissolved in a certain solvent, and the solution most carefully filtered until it leaves on evaporation the gutta percha in a pure milk-white condition.

GYP'SUM. This is native sulphate of lime. When baked, to deprive it of water, and ground, it forms PLASTER OF PARIS. Gypsum is an excellent manure for certain soils.

HAD'DOCK. A small sea-fish, allied to the cod, and esteemed an excellent article of food. It is the *Gadus æglefinus* of Linnæus. Split, smoked, and dried, it is common in the smaller shops of London.

HÆMATEM'ESIS. In *pathology*, vomiting of blood. See STOMACH DISEASES.

HÆM'ATITE. *Syn.* HEMATITE. In *mineralogy*, one of the most important iron ores. Two kinds are distinguished, the red, which is an anhydrous peroxide of iron, and the brown, which is the hydrated peroxide.

HÆMATOCRYS'TALLIN. A crystalline substance obtained by the action of oxygen and afterwards carbonic acid on the 'clot' of blood.

HÆMATOS'IN. *Syn.* HÆMATIN, RED PIGMENT OF BLOOD. The red colouring principle of the blood. It is not known in a state of purity. It differs from the other animal principles in containing, as an essential ingredient, the sesquioxide of iron.

HÆMATOX'YLIN. A principle obtained by Chevreul from common logwood (*Hæmatoxylon campechianum*), and on which its colour appears to depend.

Prep. 1. Infuse logwood chips in water, at a temperature of about 130° Fahr., for 12 hours, filter, and evaporate to dryness in a water bath; digest the residuum in rectified spirit for 24 hours, again filter and evaporate; then add a little water; again gently evaporate and set aside the solution in a cold place that crystals may form; these must be washed in rectified spirit and dried.

2. Digest powdered hard extract of logwood in rectified spirit, and proceed as last.

3. Powdered logwood is mixed with sand and digested for several days in pure ether; the resulting liquid is filtered, evaporated to a syrup, and set aside to crystallise.

Prop., &c. Brilliant reddish-white or straw-yellow crystals, soluble in boiling water, forming an orange-red solution which turns yellow as it cools, but resumes its former colour on being heated. Alkalies in excess change its colour successively into purple, violet, and brown; acids brighten it; with the metallic oxides it forms compounds having a blue, purple, or violet colour.

HÆMOP'TYSIS. In *pathology*, spitting of blood. It generally arises from extreme fulness of the blood-vessels of the lungs, or the rupture of blood-vessels, as a consequence of ulceration; but sometimes it is induced by excessive exertion or external violence. Depletion, aperients, acidulous and astringent drinks, and nauseants, are the usual remedies. Acetate of lead, in small doses, has been recommended for this affection. When this substance is given, it should be accompanied with a sufficient quantity of free acetic acid, to prevent its being converted into the poisonous carbonate of lead in the system.

HÆM'ORRHAGE. *Syn.* HEMORRHAGE; HÆMORRHAGIA, L. A bleeding or flow of blood. Bleeding may be divided into active, passive, and accidental.—Active hæmorrhage is that arising from a full state of the vessels, or plethora, — Passive hæmorrhage, from general debility of the system, and of the blood-vessels in particular,—Accidental hæmorrhage, from external violence, as blows, wounds, &c. The first generally requires depletion, and the second the usual treatment to establish the general health and vigour of the body. The bleeding from wounds, if extensive, should be arrested by tying the ruptured blood-vessels; or where this cannot be done, and in less important cases, by the application of styptics, as creasote, sulphate of iron, infusion of galls, compound tincture of benzoin, &c.

HAIR. *Syn.* CAPILLUS, PILUS, L. The hair of the human head has continually formed a subject for the chisel of the sculptor, the pencil of the artist, and the lay of the poet. Nor is this surprising, since all the features of the face, as well as the head it covers, derive from it additional finish and unequalled grace. The hair is, indeed, one of the greatest auxiliaries of personal beauty, and imparts to it some of its principal charms. All nations, in all ages of the world, have been unanimous in their admiration of luxuriant and flowing or gracefully arranged hair.

Of all organic substances, hair is the one least liable to suffer spontaneous change. It is also less affected by aqueous liquids than most other substances. Hence its value in various branches of the useful arts.

The preservation of the hair of the head, independently of its connection with personal

and the next day pour off the liquid portion from the white sediment which forms the dye. *Used* like No. 1. It is applied for 8 or 10 minutes for a brown; 30 minutes, or longer, for a black. For the first, it is washed off with water containing a little common soda.

27. The juice of the bark or shell of green walnuts, applied with a sponge. (Paulus Ægineta.)

28. A leaden comb used daily is said to darken the hair, but we have known persons persevere in its use for months without any perceptible change occurring. Premature baldness is a frequent consequence of its use.

Obs. It is right to inform the reader that all those compounds which contain nitrate of silver stain the skin as well as the hair. These stains may be removed, when quite recent, by rubbing them with water containing a little sulphydrate of ammonium (see *above*) or iodide of potassium in solution; but as this is attended with some trouble and inconvenience, the best way is to avoid the necessity of doing so. The hair-dressers adopt the plan of smearing hard pomatum over the skin immediately surrounding the hair, to protect it from the dye. By very skilful manipulation, and the observance of due precautions, the hair may be thoroughly moistened with the above fluids, without touching the adjacent skin, but this can only be done, in the case of the hair of the head, by a second person. This has led to a preference being given by many to the compounds containing lead, as the colouring matter formed in them does not stain the skin. The hue given by the latter (when pale) is very apt to possess an unnatural redness, but all the shades of colour given by the preparation of silver are rich and unexceptionable. Pyrogallic acid, and the juice of walnuts, also stain the skin, although less intensely and permanently than nitrate of silver.

The detection of dyed hair is often a matter of importance in medico-legal research. The presence of silver may be shown by digesting the hair in a little weak chlorine water or hydrochloric acid, when the resulting chloride of silver may be dissolved out with liquor of ammonia, and submitted to the usual tests. Hair containing lead, when digested in dilute nitric acid, gives a solution of nitrate of lead, in which form it is readily detected. See LEAD and SILVER.

All the preceding compounds are for dyeing living hair (human); horse-hair, bristles, &c., and other dead hair, may be readily stained by steeping them in any of the ordinary liquid dyes, more especially those employed for wool and silk. See POMMADES, WASHES, &c.

HALL MARKS. The 'Hall Marks' on articles in gold and silver not only inform us of their fineness, but furnish us with other important particulars.

The Hall Mark (proper) denotes the place of manufacture or assay, being an anchor, for Birmingham; a dagger or 3 wheat sheaves, for Chester; Hibernia, for Dublin; castle and lion for Edinburgh; castle with 2 wings, for Exeter, tree and salmon with a ring in its mouth, for Glasgow; leopard's head, for London; 3 castles, for Newcastle-on-Tyne; a crown, for Sheffield; and five lions' heads and a cross, for York.

The Duty Mark is the head of the Sovereign, showing that the duty is paid.

The Date Mark is a letter of the alphabet, which varies every year, and with the different compartments the Goldsmith's Company of London have used from 1716 to 1755 Roman capital letters, from 1756 to 1775, small Roman letters; from 1776 to 1795 old English letters; from 1796 to 1815, Roman capital letters, from A to U, omitting J; from 1816 to 1835, small Roman letters, a to u, omitting j; from 1836, old English letters.

The Standard Mark for gold is, for England, a lion passant; Edinburgh, a thistle; Glasgow, a lion rampant; Ireland, a harp crowned. For silver, a figure of Britannia. If under 22 carats, gold has the figures 18.

The Manufacturer's Mark is the initials of the maker, as S. H., W. T., C. E., &c.

HAL'OGENS. In *chemistry*, a name given by Berzelius to chlorine, bromine, iodine, and fluorine. These elements unite with metals to form compounds called 'haloid salts.'

HAMS. These are usually prepared from the legs of bacon pigs, but those of the sheep are also sometimes used for the same purpose. SMOKED HAM is strong eating, and rather fit for a relish than for diet, and should be particularly avoided by the dyspeptic and by convalescents.

Choice. A sharp knife thrust under the bone should have a pleasant smell when withdrawn. The recently cut fat should be hard and white, the lean fine-grained, and of a lively red. Those short in the hock are the best.

Curing. An ordinary sized ham requires nearly three weeks, if wet salted, and about a month if dry salted, to cure it perfectly. At the expiration of this time they are ready for smoking. MUTTON HAMS should not lie in pickle longer than 12 or 14 days.

Cooking. Hams should be put into the water cold, and should be gradually heated. A ham of 14 lbs. will take about 4 hours, one of 16 lbs. will take 4½ hours, and one of 20 lbs. about 5½ hours, to dress it properly. "If it is an old ham, it should be soaked for 12 hours previously." (Soyer.)

Pres. Most grocers and dealers in hams enclose them, after being smoked, in canvas, for the purpose of defending them from the attacks of the little insect, the *Dermestes lardarius*, which, by laying its eggs in them, soon fills them with its larvæ or maggots. This troublesome and expensive process may be altogether superseded by the use of pyroligneous acid, applied by means of a painter's brush.

HANDS. Dirty and coarse hands are no ess the marks of slothfulness and low breeding, than clean and delicate hands are those of cleanliness and gentility. To promote the softness and whiteness of the skin, mild emollient soaps, or those abounding in oil, should alone be used, by which means CHAPS and CHILBLAINS will generally be avoided. The coarse, strong kinds of soap, or those abounding in alkali, should for a like reason be rejected, as they tend to render the skin rough, dry, and brittle. The immersion of the hands in alkaline lyes, or strongly acidulated water, has a like effect. When the hands are very dirty, a little good soft soap may be used with warm water, which will rapidly remove oily and greasy matter. Fruit and ink stains may be taken out by immersing the hands in water slightly acidulated with oxalic acid or a few drops of oil of vitriol, or to which a little pearl-ash or chloride of lime has been added; observing afterwards to well rinse them in clean water, and not to touch them with soap for some hours, as any alkaline matter will bring back the stains, after their apparent removal by all the above substances, except the last. The use of a little chloride of lime and warm water, or Gowland's lotion, imparts a delicate whiteness to the skin; but the former should be only occasionally used, and should be well washed off with a little clean water to remove its odour. Glycerine employed in the same manner renders the skin soft, white, and supple. The use of a little sand or powdered pumice stone with the soap, will generally remove the roughness of the skin frequently induced by exposure to cold. The hands may be preserved dry, for delicate work, by rubbing a little club moss (LYCOPODIUM), in fine powder, over them. A small quantity of this substance sprinkled over the surface of a basin of water will permit the hand to be plunged to the bottom of the basin without its becoming wet.

HANG'ING. In cases of suspended animation from hanging, the assistance must be prompt and energetic. The body, on its discovery, should be instantly relieved from the state of suspension and all pressure about the throat. The remedial treatment chiefly consists, in the severer cases, in cupping the temples or opening the jugular vein, and so relieving the head of the blood which is accumulated in its superficial veins in consequence of strangulation. When the body is cold, friction, and the other means used for restoring the animal heat in drowned persons, should be resorted to. See ASPHYXIA and DROWNING.

HARD'NESS. Compactness; solidity; the power of resisting abrasion. Mineral substances are frequently distinguished and identified by their relative hardness. This is ascertained by their power to scratch or be scratched by one another. A valuable table on this subject will be found in the article on GEMS.

HAR'MALINE. *Syn.* HARMALINA. An alkaloid, forming yellow-brown crystals, discovered in the seeds of *Peganum harmala*. It has a bitter astringent and acrid taste, is soluble in alcohol, and forms yellow, soluble salts with the acids. It has been proposed as a yellow dye. By oxidation it yields another compound (harmine), which is a magnificently red dye-stuff, easily prepared and applied. The seeds are produced abundantly in Southern Russia.

HAR'NESS POLISH. See BLACKING, &c.

HARTS'HORN. *Syn.* CORNU CERVI, C. CERVINUM, CORNU (Ph. L.), L. The "horn of the *Cervus elephas*" (Ph. L.) or stag.

Burnt Hartshorn. *Syn.* CORNU USTUM (Ph L.), CORNU CERVI USTUM, L. *Prep.* (Ph. L. 1836.) Burn pieces of harts' horns until perfectly white, then grind and prepare them in the same way as directed for prepared chalk.

Obs. Finely powdered bone-ash is usually sold for burnt hartshorn, and possesses exactly the same properties. *Dose.* 10 to 30 grs., or more, 2 or 3 times a day, in rickets, &c.

Hartshorn Shavings. *Syn.* HARTSHORN RASPINGS; RASURA CORNU CERVI, RAMENTA C. C., L. Obtained from the turners. Boiled in water, it yields a nutritive jelly. *Used* by straw-plait workers to stiffen bonnets, &c.

HATCH'ING. See INCUBATION.

HATS. Those should be chosen possessing a short, smooth, fine nap, and a good black colour; and sufficiently elastic to resist ordinary wear and tear, without breaking or giving way. The HAT BRUSH for daily use should be made of soft hairs, but a stiffer one should be employed occasionally, to lay the nap smooth and close. Grease may be removed by means of porous brown paper, and pressure with a hot iron.

HEAD'ACHE. *Syn.* CEPHALALGIA, L. In *pathology*, pain in the head. The symptoms of this very general complaint are too well known to require any description. According to pathologists, headache arises either from a sympathy with the stomach and chylopoietic (chyle-forming) viscera, or from a weakness or exhaustion of the power of the encephalon. The former may be called SYMPATHETIC HEADACHE, and the latter NERVOUS HEADACHE. When it attacks only one side of the head it is called HEMICRANIA. The treatment of the first form should consist in restoring the healthy action of the stomach, by the administration of aperients, and by the use of proper food, and exercise; or when that viscus is overloaded with undigested food, by the exhibition of an emetic. For this purpose ½ to ½ an oz. of ipecacuanha wine may be taken in a cupful of warm water, which will generally relieve the stomach, especially if its action is assisted by drinking copiously of warm water. Headache is a common accompaniment of indigestion and stomach disease, and in general it will be found that whatever will remove the one will also cure the other. Nervous head-

aches are relieved by nervous tonics and stimulants, as bark, cascarilla, calumba, and gentian, camphor, ammonia, ether, and wine, the latter in a state of considerable dilution. A cup of strong coffee or strong green tea often acts like a charm in removing this species of headache. Small doses of tincture of henbane have also often a like effect. 20 or 30 drops of laudanum, or, preferably, half that number of liquor opii sedativus, may be taken with advantage as an anodyne, and to induce sleep. Amongst popular remedies may be mentioned 'nasal stimulants,' as snuff (cephalic), smelling salts, and aromatic vinegar, the use of which is familiar to every one; and local applications, as very cold water, ether, vinegar, strong spirits, Cologne water, &c., all of which are rubbed over the part of the head affected, with the fingers, or a linen rag dipped in them is laid thereon instead. Pressure on the head has also been used with advantage. Silence, darkness, and repose, are powerful remedies, alike suitable to every variety of headache; and change of air, scene, and occupation, are especially beneficial to those resulting from excessive mental anxiety or exertion. Blisters are extensively applied behind the ears in cases of violent headache.

Headache is often symptomatic of other diseases, especially those of the inflammatory and nervous kind, rheumatism, &c. In all these the primary disease should be sought out and attempted to be cured. In many cases these attacks rapidly yield to a few doses of compound decoction of sarsaparilla containing a little iodide of potassium. Headache in pregnancy may generally be removed by proper attention to the bowels; observing to assist their action, should they require it, by the use of some mild aperient, as castor oil, lenitive electuary, seidlitz powders, &c. When the constitution is very robust, blood may be taken. Headache in bed may frequently be relieved by washing the head with cold water, and discontinuing the use of a nightcap, at the same time preserving the feet warm by wearing worsted socks or stockings.

HEAD'ING. *Syn.* BEER HEADING, CAULIFLOWER H. *Prep.* 1. Alum and green copperas, equal parts, in fine powder.

2. Alum, copperas, and common salt, equal parts.

Used by brewers to make their beer keep its head or froth.

HEALTH. That state of the living body in which all its functions are duly performed. See HYGIENE.

HEAR'ING. See DEAFNESS, EAR, &c.

HEART'BURN. *Syn.* CARDIALGIA, L. Anxiety and pain about the region of the stomach, generally attended by a sense of gnawing and heat; hence its popular name. Faintness, nausea, and eructation of a thin, acidulous, watery liquid, especially in the morning, are common symptoms of this complaint. The usual causes of heartburn are excess in eating and drinking, the use of improper food, and sedentary habits. A good remedy is a teaspoonful of carbonate of magnesia, or carbonate of soda, in a glass of peppermint or cinnamon water, to which a little powdered ginger may be added with advantage. This dose may be taken 2 or 3 times daily until the disease is removed. Articles of food that easily undergo fermentation should at the same time be avoided, and a dry diet had recourse to as much as possible. Soda water, toast-and-water, and weak spirit-and-water, are the most suitable beverages in this complaint.

HEAT. *Syn.* CALORIC; CALORICUM, L. The consideration of this subject belongs to physics and chemistry. Much useful information, in connection with it, will, however, be found in this work under the heads EBULLITION, EVAPORATION, EXPANSION, REFRIGERATION, &c.

HEAVY SPAR. Native sulphate of barium See BARYTA.

HED'ERIN. *Syn.* HEDERINA, L. From the decoction of the ground seeds of ivy (*Hedera helix*), boiled in water, along with a little slaked lime or magnesia, the precipitate being afterwards digested in rectified spirit, and the filtered tincture evaporated. Febrifuge and sudorific.

HEL'ENIN. See INULIN.

HELIOG'RAPHY. See PHOTOGRAPHY.

HEL'LEBORE. *Syn.* BLACK HELLEBORE; HELLEBOBUS (Ph. L.), L. "The rhizome and root" of "*Helleborus niger*" (Ph. L.) or black hellebore. It is alterative and emmenagogue, in small doses (2 to 8 grs.); and a drastic hydragogue purgative and anthelmintic in larger ones (10 to 20 grs.). See WHITE HELLEBORE.

HELLEBOR'IN. *Syn.* SOFT RESIN OF HELLEBORE. An odourless, acrid substance, extracted by alcohol from black hellebore, and on which, according to Vauquelin, the activity of that drug depends.

HEM'LOCK. *Syn.* CONII FOLIA (B. P.); CONIUM (Ph. L. E. & D.), L. In *pharmacy*, "the fresh and dried leaf of the wild herb *Conium maculatum*," or spotted hemlock. The first is used to make the extract; the last, the tincture and powder.

Hemlock is a powerful narcotic acrid [illegible] occasioning stupor, delirium, paralysis, convulsions, coma, and death. In small doses it is anodyne, alterative, resolvent, antispasmodic, and anaphrodisiac, and has been exhibited in cancer, dropsy, epilepsy, rheumatism, scrofula, syphilis, and other diseases.—*Dose.* 3 or 4 grs. of the powder, twice or thrice daily, until some obvious effect is produced.

Hemlock, whether in leaf (conii folia) or powder (pulvis conii) rapidly deteriorates by keeping. When good, the powder, triturated with solution of potassa, exhales a powerful odour of conia.

In cases of poisoning by hemlock, the treat-

ment is similar to that noticed under ACONITE. See CONINE, EXTRACT, TINCTURE, &c.

HEMP. *Syn.* CANNABIS, L. In *botany* the typical genus of the natural order *Cannabinaceæ*. The common hemp, from the fibres of which cordage is made, is the species *Cannabis sativa*. The fruit of this plant (hemp seed) is demulcent and oleaginous. It is said that the plumage of bullfinches and goldfinches fed on it for too long a time, or in too large a quantity, changes from red and yellow to black.[1]

Hemp, Indian. *Syn.* HASHISH, CANNABIS INDICA. This plant, now so largely used in medicine, is a variety of *Cannabis sativa*, or, perhaps, the same simply rendered more active by climate. The parts employed in Asia for the purposes of intoxication, and in Europe as medicine, are the herb or leaves and the resin. The 'gunjah' sold in the bazaars in the East Indies is the plant, just after flowering, dried, and pressed together. Bang,' 'bhang,' 'subjee,' or 'sidhee,' consists of the larger leaves and capsules without the stalk. The concrete resinous exudation from the leaves, stems, and flowers, is called 'churrus,' and in this country 'resin of Indian hemp.' 'Hashish' seems to be a general term for the preparation of hemp.

Indian hemp is anæsthetic, anodyne, exhilarant, antispasmodic, hypnotic, and narcotic. In the East it is commonly used as an intoxicant, either by smoking it, like tobacco, or swallowing it. The inebriation produced by it is of an agreeable or cheerful character, exciting the party under its influence to laugh, dance, sing, and to commit various extravagancies. It also acts as an aphrodisiac, augments the appetite for food, and, in some cases, occasions a kind of reverie and catalepsy. In this country its action is less marked. It has here been chiefly administered under the form of alcoholic or resinous extract. See EXTRACT OF INDIAN HEMP.

HEN'BANE. *Syn.* HYOSCYAMI FOLIA (B. P.); HYOSCYAMUS (Ph. L. E. & D.), L. In *pharmacy*, "the fresh and dried stalk-leaf of the biennial herb, *Hyoscyamus niger*" (Ph. L.), or common biennial or black henbane. The first is used for preparing the extract; the last, for the powder and tincture.

Henbane is anodyne, hypnotic, antispasmodic, and sedative. It differs from opium in not being stimulant, and by not confining the bowels; and hence may be administered in cases in which that drug would be improper. In large doses it acts as a powerful narcotic poison, producing obscurity of vision, dilation of the pupils, delirium, phantasms, coma, &c. —*Dose*. 3 to 10 grs., in powder. It is usually given in the form of extract or tincture. The antidotes, &c., are the same as those noticed under OPIUM.

HE'PAR. *Syn.* LIVER. A name given by the older chemists to various combinations of sulphur, from their brownish or liver colour; as '*hepar antimonii*,' '*hepar sulphuris*,' &c. See ANTIMONY (Liver of), POTASSIUM (Sulphuret), &c.

HERBAR'IUM. [Eng., L.] *Syn.* HORTUS SICCUS, L. A collection of dried specimens of plants; hence called HORTUS SICCUS, or dry garden. Plants for the herbarium should be gathered on a dry day, and carried home in a tin-box ('VASCULUM'), or other convenient receptacle which will preserve them fresh for a time. Those which have collected moisture in their leaves should be allowed to dry, their stalks being placed in water to keep them alive. Plants with very thick, succulent leaves or stems must be killed by immersion in hot water before they can be safely placed in the drying press. The press consists simply of a few stout boards with a screw—or, still better, a number of heavy weights, bricks, or stones—for pressing them together. The specimens of plants, when all superficial moisture has been removed, are placed between layers of bibulous paper (BOTANICAL PAPER), care being taken that the parts of each are arranged in a natural manner. The sheets containing the specimens are then placed between the boards, and pressure is applied. This must be very gentle at first, and should be gradually increased as the plants become dry. The paper is changed every day or every second day, and the damp sheets are dried for use at a future time. When properly dried, the specimens are placed on sheets of writing paper, and fixed by a few stitches of thread, a little gum, or strips of gummed paper. The name of the genus and species, and the locality where found, &c., are then marked beside each. Camphor or a little corrosive sublimate may be used to preserve herbaria from the ravages of insects. The preparation of an herbarium offers an almost endless source of amusement to the ingenious, whilst the specimens so collected, if well preserved, are almost as useful to the botanist as the living plants.

HERBS. *Syn.* HERBÆ, L. The collection and drying of herbs for medicinal purposes and perfumery are noticed under VEGETABLE SUBSTANCES.

Amongst cooks, several aromatic herbs, either fresh or dried, are used for seasoning. "In many receipts is mentioned a bunch of sweet herbs, which consists, for some stews and soups, of a small bunch of parsley, two sprigs of thyme, and one bayleaf; if no parsley, then of four sprigs of winter savory, six of thyme, and one bayleaf." (Soyer.)

HER'NIA. See RUPTURE.

HER'RING. A well-known small sea-fish, belonging to the family of *Clupeidæ*, a branch of the order *Malacopterygii*. As an article of food, herrings are of a vast importance to a large proportion of the population of Europe. When recently caught and dressed by broiling or boiling, they are wholesome and agreeable;

[1] Burnett, 'Outlines of Botany.'

but if fried, or long kept, they become strong and oily, and are then apt to offend the stomach. The preparation of salted and dried or smoked herrings (bloaters, red herrings) furnishes employment for thousands, both in these countries and Holland. Real Yarmouth bloaters and Dutch herrings are highly esteemed by many as a relish. Salted herrings are said to be diuretic. The pickle was formerly used in clysters, dropsies, &c. M. Soyer calls this fish "the poor man's friend," and tells us that, after being "cleaned and scaled, and the head removed," it should be "opened in the back, and the gut taken out." Also that "the way to ascertain if a herring is too salt, is to take the fish in the left hand, and pull out a few of the fins from the back, and to taste them. You may thus find out the quality and flavour. This plan is adopted by the large dealers."

HESPER'IDIN. A peculiar substance obtained from the white portion of the rind of oranges, lemons, &c. It forms crystalline silky needles, is odourless, tasteless, fusible, soluble in alcohol and ether, less soluble in water.

HIC'COUGH (hĭk'-ŭp). *Syn.* HICCUP; SINGULTUS, L. A convulsive motion of the diaphragm and parts adjacent. The common causes are flatulency, indigestion, acidity, and worms. It may generally be removed by the exhibition of warm carminatives, cordials, cold water, weak spirits, camphor julep, or spirits of sal-volatile. A sudden fright or surprise will often produce the like effect. An instance is recorded of a delicate young lady that was troubled with hiccough for some months, and who was reduced to a state of extreme debility from the loss of sleep occasioned by it, that was cured by a fright, after medicines and topical applications had failed. A pinch of snuff, a glass of iced soda water, or an ice-cream, will also frequently remove this affection.

HI'ERA-PI'CRA. See POWDER OF ALOES AND CANELLA.

HIP'POCRAS. An aromatic medicated wine, formerly much used in England, and still employed on the Continent.

Prep. Lisbon and Canary wine, of each, 12 pints; cinnamon, 2 oz.; white canella, ½ oz.; cloves, mace, nutmeg, ginger, and galangal, or cardamoms, of each, 1 dr.; bruise the spices, and digest them in the wine for three or four days; strain, and add of lump sugar, 2½ lbs.

HIPPU'RIC ACID. $HC_9H_8NO_3$. *Syn.* ACIDUM HIPPURICUM, L. A compound discovered by Liebig in the urine of the horse, cow, and other graminivora, in which it exists as hippurate of potassium or sodium.

Prep. Concentrate fresh cow's urine by a gentle heat to about $\frac{1}{10}$th its bulk, filter from deposit, mix the liquid with excess of hydrochloric acid, and set it aside to crystallise. It may be decoloured by redissolving it in boiling water, and treating it with animal charcoal, or with a little chloride of lime along with some hydrochloric acid, and re-crystallising it.

Obs. Hippuric acid, when pure, forms long, slender, milk-white, square prisms; it is soluble in 400 parts of cold water; it also dissolves in hot alcohol. When strongly heated, it yields benzoic acid, benzoate of ammonia, and benzonitrile, with a coaly residue. The urine of horses or cows, left to itself for some time, or evaporated at a boiling temperature, yields not a trace of hippuric acid, but only benzoic acid. Nitric acid and hot oil of vitriol convert it into benzoic acid. Boiling hydrochloric acid converts it into benzoic acid and glycocoll. With the bases it forms salts which are called hippurates. See BENZOIC ACID.

HIPS. *Syn.* HEPS; ROSA CANINA (Ph. L.). The fresh fruit of the dog rose (*Rosa canina*) or wild briar. *Used* to make a conserve.

HOL'LANDS. *Syn.* GENEVA, SCHIEDAM, HOLLANDS GIN, DUTCH G. *Prep.* 1. The materials employed in the distilleries of Schiedam, in the preparation of this excellent spirit, are 2 parts of the best unmalted rye and 1 part of malted bigg, reduced to the state of coarse meal by grinding. About a barrel (36 galls.) of water, at a temperature of from 162° to 168° Fahr., is put into the mash-tun for every 1½ cwt. of meal, after which the malt is introduced and stirred, and, lastly, the rye is added. Powerful agitation is next given to the magma till it becomes quite uniform, when the mash-tun is covered over with canvas, and left in this state for two hours. Agitation is then again had recourse to, and the transparent 'spent wash' of a preceding mashing is added, followed by as much cold water as will reduce the temperature of the whole to about 85° Fahr. The gravity of the wort at this point varies from 33 to 38 lbs. A quantity of the best pressed Flanders yeast equal to 1 lb. for every 100 galls. of the mashed materials, is next stirred in, and the whole is fermented in the mash-tun for about 3 days, or until the attenuation is from 7 to 4 lbs. (sp. gr. 1·007 to 1·004). During this time the yeast is occasionally skimmed off the fermenting wort. The wash, with the grains, is then transferred to the still, and converted into 'low wines.' To every 100 galls. of this liquor, 2 lbs. of juniper berries (3 to 5 years old), and about 1 lb. of salt, are added, and the whole is put into the low-wine still, and the fine spirit drawn off by a gentle heat, only the receiver only being employed. The produce per quarter varies from 18 to 21 galls. of spirit, 2 to 3 o. p.

2. (BEST HOLLANDS.) Hollands rectified to the strength of 24° Baumé (sp. gr. ·912) or about 6 o. p.).

3. (ENGLISH-MADE.)—*a.* From juniper berries (at least a year old, and crushed in the hands), 3 lbs.; rectified spirit, 1½ gall. (of proof spirit, 2½ galls.); digest with agitation

for a week, and then express the liquor; after 24 hours' repose, decant the clear portion, add it to good corn spirit, at 2 or 3° overproof, 90 or 100 galls., and mix them well together.

b. From juniper berries, 2½ lbs.; sweet fennel seed, 5 oz.; caraway seed, 3½ oz.; proof spirit, 2 galls.; corn spirit, 90 or 100 galls.

c. As the last, with the addition of Strasburg turpentine or Canadian balsam, 1 lb.

d. To either of the last two or three, add a very small quantity of ground cardamoms or horse-radish. Some compounders also add 4 or 5 cloves of garlic, or about 15 grs. of assafœtida, with 1 gr. of ambergris rubbed to a powder with a little white sand or lump sugar. Good plain gin may be advantageously employed in lieu of the corn spirit ordered above, when expense is no object.

Obs. The last four forms, which are only given as examples, produce a very pleasant spirit, if it is kept for some time to 'mellow.' Age is one of the principal causes of the 'creaminess' of foreign gin, which usually lies in bond for some time before being consumed. The product is, however, much superior if the ingredients are rectified along with 20 galls. of water, and about 14 lbs. of salt, by a gentle heat.

It will be seen from the above that the superior flavour of Hollands spirit depends more on the peculiar mode of its manufacture than on the quantity of juniper berries employed; 2 lbs. of them, when new, being barely equivalent to 1 oz. of the essential oil; and when old, to less than ½ oz., a quantity wholly insufficient to flavour 100 gallons of spirit. The Dutch distillers, most noted for this liquor, add a little pure Strasburg turpentine and a handful or two of hops to the spirit, along with the juniper berries, before rectification. The former substance has a pale yellowish-brown colour, and a very fragrant and agreeable smell, and tends materially to impart that fine aroma for which the best geneva is distinguished. At Rotterdam sweet fennel seed is commonly added as a flavouring; and at Weesoppe Strasburg turpentine and fennel seeds, or the essential oil of fennel, are frequently substituted for a large portion of the juniper berries.

Schiedam Hollands is considered the best; the next quality is that of Rotterdam; after these comes that of Weesoppe.

Attempts have been made by Mr. Robert Moore, and others, to introduce into general consumption in this country a home-made liquor, resembling and prepared in the same manner as foreign geneva, "but the palates of our gin-drinkers were too corrupted to relish so pure a spirit."

HOMŒOP'ATHY. *Syn.* HOMŒOPATHIA, L. A medical hypothesis promulgated at the commencement of the present century by the late Dr. Hahnemann, of Leipsic, according to which diseases may be cured by the administration of minute doses of medicines capable of producing in healthy persons affectio similar to those it is intended to remo The doctrine that "*similia similibus curantu* had long previously been practically acted o to a limited extent, in certain cases, in legit mate medicine (allopathy, heteropathy), a though not verbally recognised as belongin to its system. The administration of infin tesimal doses is an absurdity which homœo pathy, however, alone can claim. Accordin to this method, the millionth of a grain i often an excessive dose; whilst billionths an decillionths, quantities so small as to be vastl beyond human perception, form the commo doses. This reduces the whole practice o homœopathy to a system of doing nothing beyond regulating the diet and habits of the patient. "All judicious practitioners have long been agreed that there are many cases which are best treated in the manner just mentioned, and in which physic does more harm than good; in which, in short, a sensible physician endeavours to amuse the patient, whilst nature cures the disorder; so that the frequent success of homœopathic treatment may be explained, without admitting the principle upon which it is presumed to be founded." (Brande.)

HON'EY. *Syn.* MEL (B. P.), L. The sweet substance elaborated by the domestic bee from the juices of the nectaries of flowers, and deposited in the cells of wax forming the honeycomb.

Var. Pure honey consists of a syrup o uncrystallisable sugar and crystalline saccharine grains, resembling grape sugar.—'Virgin honey' is that which flows spontaneously from the comb.—'Ordinary honey,' that obtained by heat and pressure. The former is pale and fragrant; the latter darker, and possessing a less agreeable taste and smell.—'English honey' is chiefly collected from furze and broom flowers, and is more waxy than that from the South of Europe;—'Narbonne honey,' chiefly from rosemary, and other labiate flowers, very fine;—'Poisonous honey' is found near Trebizond, in Asia.

Pur. Honey is frequently adulterated with treacle, potato-sugar syrup, potato farina, starch, and wheat flour. The first may be detected by the colour and odour; the second, in the way noticed under SUGAR; and the others by the honey not forming a nearly clear solution with cold water, and striking a blue colour with iodine. When it contains wheat flour, and is heated, it at first liquefies, but on cooling it becomes solid and tough. The absence of starchy matter or flour is easily proved by the following test:—Boiled with water for five minutes, and allowed to cool, it should not become blue with iodine water—indicating absence of flour.

Uses, &c. Honey is nutritive and laxative, but rather apt to gripe. It is employed in the preparation of OXYMELS and GARGLES, and also to cover the taste of nauseous medi-

cines, which it does better than sugar. Clarified honey is alone ordered to be used in medicine.

Honey, Clar'ified. *Syn.* REFINED HONEY, STRAINED H.; MEL DEPURATUM (Ph. D.), MEL PRÆPARATUM, L. The honey is simply melted by the heat of a water bath, and strained whilst hot through flannel (Ph. D.); or—it is melted as last, and the scum removed (Ph. U. S.); or—it is melted with 1-3rd its weight of water, skimmed, strained through flannel, and evaporated until it reaches the sp. gr. 1·261. (P. Cod.) Honey is not to be employed without being despumated. (Ph. L.)

Obs. Clarified honey is less agreeable than raw honey, and has lost the crystalline character of the latter; but it is less liable to ferment and gripe. The use of copper and iron vessels or implements should be avoided, as honey acquires a dark colour by contact with them. Berlin-ware, stone-ware, or well-silvered or tin copper pans, should alone be used. On the large scale, one or other of the following plans are adopted:—

1. The honey is mixed with an equal weight of water and allowed to boil up 5 or 6 times without skimming; it is then removed from the fire, and after being cooled, brought on several strong linen strainers, stretched horizontally, and covered with a layer of clean and well-washed sand, an inch in depth; the sand is rinsed with a little cold water, and the mixed liquor is finally evaporated to the thickness of syrup.

2. Dissolve the honey in water, as last, clarify with white of egg, and evaporate to a proper consistence.

3. Dissolve in water, add 1½ lb. of animal charcoal to every ¼ cwt. of honey, gently simmer for 15 minutes, add a little chalk to saturate excess of acid, if required, strain or clarify, and evaporate.

4. Honey, 1 cwt.; water, 9 galls.; fresh burnt animal charcoal, 7 lbs.; simmer for 15 minutes, add a little chalk to saturate free acid (if required), strain or clarify, and evaporate as before.

HONEYS. (In *pharmacy*.) *Syn.* MELLITA, L. These are minor preparations, now almost superseded by 'syrups' (SYRUPI). The *mellita* of the Ph. L., including two 'oxymels,' are only four in number.

Honey of Bo"rax. *Syn.* MEL BORACIS (B. P. Ph., L. E. & D.), L. *Prep.* (B. P.) Finely powdered borax, 1; clarified honey, 7; mix. Astringent, detersive, and cooling. It is employed in aphthæ of the mouth, excessive salivation, &c. A great improvement would be to dissolve 1 of borax in 1 of glycerin, and then add 6 of honey.

Honey of Col'chicum. *Syn.* MEL COLCHICI, L. *Prep.* (Beasley.) Dried colchicum, 1 part; water (at 140°), 16 parts; infuse for 12 hours, strain, let it settle, and boil the clear liquor with white honey, 12 parts, to the consistence of a syrup. See COLCHICUM.

Honey of Liq'uorice. *Syn.* MEL GLYCYRRHIZATUM, L. *Prep.* (Ph. Hamb.) Honey and a strong infusion of liquorice boiled to a proper consistence. Emollient, pectoral, and laxative.

Honey of Male Fern. *Syn.* MEL FILICIS, L. *Prep.* (Dunglison.) Ethereal extract of male fern, 30 grs.; honey of roses, 4 drs.; mix. In tape-worm.—*Dose.* One half at bed-time, followed by the remainder in the morning.

Honey of Mercury. *Syn.* MEL HYDRARGYRI, L. *Prep.* (Bell.) Mercury, 1 dr.; honey, 1 oz.; triturate till the globules disappear. Allard adds of oil of cloves, ½ dr. Properties similar to those of mercurial pill. It is chiefly used as an application to ulcers of the throat.

Honey of Ro"ses. *Syn.* MEL ROSÆ (Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Dried petals of the red rose (the leaves separated), 4 oz.; boiling water, 16 fl. oz.; macerate for 2 hours, lightly press them in the hand, and strain; then add 8 fl. oz. more of boiling water to the roses, macerate for a short time, and again gently express the liquor; to this add half of the first infusion, and set aside the other half; next add to the mixed liquors, honey, 5 lbs., and evaporate in a water bath, so that, the infusion which was set aside being added, it may become of a proper consistence.

2. (Ph. E.) Dried rose petals, 4 oz.; boiling water, 2½ pints; infuse for 6 hours, and gently squeeze out the liquor; after the impurities have subsided, decant the clear, add of honey, 5 lbs., and evaporate, as before, to a proper consistence, removing the scum which forms. *Used* to make astringent gargles. It must not be boiled in a copper or iron vessel, as they will spoil the colour. The last form is that commonly adopted in trade.

Honey of Squills. *Syn.* MEL SCILLÆ, L. *Prep.* 1. Thick clarified honey, 3 lbs.; tincture of squills, 2 lbs.; mix.

2. (Souheiran.) Dried squills, 1 oz.; boiling water, ½ pint; infuse 2 hours, strain, add of honey, 12 oz., and evaporate to a proper consistence. Resembles OXYMEL OF SQUILLS (nearly).

Honey of Vi'olets. *Syn.* MEL VIOLÆ, L. *Prep.* From clarified honey, 2 parts; expressed and depurated juice of violets, 1 part. Resembles syrup of violets.

HON'EY DEW. *Syn.* ROS MELLITUS, L. A sweetish matter ejected upon the leaves of plants by certain aphides.

HOOP'ING COUGH. See WHOOPING COUGH.

HOPS. *Syn.* LUPULUS (B. P.), L. "The catkins of the female plant of the *Humulus lupulus*" or common hop. (B. P.) "The dried strobiles." (Ph. D.) The hops of commerce are the strobiles or catkins (LUPULI STROBILI, L. AMENTA) of the hop plant. The yellow powder or small lupulinic grains or glands (LUPULIN), which are attached to the strobiles, are the portion on which their characteristic qualities chiefly depend.

The hop is tonic, stomachic, and moderately narcotic. It is used in diseases of local debility with morbid vigilance and other nervous

in great abundance, and may be collected over water.

Prop. Colourless; neutral; nearly inodorous; burns with a yellow flame, producing pure water and carbonic acid; explodes when kindled in contact with air or oxygen.

2. **Heavy Carburetted Hydrogen.** C_2H_4. See OLEFIANT GAS.

Obs. COAL GAS, OIL GAS, and RESIN GAS, consist, for the most part, of mixtures of these two gaseous hydrocarbons in uncertain proportions, obtained respectively from coal, oil, and resin, by the action of heat, and used for the purposes of illumination. See GAS.

Oxides of Hydrogen. There are two well-defined compounds of hydrogen and oxygen:—

1. **Subox'ide of Hydrogen.** H_2O. Water which *see*).

2. **Perox'ide of Hydrogen.** HO. *Syn.* HYDROXYL, BINOXIDE OF HYDROGEN, DEUTOXIDE OF H., OXYGENATED WATER; HYDROGENII BINOXYDUM, L. This singular fluid was discovered by M. Thénard, in 1818.

Prep. (Odling.) A known quantity of pure hydrochloric acid, diluted with 8 or 10 times its volume of distilled water, is placed in a glass beaker surrounded with ice or a freezing mixture. A quantity of binoxide of barium rather less than sufficient to neutralise the acid is then ground to a fine paste with distilled water, and added gradually to the acid, in which it should dissolve without effervescence. Diluted sulphuric acid is next added cautiously, to precipitate the barium, and reproduce hydrochloric acid to act upon a fresh quantity of peroxide. The liquid having been filtered from the insoluble sulphate of baryta, a second proportion of binoxide of barium paste is added gradually, as before. The treatment with sulphuric acid, filtration and addition of binxoide, is repeated 6 or 7 times. Sulphate of silver is then very carefully added, so as exactly to precipitate in the form of chloride of silver the whole of the chlorine. After filtration, pure baryta, first as a paste and then in solution, is cautiously added, to precipitate exactly the sulphuric acid set free from the sulphate of silver. Filtration is again resorted to, and the clear liquid (aqueous solution of peroxide of hydrogen) is placed in a dish over oil of vitriol in vacuo, in order that the water mixed with it may evaporate.

Prop., &c. A colourless, transparent, somewhat syrupy liquid, of sp. gr. 1·452. It has a metallic taste, and corrodes the skin. It is easily resolved into oxygen and water. It mixes freely with water, and becomes more permanent by the dilution. It bleaches organic substances, and acts as a powerful oxidating agent. Under certain circumstances, however, it plays the part of a reducing agent. To the chemist, peroxide of hydrogen and its analogue, binoxide of barium, have been of great service as instruments of research. The only use to which binoxide of hydrogen has been applied in the arts, is to restore the blackened lights of paintings, which have become darkened by sulphuretted hydrogen.

Phosphuret'ted Hydrogen. See PHOSPHORUS.

Sul'phides of Hydrogen. See SULPHUR.

HY'DROMEL. *Syn.* HYDROMELI, L. An aqueous solution of honey. *Prep.* (P. Cod.) Honey, 2 oz.; boiling water, 32 oz.; dissolve, and strain. A refreshing and slightly laxative drink; in fevers, hoarseness, sore throats, &c.

HYDROM'ETER. *Syn.* AREOMETER, GRAVIMETER; HYDROMETRUM, L. An instrument for ascertaining the specific gravities of liquids, and hence their strength, the latter being either in inverse or direct proportion to the former. Hydrometers are of two kinds:—1. Those which are always immersed to the same depth in distilled water, and the liquid to be tried, small weights being used for the purpose, as in FAHRENHEIT'S and NICHOLSON'S hydrometers; and 2nd, those which are suffered to rise or sink freely in the liquid, until they come to a state of rest, as in SYKE'S, BAUMÉ'S, &c. In both cases a correction must be made for any variation in temperature.

Of the two kinds, the first give the most accurate results, and have the great advantage of being applicable to liquids either lighter or heavier than water, but the second are the readier in practice, requiring less time, and less skill to use them. The following are those best known:—

BAUMÉ'S HYDROMETER or AREOMETER, which is very generally employed on the Continent, consists of two distinct instruments, the one for liquids heavier than water, the other for liquids lighter than that fluid. The first floats at the 0, or 'zero,' of the scale, in distilled water, at the temperature of 58° Fahr., and each degree, marked downwards, indicate a density corresponding to one per cent. of common salt. The hydrometer for liquids lighter than water is poised so that the 0 of the scale is at the bottom of the stem, when it is floating in a solution of 1 oz. of common salt in 9 oz. of water, and the depth to which it sinks in distilled water shows 10°; the space between these fixed points being equally divided, and the graduation continued upwards to the top of the scale.

The temperature at which these instruments were originally adjusted by Baumé was 12·5° Centigrade (54·5° Fahr.). They are now commonly adjusted in this country at 58° or 60° Fahr. Hence arise the discrepancies observable in the published tables of the "correspondence between degrees of Baumé and real specific gravities."

CARTIER'S HYDROMETER, which is much used in France for light liquids, has the same point for the zero of its scale as Baumé's, but its degrees are rather smaller, 30° Baumé being equal to 32° Cartier.

FAHRENHEIT'S HYDROMETER consists of a hollow ball, with a counterpoise below, and a

very slender stem above, terminating in a small dish. The middle, or half-length of the stem, is distinguished by a fine line across it. In this instrument every division of the stem is rejected, and it is immersed in all experiments to the middle of the stem, by placing proper weights in the little dish above. Then, as the part immersed is constantly of the same magnitude, and the whole weight of the hydrometer is known, this last weight, added to the weights in the dish, will be equal to the weight of fluid displaced by the instrument, as all writers on hydrostatics prove. And accordingly, the sp. gravities for the common form of the tables will be had by the proportion—

As the *whole weight of the hydrometer and its load, when adjusted in distilled water*, is to the *number* 1000, so is the *whole weight when adjusted in any other fluid*, to the *number expressing its specific gravity*.

GAY-LUSSAC'S ALCOHOLOMETER is used to determine the strength of spirituous liquors. It, at once, indicates on the stem, the percentage of absolute alcohol in the liquid examined. The original experiments of Gay-Lussac having been made on liquids at a temperature of 59° Fahr., all examples examined by the alcoholometer, must either be brought to that temperature previous to being tested, or a correction made in the strength found.

NICHOLSON'S HYDROMETER is constructed on the same principle as Fahrenheit's. It has, in addition to the small dish for weights above, a little cup attached below, for holding any solid body whose weight in water is required. It is chiefly intended for taking the sp. gr. of minerals.

RICHTER'S HYDROMETER resembles, for the most part, Gay-Lussac's.

SYKES'S HYDROMETER is that adopted by the Revenue authorities in England for ascertaining the strength of spirits, and has been already fully noticed.

TRALLES'S HYDROMETER resembles Gay-Lussac's (nearly).

TWADDELL'S HYDROMETER is much used in the bleaching establishments of Scotland, and in some parts of England. According to this scale, 0 is equal to 1000 or the sp. gr. of distilled water, and each degree is equal to ·005; so that, by multiplying this number by the number of degrees marked on the scale, and adding 1·, the real specific gravity is obtained.

Obs. Hydrometers, unless manufactured with great care and skill, merely afford approximate results, but which are nevertheless sufficiently correct for all ordinary purposes. They also require several ounces of liquid to float them, and hence cannot be used for very small quantities. Those of Fahrenheit, Nicholson, and Sykes, are the most accurate, both in principle and application. They are all employed with a tall glass cylinder, termed a sample, test, or hydrometer glass, in the way already noticed; but the thermometer for ascertaining the temperature must be covered with a glass case, or arranged with a folding scale, to allow of its immersion in corrosive liquids.

ALCOHOLOMETERS, ELAIOMETERS, SACCHAROMETERS, URINOMETERS, &c., are simply hydrometers so weighted and graduated as to adapt them for testing spirits, syrups, urine, &c. See ALCOHOLOMETRY, ALCOHOLMETRY, AREOMETER, SPECIFIC GRAVITY, &c.

HYDROM'ETRY. *Syn.* AREOMETRY. The art of determining the specific gravity of liquids, and hence their strength and commercial value. The instruments used are noticed above; their action depends upon the fact that a floating body displaces a bulk, equal to itself in weight, of the fluid in which it floats, and consequently that a body of a given weight sinks deeper in a lighter than in a heavier fluid. In hydrometric determinations the temperature of the samples must be carefully attended to, for fluids expand as their temperature is increased. The hydrometers used in England are generally adjusted to the standard temperature of 60° Fahr., and when 'Hydrometer Tables,' giving the corrections for the variations of the thermometer, are not accessible, the fluids to be examined should be brought to this standard temperature by applying heat directly to the vessel, when the temperature is below the standard, or by surrounding the vessel with cold water, when it is above the standard. The principal applications of hydrometry are described in different parts of this work. See ACETIMETRY, ALCOHOLOMETRY, CHLOROMETRY, SPECIFIC GRAVITY, &c.

HYDROP'ATHY. *Syn.* WATER CURE; HYDROPATHIA, L. A mode of curing diseases by the copious use of pure cold water, both internally and externally, together with dry sweating, and the due regulation of diet, exercise, and clothing. This "treatment of diseases undoubtedly includes powerful therapeutic agents, which, in the hands of the educated and honourable practitioner, might be most beneficially resorted to as remedia agents." (Pereira.)

HYDROPHO'BIA. *Syn.* CANINE MADNESS; RABIES CANINA, L. A disease which is generally considered as the result of a morbid poison being introduced into the system by the bite of a rabid animal. A clear case of idiopathic or spontaneous hydrophobia has never yet been known to occur in the human subject.

The common symptoms of hydrophobia are great excitability and horror at the sight of water or the attempt to drink, fever, vomiting, excessive thirst, spitting of viscid saliva, difficult respiration, irregular pulse, convulsions, syncope, delirium, and death.

The whole materia medica has been, unfortunately, unsuccessfully sought without the discovery of a single remedy for this

disease, or even a palliative of its severer symptoms.

The treatment of the recent bites of venomous animals has been fully explained, and need not be repeated here. To prevent secondary or constitutional effects arising, the use of lemon juice, or arsenical solution, has long been popular. (Graham, and others.) Dr. Buchan remarks that "vinegar is of considerable use, and should be taken freely."

HYDROSULPHU'RIC ACID. See SULPHUR.

HYGIENE'. *Syn.* HYGIÈNE, Fr. Health; its preservation, promotion, and restoration. That department of medicine and civil government which relates to health. See AIR, BATH, EXERCISE, FLANNEL, FOOD, NUTRITION, SLEEP, VENTILATION, &c.

HYOCHOL'IC ACID. $C_{25}H_{40}O_4$. *Syn.* GLYCOHYOCHOLALIC ACID. A compound peculiar to the gall of pigs, discovered by Strecker and Gundelach.

Prep. The fresh gall of pigs is mixed with a solution of sulphate of sodium; the precipitate is dissolved in absolute alcohol, and decolourised by animal charcoal. From this solution ether throws down hyocholate of sodium, which, on the addition of sulphuric acid, yields hyocholic acid as a resinous mass, which is dissolved in alcohol, re-precipitated by water, and dried. When heated with alkaline solutions, glycocine and a new crystalline acid (hyocholalic acid) are formed. When boiled with acids, it yields glycocine and hyodysysin.

HYOSCY'AMINE. *Syn.* HYOSCYAMIA, HYOSCYAMINA, DATURINE, DATURIA. An alkaloid obtained from common henbane (*Hyoscyamus niger*), and also from the thorn apple (*Datura stramonium*). See DATURINE.

HYPNOT'ICS. *Syn.* HYPNOTICA, L. Agents or medicines which induce sleep, as opium, morphia, henbane, Indian hemp, lactucarium, &c. Agents which prevent sleep are called agrypnotics (*Agrypnotica*, L.), or anthypnotics (*Anthypnotica*, L.).

HYPOCHLO''RIC ACID. See CHLORINE.

HYPOCHONDRI'ASIS. *Syn.* HYPOCHONDRIACISM. The 'hip' or 'hyp,' the 'vapours,' depression of spirits, 'blue devils.' This disease chiefly affects persons of the melancholic temperament, and is commonly induced by hard study, irregular habits of life, want of proper social intercourse, living in close apartments, and insufficient out-of-door exercise. The treatment may, in most cases, be similar to that recommended for DYSPEPSIA, observing, however, that success depends more on amusing and engaging the mind, and in gradually weaning it from old conceits, than in the mere administration of medicine. When the patient is tormented with a visionary or exaggerated sense of pain, or of some concealed disease, or a whimsical dislike of certain persons, places, or things, or groundless apprehensions of personal danger or poverty, or the conviction of having experienced some dreadful accident or misfortune, the better way is to avoid any direct attempts to alter his opinions, but to endeavour to inspire confidence in some method of relief. Greding mentions the case of a medical man who conceived that his stomach was full of frogs, which had been successively spawning ever since he had bathed, when a boy, in a pool in which he had perceived some tadpoles; and he had spent his life in endeavouring to get them removed. One patient, perhaps, fancies himself a giant; another, as heavy as lead; a third, a feather, in continual danger of being blown away by the wind; and a fourth, a piece of glass, and is hourly fearful of being broken. Marcellus Dentatus mentions a baker of Ferrara who thought himself a lump of butter, and durst not sit in the sun, or come near the fire, for fear of being melted. The writer of this article once knew a man who always put on his coat the wrong side in front, because he conceived his face looked behind him. In such cases it is useless to argue with the patient, as it only causes irritation, and increases the malady. The restoration of the bodily health, and a sudden surprise or change of scene, will often effect a cure.

HYPONI'TRIC ACID. See NITROGEN.

HYPONI'TROUS ACID. See NITROGEN.

HYPOPHOS'PHITES. See PHOSPHORUS.

HYPOPHOSPHITE. A salt of hypophosphorous acid.

HYPOSUL'PHATE. *Syn.* DITHIONATE; HYPOSULPHAS, L. A salt of hyposulphuric acid.

HYPOSUL'PHITE. *Syn.* THIOSULPHATE; HYPOSULPHIS, L. A salt of hyposulphurous acid.

HYPOSUL'PHUROUS ACID. See SULPHUR.

HYRA'CEUM. A substance produced by the Cape badger (*Hyrax Capensis*), and proposed as a substitute for CASTOREUM. Pereira considered it to be inert and useless.

HYSTERICS. *Syn.* HYSTERIA, PASSIO HYSTERICA, L. In *pathology*, a nervous affection peculiar to women, attacking in paroxysms or fits, preceded by dejection, tears, difficult breathing, sickness, and palpitation of the heart. The treatment of this disease varies with the causes and the symptoms. Bleeding, cupping, and depletives, are generally had recourse to in robust and plethoric habits, and stimulants and tonics in those of a weakly or relaxed constitution. Affusion of cold water and nasal stimulants will frequently remove the fit in mild cases. Exercise, proper amusements, and regular hours and diet, are the best preventives. See DRAUGHT (Antihysteric and Hydrocyanic), &c.

ICE. *Syn.* GLACIES, L. Water in the solid state. On being cooled, water gradually contracts until the temperature has fallen to 39·9° Fahr., when it begins to expand. At the freezing-point, 32° Fahr., under ordinary con-

ditions, water crystallises or freezes, and in consequence of the continued expansion, the sp. gr. of ice, as compared with that of water at 39·9°, is as ·94 to 1·00. Ice has the peculiar property of reuniting by the contact of adjoining surfaces after having been broken into fragments (REGELATION). Coloured water and salt water, by freezing, produce colourless and fresh ice; and clean solid ice, when thawed, furnishes water equal in purity to that which has been distilled.

The use of ice in the preparation of ICE-CREAMS, ICED-LIQUORS, &c., is noticed elsewhere. The confectioner collects his ice as early as possible during the winter, and stores it in a well-drained well or excavation, somewhat of the form of an inverted sugar-loaf, contained in a small shed or building called an ICE-HOUSE. This building should always be situated on a dry sandy soil, and, if possible, on an eminence. The door should be on the north side, and the roof should be conical and thickly thatched with straw.

In *medicine*, ice is frequently employed externally in inflammation of the brain, to resolve inflammation, to stop hæmorrhage, to constringe relaxed parts, and as an anodyne, to deaden pain. For these purposes it is pounded small, in a cloth, and placed in a bladder or bag of gauze (ICE-CAP, ICE-POULTICE) before applying it. Internally, ice or ice-cold water has been given with advantage in heartburn, typhus, inflammation and spasms of the stomach, to check the vomiting in cholera, and to arrest hæmorrhage, whether bronchial, gastric, nasal, or uterine. Very recently, ice has been proposed as a remedy in the treatment of diphtheria. Small lumps of ice, or a small glassful of pounded ice-and-water, will often temporarily restore the tone of the stomach and nervous system during hot weather, when all other means fail. Ice-creams, taken in moderation, act in the same way.

In the warmer climates of Europe an ICE-HOUSE or an ICE-SAFE (a REFRIGERATOR) is a necessary appendage to every respectable dwelling, not merely for the purpose of pleasing the palate with iced beverages, but to enable the residents to preserve their provisions (fish, meat, game, milk, butter, &c.) in a wholesome state from day to day. See REFRIGERATION.

ICE'LAND MOSS. *Syn.* CETRARIA (B. P.), LICHEN ISLANDICUS, L. The lichen termed *Cetraria Islandicus*. It is much employed, both as a nutritious food and as a mild mucilaginous tonic, in catarrh and consumption. It may be purified from its bitter principle by a little cold solution of potassa.

ICES. (In *confectionery*.) These are commonly composed of cream or sweetened water, variously flavoured, and congealed by ice or a freezing mixture. Sometimes, instead of cream, the materials of a custard are used. The mixed ingredients are placed in a tin furnished with a handle at top, called a 'freezer,' or 'freezing-pot,' which is then plunged into a bucket containing ice broken small, and mixed with about half its weight of common salt, and is kept in rapid motion, backwards and forwards, until its contents are frozen. As the cream congeals and adheres to the sides, it is broken down with the ice-spoon, so that the whole may be equally exposed to the cold. As the salt and ice in the tub melt, more is added, until the process is finished. The 'ice-pot,' with the cream in it, is next placed in a leaden 'ice-stand,' is at once surrounded with a mixture of ice and salt, and closely covered over. In this state it is carried into the shop. The glasses are filled as required for immediate use, and should have been previously made as cold as possible.

PLAIN ICE-CREAM, or CREAM FOR ICING, is commonly made by one or other of the following formulæ:—

1. New milk, 2 pints; yolks of 6 eggs; white sugar, 4 oz.; mix, strain, heat gently, and cool gradually.

2. Cream, 1 pint; sugar, 4 oz.; mix, as above.

3. Cream and milk, of each, 1 pint; white sugar, ½ lb.

FLAVOURED ICE-CREAMS are made by mixing cream for icing with half its weight of mashed or preserved fruit, previously rubbed through a clean hair sieve; or, when the flavour depends on the juice of fruit or on essential oil, by adding a sufficient quantity of such substances. RASPBERRY and STRAWBERRY ICES are made according to the former method; LEMON, ORANGE, NOYEAU, and ALMOND ICES, by the latter method. In the same way any other article besides cream may be frozen.

CHOCOLATE FOR ICING is made by rubbing 1 oz. of chocolate to a paste with a tablespoonful of hot milk, and then adding 'cream for icing,' 1 pint.

COFFEE FOR ICING is made of cream for icing, 1 quart, to which a small teacupful of the strongest possible clarified coffee has been added, together with 2 oz. of sugar and the yolks of 3 or 4 eggs. See ICING (*below*).

I'CING. (For cakes.) *Syn.* SUGAR ICE. The covering of concreted sugar with which the confectioners adorn their cakes. *Prep.* Beat the white of eggs to a full froth, with a little rose or orange-flower water; then add, gradually, as much finely powdered sugar as will make it thick enough, beating it well all the time. For use, dust the cakes over with flour, then gently rub it off, lay on the icing with a flat knife, stick on the ornaments while it is wet, and place it in the oven for a few minutes to harden, but not long enough to discolour it. It may be tinged of various shades by the addition of the proper 'stains.'

ID'RIALIN. A fusible, inflammable substance, found associated with the native cinnabar of the mines of Idria, in Carniola. It is extracted from the ore by means of oil of

turpentine. It is only slightly soluble in alcohol and ether. When pure, it is white and crystalline.

ID'RYL. A hydrocarbon generally found associated with idrialin.

IGASU'RIC ACID. *Syn.* ACIDUM IGASURICUM, L. An acid associated with strychnine in the St. Ignatius' bean and in nux vomica. It may be obtained by digesting the rasped or ground beans first in ether and then in boiling alcohol, evaporating the latter decoction to dryness, diffusing the residuum through water, adding a little carbonate of magnesium, again boiling for some minutes, filtering, washing the powder with cold water, and digesting it in alcohol, and filtering. The igasurate of magnesium thus obtained is dissolved in boiling water, the solution decomposed by acetate of lead, and the precipitate (igasurate of lead), after being washed and diffused through distilled water, is decomposed by sulphuretted hydrogen. The solution thus obtained yields crystals (igasuric acid) on being evaporated. It is soluble in both water and alcohol.

IGNI"TION. In the laboratory, this term is commonly applied to the act of heating to redness or luminousness. See CALCINATION.

ILLUMINA'TION. The act of illuminating or making luminous. For supplying artificial light to streets and the interiors of houses coal gas and oils and fats are generally employed. These illuminating agents are compounds rich in carbon, upon the presence of which the brightness of their flames depends. Flame is gas or vapour heated to incandescence during the process of combustion. A flame containing no solid particles emits but a feeble light, even if its temperature is the highest possible. Pure hydrogen, for instance, burns with a pale, smokeless flame, though with the production of considerable heat. On the other hand, wax, paraffin, coal gas, &c., while undergoing combustion, give out considerable light, because their flames contain innumerable solid particles of carbon, which act as radiant points. To give the greatest degree of luminosity to flame, the supply of air must be proportioned to the character of the burning substance, and be insufficient for the instantaneous combustion of the evolved gases; in which case the hydrogen takes all the oxygen, and the larger portion of the carbon is precipitated, and burnt in the solid form, at some little distance within the outer surface of the flame. When the supply of air is sufficient for the immediate and complete combustion of the whole of the combustible matter, no such precipitation takes place, and the flame is neither white nor brilliant. The richest coal gas, mixed with sufficient air to convert all its hydrogen and carbon into water and carbonic acid, explodes with a pale blue flash; yet the same gas, when consumed in the ordinary way, burns with a rich white flame. Every one must have noticed the effect of a gust of wind upon the flaring gas-jets of a butcher's shop; the plentiful supply of air causes complete combustion, and so converts the bright white flames into dull blue streaks of fire. When the supply of air is insufficient to cause the combustion of the newly formed solid carbon at the instant of its development, and whilst it is in an incandescent state, the flame becomes red and smoky, and unburnt sooty particles are thrown off. The same occurs when the temperature of any portion of the hydrogen is reduced below that intensity required for the combustion of the newly separated charcoal. Solid bodies, as tallow, oils, and fats, which burn with flame, are converted into the state of gas by the heat required to kindle them, and it is this gaseous matter which suffers combustion, and not the substance which produces it.

The relative value of the ordinary illuminating agents has been accurately determined by Dr. Frankland. According to his experiments, the quantities of various substances required to give the same amount of light as would be obtained from 1 gallon of Young's Paraffin oil are as follows:—

Young's Paraffin oil	1·00 gall.
American rock oil[1]	1·26 „
Paraffin candles	18·6 lbs.
Sperm	22·9 „
Wax	26·4 „
Stearic	27·6 „
Composite	29·5 „
Tallow	39·0 „

The following table exhibits the comparative cost of the light of 20 sperm candles, each burning 10 hours at the rate of 120 grs. per hour; also the amount of carbonic acid produced and heat evolved per hour, in obtaining this quantity of light:—

	Cost. s.	Cost. d.	Carb. acid per hour in cub. feet.	Units of heat. per hour.
Wax	7	2½	8·3	82
Spermaceti	6	8		
Paraffin candles	3	10	6·7	66
Tallow	2	8	10·1	100
Rock oil	0	7½	3·0	29
Paraffin oil	0	6		
Coal gas	0	4½	5·0	47
Cannel gas	0	3	4·0	32

These figures prove that coal-gas and the mineral oils are the cheapest and best illuminating agents, producing the largest amount of light with the least development of heat.

The light emitted by incandescent lime (DRUMMOND LIGHT, HYDRO-OXYGEN LIGHT, LIME LIGHT, OXYHYDROGEN LIGHT) is intensely brilliant, and is often made use of to enable workmen to continue operations at night. It is obtained by directing the flame produced by the combustion of a mixture of hydrogen (or coal gas) and oxygen upon a small cylinder of lime. In the improved form of

[1] Acknowledged to be an inferior sample.

this light the lime is protected from crumbling by a cage of platinum wire, and is caused to rotate slowly by means of clockwork, so as constantly to expose a fresh surface to the flame. When reflected from a 'parabolic mirror' in a pencil of parallel rays, the Drummond light has been recognised during daylight at a distance of 108 miles. The lime light produced with coal gas and oxygen is used for the MAGIC LANTERN and GAS MICROSCOPE.

Another powerful illuminator is the ELECTRIC LIGHT. It is produced by the passage of a strong current of voltaic electricity between two pencils of hard charcoal or coke, such as that deposited in the retorts of gas-works. The electric light has been successfully applied to lighthouse illumination. It is too intense, and its cost is too great, for its application to domestic purposes. See CANDLES, FLAME, GAS, PHOTOMETRY, &c.

ILLU'TATION. See BATH (Mud).

IMAGINA'TION. The influence of the imagination, both in the production and cure of disease, has been long admitted by medical practitioners. It is probably the most powerful therapeutic agent known. "Extraordinary cures have been ascribed to inert and useless means, when, in fact, they were referable to the influence of the imagination." (Dr. Pereira.)

IMPE'RIAL. *Syn.* POTUS IMPERIALIS, PTISANA I., L. *Prep.* 1. Cream of tartar, ½ oz.; 1 lemon, sliced; lump sugar, 2 oz.; boiling water, 1 quart; infuse, with occasional stirring until cold, then pour off the clear portion for use.

2. A lemon, sliced; sugar, 1 oz.; boiling water, 1 pint.

3. Yellow rind and juice of lemon; citric acid, 1 dr.; sugar, 2½ oz.; hot water (which has been boiled), 1 quart; as No. 1. Refrigerant and slightly diuretic. *Used* as a common drink in fevers, dropsy, &c., and as a summer beverage.

IM'PLEMENTS (Agricultural). "Almost all the operations of agriculture may be performed by the plough, the harrow, the scythe, and the flail; and these are the sole implements in the primitive agriculture of all countries. With the progress of improvement, many other implements (and machines) have been introduced, the more remarkable of which are the DRILL PLOUGH, the HORSE HOE, the WINNOWING MACHINE, the THRESHING MACHINE, the HAY-MAKING MACHINE, and the REAPING MACHINE. The object of all these implements and machines is to abridge human labour, and to perform the different operations to which they are applied with a greater degree of rapidity, and in a more perfect manner, than before." (Loudon.) On the perfection of agricultural implements and machines depends much of the improvement of which this art is susceptible. See AGRICULTURE, &c.

IMPROV'ING. The trade name for 'doctoring,' 'adulterating,' or 'lowering,' the quality of any substance, with the view of cheapening it or increasing its bulk. See WINE, &c.

IN'CENSE. *Prep.* 1. Olibanum, 2 or 3 parts; gum benzoin, 1 part.

2. Olibanum, 7 parts; gum benzoin, 2 parts; cascarilla, 1 part. Placed on a hot plate or burned, it exhales an agreeable perfume. Used in some of the rituals of the Roman Catholic Church.

INCINERA'TION. The reduction of organic substances to ashes by combustion. See CALCINATION.

INCOMBUSTIBIL'ITY. The property of being incapable of being kindled, or of being consumed by fire. Substances possessing this property are said to be 'incombustible' or 'fireproof.'

INCOMBUST'IBLE FAB'RICS. *Syn.* NON-INFLAMMABLE FABRICS. The fashion of wearing light gauzy dresses extended by hoops or crinoline has made death from fire a common casualty. With a view of diminishing the danger to which women expose themselves, chemists have lately devoted considerable attention to the problem of rendering muslin and other light fabrics non-inflammable. This object may be attained by steeping the fabric in almost any saline solution. Thus, cotton or linen stuffs prepared with a solution of borax, phosphate of soda, phosphate of ammonia, alum, or sal-ammoniac, may be placed in contact with ignited bodies without their suffering active combustion or bursting into flame. The salts act by forming a crust of incombustible matter on the surface of the fibres. They do not, however, prevent carbonisation taking place, when the temperature is sufficiently high. It is by a knowledge of this property of culinary salt, that jugglers are enabled to perform the common trick of burning a thread of cotton whilst supporting a ring or a small key, without the latter falling to the ground. The cotton is reduced to a cinder, but, from the action of the salt, its fibres still retain sufficient tenacity to support a light weight.

The addition of about 1 oz. of alum or sal-ammoniac to the last water used to rinse a lady's dress, or a set of bed furniture, or a less quantity added to the starch used to stiffen them, renders them uninflammable, or at least so little combustible that they will not readily take fire; and if kindled, are slowly consumed, without flame. None of the above-named salts are adapted for fine soft muslins, which mostly require chemical treatment, because they injure the texture, rendering the fabric harsh and destroying all its beauty. The salt which is found to answer most completely all the required conditions is TUNGSTATE OF SODA. "Muslin steeped in a solution containing 20% of this salt is perfectly non-inflammable when dry, and the saline film left on the surface is smooth and of a fatty appearance like talc, and

therefore does not interfere with the process of ironing, but allows the hot iron to pass smoothly over the surface. The non-fulfilment of this latter condition completely prevents the use of many other salts—such as sulphate or phosphate of ammonia, which are otherwise efficacious in destroying inflammability—for all fabrics which have to be washed and ironed." (Watts.)

The addition of a little phosphoric acid or phosphate of soda to the 'tungstate' is recommended, for without this addition a portion of the 'tungstate' is apt to undergo a chemical change and become comparatively insoluble. Messrs. Versmann and Oppenheim, the introducers of tungstate of soda, give the following formula for a solution of minimum strength:—

Dilute a concentrated solution of neutral tungstate of soda with water to 28° Twaddell (sp. gr. 1·14), and then add 3% of phosphate of soda. This solution is found to keep and to answer its purpose very well; it is now constantly used in the Royal Laundry.

PAPER, WOOD, &c., may also be rendered comparatively incombustible by soaking them in saline solutions. See ASBESTOS, FIRE, &c.

INCOMPATIBLES. In *medicine* and *pharmacy*, substances which exert a chemical action on each other, and cannot, therefore, with propriety, be prescribed together in the same formula or prescription. The principles on which we should act to avoid prescribing or dispensing incompatibles, are briefly developed under the heads AFFINITY and DECOMPOSITION. To this we may add that, if a substance is endowed with well-marked therapeutical or poisonous properties, independent of those which may exert a chemical effect upon the tissues, its mode of action will neither be changed nor destroyed by the combinations which it forms, provided always that the new compounds are not insoluble in water.

"It is not necessary to give two incompatible medicines at the same time, in order to produce decomposition; it is sufficient if they are given within a very short interval of each other. Thus, a sick person, who has been treated with lead externally, or even internally, will present a discoloration of the skin, if he takes a sulphur bath four or five days after the lead treatment has been discontinued. If a person is rubbed with iodide of potassium shortly after having applied Vigo's plaster (plaster of ammoniacum with mercury), or the Neapolitan ointment (mercurial ointment), iodide of mercury and caustic potash will be formed, which will cause vesication. So also vomiting occurs if lemonade made with tartaric acid is taken five or six days after the administration of white oxide of antimony." (Trousseau and Reveil.)

Lists of incompatibles are published in many pharmaceutical and medical works, but are, in reality, of little use beyond illustrating rules and principles which are familiar to every chemist, and which every prescriber should also be intimately acquainted with.

INCRUSTATION, Prevention of, in Steam Boilers. With all qualities of water commonly used for feeding steam boilers there is a tendency to the production of hard calcareous deposits or layers of incrustation within the boiler, due to the separation of lime salts (particularly the carbonate and sulphate, or mixtures of these with a certain amount of carbonate of magnesia) as the direct consequence of the accumulation of these impurities from large quantities of water evaporated. The sparing solubility of the sulphate of lime (gypsum) in hot water fully accounts for its deposition in the boiler, and the carbonate of lime (chalk) is thrown down, not only as the result of direct evaporation, but by the ebullition expelling free carbonic acid, which holds this body to some extent in solution. Rain water, which of itself is too pure to give rise to these incrustations, cannot be used *alone* for boiler purposes, for it has been found to exert a highly corrosive action upon the iron plates and fittings. It can, however, be advantageously employed in conjunction with 'hard' spring or river waters, and has the effect of diminishing the incrustation merely as the result of dilution. The drain pipes leading from the roof of the factory may be placed in connection with the tank or well from which the supply of water is drawn for the boilers. It will be seen, hereafter, that the self-same remedy is efficient both as a means of preventing incrustation and obviating corrosion, and that by using one of the alkaline substances about to be specified this twofold advantage may be secured. Iron will not rust when immersed in water containing a mere trace of caustic alkali, and it is a common observation that the iron vessels used in the preparation of potash and soda remain for any length of time free from all appearance of rust. This singular property is, no doubt, susceptible of important applications, amongst them may be mentioned the better protection of iron ships from the attack of bilge water, of hydraulic rams, moulding boxes, smiths' tools, and other objects liable to be placed at times under the influence of water. Some forms of surface-condensers become quickly corroded in consequence of the purity of the water accumulating in them by the process of distillation, and a small dose of caustic alkali is then useful as a means of protection; the engine-cylinders also are to some extent preserved when alkaline anti-incrustation fluids are introduced into the boiler, for the minute quantity which is carried forward mechanically in the form of spray mixed with the steam suffices to preserve the iron. Whilst a tendency to 'priming' undoubtedly results from a too liberal use of soda or other alkali in the boiler, it will in practice be found easy to adjust the proportion of this ingredient, so as to secure immunity from corrosion and

incrustation, and, at the same time, avoid the tumultuous kind of ebullition known as 'priming.' In all cases it is advisable to carry out a rigid system of inspection, and it is only in the way of saving fuel and labour that the application of boiler-fluids is to be recommended.

Much benefit has often resulted from a coating of coal-tar or 'dead oil' applied to the interior surfaces below the water line, when the boiler is opened for cleaning and inspection. These will tend very considerably to lessen the adhesion of calcareous crusts, and are not in any way affected by the boiler fluids in common use. Soda crystals and caustic soda may be used with great success in boilers to effect the immediate precipitation of the lime salts, and they act by throwing down a finely divided form of carbonate of lime, which in time furnishes nuclei for the deposition of subsequent accretions both of the carbonate and sulphate, so that they are prevented from crystallising upon the walls of the boiler. A granular mud is thus formed, which subsides quickly and may be for the most part got rid of through the 'blow-off' cock,' which should be opened for this purpose two or three times every day, and run out with as little water as possible.

The use of caustic soda has undergone a thorough trial at the hands of Mr. J. Spiller, F.C.S., in the boilers of the Royal Arsenal, Woolwich, and we are favoured with the following general instructions regarding its use, which are based upon an experience of upwards of ten years. The caustic soda should be dissolved in water so as to make a concentrated solution of specific gravity 1300. This, being perfectly miscible with water, may be introduced into the boiler with the feed-water at any time when, from the pressure of steam, it may not be convenient to pour it through the safety valve or other openings in the boiler. But when the steam is down there is no difficulty in introducing the prescribed dose by using a tin funnel with flattened aperture to pass it through the safety valve; or a tubular arrangement with double cocks will answer at all times. Half a gallon per diem is the average quantity found sufficient for a 20-horse stationary boiler, working with Thames water for ten hours daily. If the water should happen to be unusually hard a larger dose may be employed, but it would not be expedient to add in one charge more than the amount required for the day's consumption. Locomotive and multitubular boilers have been worked successfully with caustic soda, and it is here that the importance of using anti-incrustation fluids makes itself most apparent.

Many other methods have at various times been proposed to prevent the formation of deposits in steam boilers. Dr. Ritterband's method consists in simply throwing a little sal-ammoniac into the boiler, by which carbonate of ammonia is formed, which passes off with the steam, and chloride of calcium, which remains in solution. In Holland this plan has been used with satisfaction for locomotive boilers. About 2 oz. of the salt may be placed in the boiler twice a week. The chloride of tin is equal to sal-ammoniac, and is similar in its action. Carbonate of soda has been recommended by Kuhlmann and Fresenius of Germany, and by Crace Calvert of England. It is now employed generally in the boilers of engines in Manchester. The common plan adopted by working engineers to prevent incrustations from either variety of water is, on each occasion of cleaning out the boiler, to introduce some substance which, by its mechanical action, shall prevent the precipitated earthy matter caking together, or adhering to the boiler plates. Some common tar, bitumen, or pitch, appears to answer well under most circumstances. Mr. Ira Hill recommends the use of 3 or 4 shovelfuls of coarse sawdust. He states that, after adopting the use of this article, he never had any difficulty from lime, although using water strongly impregnated with it, and has always found the inside of his boilers as smooth as if just oiled. We have worked a powerful boiler daily for months without opening the 'man-hole,' after throwing a few pounds of potatoes into it. In all cases, when the earthy matter can be kept in a state of solution, or precipitated in a pulverulent form, it is easily removed from the boiler by what engineers term 'priming,' which is allowing the hot water to be blown over with the steam, so that, after a sufficient time, the whole original contents of the boiler are removed, and replaced by fresh water. Before doing so, however, it is of consequence to cut off the communication with the cylinders, and to open the waste-steam cock.

INCUBA'TION (Artificial). The hatching of eggs by artificial heat. This has been practised by the Egyptians from a very remote period. M. Bonnemain has the honour of having introduced this art to Western Europe, in 1775, and having been the first to pursue it successfully on the commercial scale. The source of heat employed by him was a circulatory hot-water apparatus, and the temperature maintained by it 100° Fahr. His plan was to introduce, daily, 1-20th only of the eggs the apparatus was capable of receiving, so that on the 21st day the first chickens were hatched, and a like number every day afterwards as long as the supply of eggs was kept up. Among the trays containing the eggs he placed saucers of water, to compensate for the absence of moisture derived in natural incubation by transpiration from the body of the hen. The chickens, as soon as hatched, were transferred to a 'nursery' or 'chick-room,' also artificially heated, and were fed with crushed millet seed. Several attempts have been made of late years to introduce artificial incubation into this country, with variable success.

IN'CUBUS. See NIGHTMARE.

IN'DIA RUB'BER. See CAOUTCHOUC.

INDIGES'TION. See DYSPEPSIA.

IN'DIGO. *Syn.* INDICUM, PIGMENTUM INDICUM, L. A blue dyestuff extracted from several plants growing in India and America, especially from the leguminous species *Indigofera tinctoria* and *I. cærulea*. It exists in the plant as a colourless juice. The method of manufacture consists in steeping the plant in water until fermentation sets in; the colouring matter dissolves in the water, forming a yellow solution, which is drawn off from the rest of the vegetable matter, and agitated and beaten to bring it freely into contact with the air for about 2 hours; this treatment causes the indigo to form and settle down as a blue precipitate; this is cut, while soft, into cubical cakes, and dried by artificial heat. To hasten the formation of the indigo, a little lime water is sometimes added to the yellow solution. The indigo of commerce contains INDIGO-BLUE or INDIGOTIN, its most important constituent, INDIGO-RED, and many other substances, some of which must be regarded as accidental impurities or adulterations.

Prop. Tasteless; scentless; of an intense blue colour, passing into purple; when rubbed with a smooth hard body, it assumes a coppery hue; insoluble in water, cold alcohol, ether, alkalies, hydrochloric acid, dilute sulphuric acid, and the cold fixed and volatile oils; slightly soluble in boiling alcohol and oils; freely soluble in concentrated sulphuric acid, and, when decoloured or reduced by contact with deoxidising substances, in alkaline lyes; soluble in creasote; its colour is destroyed by chromic acid, nitric acid, and chlorine; when suddenly heated, it gives off rich purple fumes, which condense into brilliant copper-coloured needles.

Pur. The best indigo is that which has the deepest purple colour, and assumes the brightest, coppery hue when rubbed with the nail; its fracture is homogeneous, compact, fine-grained, and coppery; its powder is of an intensely deep blue tint, and light enough to swim on water; and it leaves only a fine streak when rubbed upon a piece of white paper. In general, when indigo is in hard, dry lumps of a dark colour, it is considered of bad or inferior quality. Indigo, when in hard or brittle lumps, or in dust or small bits, is often adulterated with sand, pulverised slate, and other earthy substances.

Estimation. Various methods for estimating the value of samples of indigo have been proposed, but none of them can be depended upon to give perfectly accurate results. The plan recommended by O'Neill[1] is perhaps the best; it is performed as follows:—

Weigh 25 grs. of a fair sample of the indigo finely ground; and to soften and disintegrate it still further, boil it for a short time with weak caustic soda, and then, if there be any soft lumps or clots, strain through calico; mix this with 3 quarts of water in a narrow-necked bottle which it will nearly fill, and added 400 grs. of quicklime, which has been slaked as perfectly as possible; shake well up, and add 1000 grs. measure of solution of 'green copperas' (protosulphate of iron) at 30° Twaddell; cork the bottle closely, and leave it for three days, frequently shaking it in the interval. The indigo will be dissolved by this time; 1 quart of the clear solution is drawn off, shaken up in a bottle to oxidise it, acidified with acetic acid, and the pure indigo (INDIGOTIN) collected upon a filter, dried, and weighed. Four times the weight of the pure indigo is the per-centage of indigo in the sample.

[1] See 'Dictionary of Calico Printing and Dyeing.'

Uses. As a dye stuff, indigo is of great importance, both from the beauty and permanence of the colour it yields, and from the ease with which it is applied to fabrics of all materials. As a medicine, it has been employed in various affections of a spasmodic character, as chorea, convulsions, epilepsy, hysteria, &c. In large quantities, it often induces giddiness, vomiting, and diarrhœa; and when continued for some time, muscular twitchings, resembling those arising from strychnine.—*Dose.* Beginning at about 15 grs., and gradually increased to 1, 2, or even 3 drs., at which it should be continued for 3 or 4 months; made into an electuary with honey or sugar, to which some aromatic may be added. See INDIGO DYE, INDIGOTIN, &c.

Indigo, Sul'phate of. *Syn.* SULPHINDYLIC ACID, SULPHINDIGOTIC A., SAXONY BLUE, SOLUBLE INDIGO.

Prep. By gradually adding indigo (in fine powder), 1 part, to fuming sulphuric acid (Nordhausen sulphuric acid), 5 parts, or oil of vitriol, 8 parts, contained in a stone-ware vessel placed in a tub of very cold water, to prevent the mixture heating; the ingredients are stirred together with a glass rod at short intervals until the solution is complete, after which the whole is allowed to repose for about 48 hours, by which time it becomes a homogeneous pasty mass of an intense blue colour, which in a dull light appears nearly black.

Obs. In this state it forms 'BARTH'S BLUE,' or the 'CHEMIC BLUE' or 'INDIGO COMPOSITION' of the dyer. Diluted with about twice its weight of soft water, it is converted into the 'SAXONY BLUE' or 'LIQUID BLUE' of the shops, also used for dyeing. When commercial sulphate of indigo is diffused through a large quantity of water, nearly boiling, and wool (old white flannel rags, &c.) is macerated in it for some time, the latter absorbs the whole of the sulphate and is dyed blue, whilst the liquor assumes a greenish-blue colour. Wool, so prepared, when well rinsed in cold water, and boiled for some minutes in a large quantity of that liquid containing 1% or 2% of carbonate of potassa, or a quantity equal to about 1-3rd that of the indigo originally employed, gives up its blue colour, and be-

comes of a dull brown. The liquid is now a rich blue-coloured solution of sulphindylate of potassa, from which the salt may be obtained by cautious evaporation. This compound is prepared on the large scale, by diluting sulphate of indigo with about 12 times its weight of soft water, and imperfectly saturating the solution with carbonate of potassa; the sulphindylate falls down as a dark-blue coppery looking powder, soluble in 140 parts of cold water and in about 90 parts of boiling water. This substance is kept both in the moist and dry state, and is known in commerce under the respective names of 'DISTILLED INDIGO,' 'PRECIPITATED INDIGO,' 'SOLUBLE INDIGO,' 'INDIGO PASTE,' 'BLUE CARMINE,' 'DISTILLED BLUE,' 'SOLUBLE BLUE,' &c. It is extensively used in dyeing; and when mixed with starch, whilst in the moist state, and made into cakes or knobs, it constitutes the finest variety of the 'BLUE' used by laundresses for tinging linen. The ammonia and soda salts may be prepared in the same way as the potassa salt, by substituting the carbonates of those bases for carbonate of potassa. The ammonia salt is very soluble.

INDIGO BLUE. See INDIGOTIN.

INDIGO DYE. There are two methods of preparing solutions of indigo for dyeing.—1. By deoxidising it, and then dissolving it in alkaline menstrua.—2. By dissolving it in sulphuric acid. The former method is used in preparing the ordinary INDIGO VAT of the dyers.

1.—*a.* (COLD VAT.) Take of indigo, in fine powder, 1 lb.; green copperas (clean cryst.), 2½ to 3 lbs.; newly slaked lime, 3½ to 4 lbs.; triturate the powdered indigo with a little water or an alkaline lye, then mix it with some hot water, add the lime, and again well mix, after which stir in the solution of copperas, and agitate the whole thoroughly at intervals for 24 hours. A little caustic potassa or soda is frequently added, and a corresponding portion of lime omitted. For use, a portion of this 'preparation vat' is ladled into the 'dyeing vat,' as wanted. After being employed for some time, the vat must be refreshed with a little more copperas and fresh-slaked lime, when the sediment must be well stirred up, and the whole thoroughly mixed together. This is the common vat for cotton.

b. (POTASH VAT.) Take indigo, in fine powder, 12 lbs.; madder, 8 lbs.; bran, 9 lbs.; 'potash,' 24 lbs.; water at 125° Fahr., 120 cubic feet; mix well; at the end of about 36 hours add 14 lbs. more potash, and after 10 or 12 hours longer further add 10 lbs. of potash, and rouse the whole up well; as soon as the fermentation and reduction of the indigo are well developed, which generally takes place in about 72 hours, add a little fresh-slaked lime. This vat dyes very quickly, and the goods lose less of their colour in alkaline and soapy solutions than when dyed in the common vat. It is well adapted for woollen goods.

c. (WOAD VAT.) As the last, but employing woad instead of madder; the vat is 'set' at 160° Fahr., and kept at that temperature until the deoxidation and solution of the indigo has commenced. The last two are also called the 'warm vat.'

d. (PASTEL VAT.) This is 'set' with a variety of woad which grows in France, and which is richer in colouring matter than the plant commonly known as 'woad.'

Obs. Wool, silk, linen, and cotton, may each be dyed blue in the indigo vat. The goods, after being passed through a weak alkaline solution, are subjected to the action of the vat for about fifteen minutes; they are then freely exposed to the air; the immersion in the vat and the exposure are repeated until the colour becomes sufficiently deep. Woad and madder improve the richness of the dye. Other deoxidising substances, besides those above mentioned, may be used to effect the solution of the indigo; thus a mixture of caustic soda, grape sugar, indigo, and water, is often employed on the Continent for this purpose; and orpiment lime, and pearlash are also occasionally used. When properly prepared, the indigo vat may be kept in action for several months by the addition of one or other of its constituents, as required. An excess of either copperas or lime should be avoided.

2. Solution of sulphate of indigo is added to water, as required, and the goods, previously boiled with alum, are then immersed in it, and the boiling and immersion are repeated until the wool becomes sufficiently dyed.

Obs. With this every shade of blue may be dyed, but it is most commonly employed to give a ground to logwood blues. The colouring matter has affinity for woollen and silk with or without 'mordant,' but none for cotton. A solution of soluble indigo (sulphindylate of potassa or soda), in water very slightly acid with sulphuric acid, imparts a very fine blue to cloth, superior in tint to that given by the simple sulphate. See DYEING, &c.

INDIGO PUR'PLE. *Syn.* PHŒNICINE. The name given by Mr. Crum to the purple precipitate obtained by filtration from a solution of indigo in fuming sulphuric acid, when largely diluted with water.

INDIGO RED. *Syn.* INDIGO RESIN, RED RESIN OF INDIGO. This is prepared by boiling alcohol (sp. gr. ·830), on powdered indigo previously exhausted by digestion in dilute acids and in a strong alkaline solution. When heated, it is converted into a white sublimate (deoxidised indigo red), but recovers its red colour by the action of nitric acid.

INDIGO WHITE. *Syn.* INDIGOGENE, INDICYLE, REDUCED INDIGO, HYDROGENISED I., HYDRATE OF I. Reduced or deoxidised indigo blue.

Prep. The yellow alkaline solution obtained

by one or other of the processes noticed under INDIGOTIN is carefully protected from the air, both before and after precipitation with hydrochloric acid; and the precipitate, after being rapidly washed with recently boiled distilled water, or with very dilute sulphurous acid, is drained on a filter, dried in vacuo, and then at once transferred to a well-stoppered bottle.

Prop., &c. A grayish-white mass of minute crystals, generally light blue on the surface, and rapidly turning blue on exposure to the air; soluble in alkalies, alcohol, and ether, to which it imparts a yellow colour. These solutions deposit indigo blue on exposure to the air. A solution of this substance constitutes the indigo vat of the dyer (see *above*).

INDIGO'TIN. *Syn.* CERULIN, INDIGO BLUE. This is the pure blue principle of indigo. It appears to be the oxide of the same organic radical of which indigo white is probably the hydrate.

Prep. 1. Indigo (in fine powder) is digested successively in dilute hydrochloric acid, solution of potassa, and alcohol; the dried residuum is crude indigotin.

2. Indigo (in fine powder), 1 part; green sulphate of iron, 2 parts; hydrate of lime, 3 parts; water, 15 parts; mix, agitate occasionally until the colour is destroyed, then decant the clear portion, precipitate with dilute hydrochloric acid, and wash the powder, first with water, and then with boiling alcohol, until the latter ceases to acquire a yellow colour.

3. Caustic soda and grape sugar, of each, 1 part; water, 20 parts; powdered indigo, 5 parts; mix, and proceed as last. The above are essentially the same as the indigo vat, but on the small scale.

4. The process for estimating the value of indigo given under INDIGO is a good process for obtaining indigotin.

Obs. The product from all the above exceeds 50% of the indigo operated on.

5. (Taylor.) Powdered indigo, 2 parts; plaster of Paris, 1 part; water, q. s. to reduce the mixture to a thin paste; spread the mass evenly upon an oblong iron plate to the depth of about $\frac{1}{8}$ inch, and dry it by a gentle heat. It must then be held over the flame of a spirit lamp, when a disgusting odour will be evolved, the mass will begin to smoke, and in a few minutes will be covered with a heavy purple vapour, which will condense into brilliant flattened prisms or plates of an intense copper colour, forming a thick velvety coating over the surface immediately exposed to the heat. Should the mass catch fire, it may be instantly extinguished by a drop of water let fall upon it. *Prod.* 15 to 18%. See INDIGO, &c.

INDURA'TION. In *pathology*, an increase in the consistence of any portion of the body, usually resulting from chronic inflammation, pressure, or friction.

IN'FANCY. "The domestic treatment of infants and children is comprised in the application of the laws of health to the mother as well as to the child. The position of parent is one of serious responsibility, both morally and physically, and the edict has gone forth that 'the sins of the parent shall be visited on the children.' If we could ensure good mothers, we could vastly improve the race of men. The nursing mother of a sick infant must, by following faithfully the rules of health in respect of the four great hygienic principles—food, clothing, exercise, and ablution—give health with her milk to her offspring; she must also pay close attention to her mind, avoid all sources of irritation and anxiety, and remember that an angry mother sours her milk, and produces a fractious and often a diseased infant. I am quite of opinion, that if mothers were sound in constitution, and bestowed the requisite care upon the maintenance of their health, we should hear little of diseases of children. In children, as well as in parent, the rules of health must be carried out," and their neglect cannot fail to bring with it a heavy retribution. (Eras. Wilson.) See EXERCISE, NURSING, &c.

IN'FANT'S PRESER'VATIVE (Atkinson's). Carbonate of magnesia, 6 drs.; white sugar, 2½ oz.; oil of aniseed, 20 drops; compound spirit of ammonia and rectified spirit, of each, 2½ fl. drs.; laudanum, 1 fl. dr.; syrup of saffron, 1 oz.; caraway water, q.s. to make the whole measure 1 pint. Antacid, anodyne, and hypnotic.

INFEC'TION. *Syn.* CONTAGION. The communication of disease, either by personal contact with the sick or by means of effluvia arising from their bodies. Attempts have been made to restrict the term contagion to the former, and infection to the latter, but this distinction is now discarded by the majority of writers. The following are the principal diseases which are commonly regarded as contagious:—chicken-pox, cholera, cow-pox, dysentery, erysipelas, glanders, gonorrhœa, hooping-cough, hydrophobia, itch, measles, mumps, ophthalmia (purulent), plague, scald-head, scarlet fever, smallpox, syphilis, yaws. See DISINFECTANT, &c.

INFLAM'MABLE AIR. See HYDROGEN.

INFLAMMA'TION. *Syn.* INFLAMMATIO, L. In *pathology*, a certain state of disease. The common symptoms of inflammation are pain, swelling, heat, and redness, attended with fever and general constitutional derangement when severe.

The treatment of inflammations, whether trifling or serious, is essentially the same in principle, and only differs in degree. This consists in the adoption of the usual means for lowering the force of the circulation and the frequency of the pulse; of which bleeding, purging, a low diet, and the use of refrigerant drinks and lotions, form the most important part. The constitutional derangement or symptomatic inflammatory fever, and inflam-

fresh tops before the flowers are formed. Vermifuge.—*Dose.* A teacupful 3 or 4 times a day; also used as an astringent gargle and lotion. For internal use, an equal weight of liquorice root (sliced) is commonly added.

Al'kaline Infusion. *Syn.* INFUSUM ALKALINUM, L. *Prep.* (Beasley.) Hickory ash, 1 pint; wood soot, ¼ pint; boiling water, 1 gall.; in 24 hours decant the clear. "A popular remedy in America for dyspepsia with acidity."

Infusion of Al'oes. *Syn.* INFUSUM ALOËS, L. *Prep.* 1. From hepatic or Socotrine aloes (in powder), 2 drs.; carbonate of potassa, 1½ dr.; boiling water, 1 pint.

2. (Compound; INFUSUM ALOËS COMPOSITUM, L.)—*a.* As the COMPOUND DECOCTION OF A. (Ph. L.), but using only a pint of boiling water.

b. (Fothergill.) Calumba and rhubarb, of each, 1 oz.; aloes, 2 drs.; lime water, 16 fl. oz.; spirit of horseradish, 1 fl. oz.; macerate in the cold for 12 hours, and strain. The last three, like the decoction, are aperient, antacid, stomachic, tonic, and emmenagogue.—*Dose.* 1 table-spoonful to a small wine-glassful, in water. The last one is an admirable medicine in dyspepsia, loss of appetite, and troublesome constipation.

Infusion of Amer'ican Calum'ba. *Syn.* INFUSUM FRASERÆ, L. From the dried root of American calumba (*Frasera Carolinensis*). A pure, powerful, and excellent bitter, destitute of aroma, and fully equal to gentian. (Lindley.)

Infusion of Amer'ican Cen'taury. *Syn.* INFUSUM SABATII, L. From the herb (*Sabbatia angularis*). A pure bitter tonic, without astringency or aroma.

Infusion of Amer'ican Sen'na. *Syn.* INFUSUM CASSIÆ MARYLANDICÆ, L. *Prep.* (Martin.) Leaves of American or wild senna (*Cassia Marylandica*), 1½ oz.; coriander seed, ½ dr.; boiling water, 1 pint. Purgative.

Infusion of Angel'ica. *Syn.* INFUSUM ANGELICÆ, L. From the root of garden angelica. A warm stomachic and diaphoretic; and, in large doses, aperient. It is a popular remedy in dyspepsia, flatulent colic, and heartburn.

Infusion of An'iseed. *Syn.* ANISEED TEA; INFUSUM ANISI, L. Carminative; an excellent adjunct to purgatives, to prevent griping; given to infants to relieve colic, &c. Dr. Prout recommends the use of water at 120° or 125° Fahr.

Antiscorbu'tic Infusion. *Syn.* INFUSUM ANTISCORBUTICUM, MISTURA ANTISCORBUTICA, L. *Prep.* Water trefoil (*Menyanthes trifoliata*), 1 oz.; orange peel, 2 drs.; boiling water, 1 quart; infuse for 8 or 10 hours, strain, and add of compound spirit of horseradish, 5 fl. oz. In scurvy.

Infusion of Ar'nica. *Syn.* INFUSUM ARNICÆ, L. 1. From the flowers of mountain arnica or German leopard's bane (*Arnica montana*). Cottereau orders 1 oz., Dr. Pereira ½ oz., and Dr. A. T. Thomson, ¼ oz. of the flowers to the pint. The first is the usual quantity. The dose of the first is a table-spoonful; of the second, ½ to 1 fl. oz.; of third, ½ to 1 wine-glassful.

2. (Compound; INFUSUM ARNICÆ COMPOSITUM, L.—Ph. Copenh.) Flowers of arnica, 1 dr.; peppermint, 2 drs.; chamomiles, ½ oz.; boiling water, ½ pint.—*Dose.* 1 fl. oz. As the last.

Infusion of Arnica-root. *Syn.* INFUSUM ARNICÆ RADICIS, L. *Prep.* (Ph. Castr. Ruth.) Arnica root, 40 grs.; water, 1 lb.—*Dose.* 1 fl. oz. As the above.

Astrin'gent Infusion. *Syn.* INFUSUM ASTRINGENS, MISTURA A., L. *Prep.* 1. From oak-bark.

2. Infusion of cusparia, 17 fl. oz.; tincture of catechu or kino, 1 fl. oz.; powdered ipecacuanha, 1 dr.; powdered opium, 12 grs.; mix. In diarrhœa, &c. It must be well shaken before pouring out the dose.

Infusion of Balm. *Syn.* INFUSUM MELISSÆ, L. *Prep.* (Plenck.) Fresh herb, 5 drs.; boiling water, 1 pint; infuse for 15 minutes.

Infusion of Bar'berry. *Syn.* INFUSUM BARBERIS, L. *Prep.* (Dr. Copland.) From the bark of the barberry shrub (*Berberis vulgaris*). In jaundice, biliary fluxes, and other cases where heat and acrimony prevail; either alone or combined with a little carbonate of soda or potassa, and tincture of calumba.

Infusion of Bark. See INFUSION OF CINCHONA.

Infusion of Bay-leaves. *Syn.* INFUSUM LAURI, I. LAURI NOBILIS, L. From the leaves or the berries of the sweet bay (*Laurus nobilis*). Aromatic, stimulant, and emmenagogue; in very large doses, emetic and poisonous. It is chiefly given in colic, flatulence, paralysis of the extremities, and obstructed menstruation.

Infusion of Beef. See ESSENCE, TEA, &c.

Infusion of Belladon'na. *Syn.* INFUSUM BELLADONNÆ, L. *Prep.* 1. (Dr. Paris.) Leaves of deadly nightshade (dried), 4 grs.; boiling water, 2 fl. oz.; for a dose.

2. (Compound;—Dr. Saunders.) Leaves (dried), ½ dr.; boiling water, 12 fl. oz.; infuse, strain, and to every 7 fl. oz. of the infusion add of compound tincture of cardamoms, 1 fl. oz.

Infusion of Bis'tort. *Syn.* INFUSUM BISTORTÆ, L. *Prep.* (Radius.) Bistort or snakeweed root (*Polygonum Bistorta*), ½ oz.; boiling water, 1 pint; infuse 2 hours, and strain. In passive hæmorrhages.

Infusion of Black Snake-root. *Syn.* INFUSUM CIMICIFUGÆ RACEMOSÆ, L. In dropsy, rheumatism, and chest complaints.

Infusion of Bles'sed Thistle. *Syn.* INFUSUM CARDUI BENEDICTI, L. From the whole herb. In small doses it is diaphoretic; in larger ones, tonic, stomachic, and deobstruent; taken warm, it is occasionally given to promote the action of emetics. The properties of carduus benedictus "are such as to lead us to the belief

that it has been superseded by other not more efficacious remedies." (Lindley.)

Infusion of Blood-root. *Syn.* INFUSION OF PUCCOON; INFUSUM SANGUINARIÆ, L. *Prep.* Blood-root (*Sanguinaria Canadensis*), ½ oz.; boiling water, 1 pint. Stimulant and emetic.

Infusion of Blue Flag. *Syn.* INFUSUM IRIDIS VERSICOLORIS, L. *Prep.* 1. From the flowers of blue flag (*Iris versicolor*).—2. From the root or rhizomes. The first is used chiefly for its rich colour, as a test, &c.; the second is diuretic and cathartic, and apt to produce distressing nausea and prostration.

Infusion of Bone'set. *Syn.* INFUSUM EUPATORII, L. *Prep.* 1. (Ph. U.S.) From the dried leaves and flowers of boneset or thoroughwort (*Eupatorium perfoliatum*). Diaphoretic, nauseant, and emetic when warm; tonic when cold.

2. (Compound; INFUSUM EUPATORII COMPOSITUM, L.—Ellis.) Boneset and sage, of each, ½ oz.; cascarilla, 1 dr.; boiling water, 1½ pint; infuse until cold, and strain. In hectic fever. A wine-glassful of either of the above, given hourly, in these diseases, until perspiration and nausea are induced, has been highly recommended in influenza.

Infusion of Braz'il-wood. *Syn.* INFUSUM LIGNI BRASILIENSIS, L. From ground or rasped Brazil wood. When wanted to keep, rectified spirit, 3 fl. oz., is added to every pint. Used for colouring, and as a test.

Infusion of Broom. *Syn.* INFUSUM SCOPARII, L. See DECOCTION OF BROOM.

Infusion of Bu'chu. *Syn.* INFUSUM BUCHU (B. P.), I. BUCKU (Ph. E.), I. DIOSMÆ, L. *Prep.* 1. (B. P.) From bruised buchu leaves, 1 oz.; boiling distilled water, 1 pint: infuse for an hour and strain. Diuretic, sudorific, tonic; in dyspepsia, &c.; but chiefly in chronic affections of the bladder and urethra attended with copious secretion.—*Dose.* 1 to 2 oz.

2. (Compound; INFUSUM BUCHU COMPOSITUM, I. DIOSMÆ C., L.—Radius.) Leaves of buchu and whortleberry, of each, ½ oz.; boiling water, 8 oz. (say ½ pint); digest for half an hour, strain, and add of syrup of senega, ½ fl. oz.—*Dose.* 1 or 2 table-spoonfuls every hour; in atony of the bladder and mucous discharges.

Infusion of Buck'bean. *Syn.* INFUSUM MENYANTHIS, L. From the herb or root of buck-bean or marsh trefoil (*Menyanthes trifoliata*). Bitter, stomachic, tonic, and diuretic; in large doses, purgative, vermifuge, and emetic. It has been recommended in agues, gout, dropsy, scurvy, worms, &c. The chief consumption of this plant is by the brewers; "2 oz. being equal to 1 lb. of hops." (Gray.)

Infusion of Bur'dock. *Syn.* INFUSUM BARDANÆ, L. From the root of common burdock. Aperient, diuretic, diaphoretic, and tonic; in gout, rheumatism, skin diseases, &c. See DECOCTION and EXTRACT.

Infusion of Calum'ba. *Syn.* INFUSUM CALUMBÆ (B. P.),—L. *Prep.* 1. (B. P.) Calumba, in coarse powder, 1 oz.; cold distilled water, 2 oz.; macerate one hour, and strain. Infusion of calumba is a good tonic and stomachic bitter.—*Dose.* 1 to 3 fl. oz.; in dyspepsia, &c., and for restraining vomiting and diarrhœa during pregnancy or dentition. It is preferably joined with small doses of the carbonates of soda, potassa, ammonia, or magnesia, when there is acidity; or with chalybeates, when there is paleness and a low pulse; with all of which substances it may be mixed without suffering any sensible alteration.

2. (Concentrated; INFUSUM CALUMBÆ CONCENTRATUM, L.)—*a.* Calumba, in coarse powder, 5½ oz.; cold distilled water, 12 fl. oz.; digest, with frequent agitation, for 3 or 4 hours, then express the liquor, and repeat the digestion with 5½ fl. oz. more of tepid water; after another hour, express this portion also, using as much force as possible; next mix the liquors, heat them quickly to the boiling-point in a shallow vessel, and pour the infusion, whilst still hot, into a strong bottle, and when it has cooled a little add of rectified spirit, 4 fl. oz., secure down the stopper or cork, and agitate well for a few minutes; the bottle must now be set aside for a week, after which the clear portion is to be decanted from the dregs. Very superior.

b. (Wholesale.) From calumba (reduced to coarse powder), 5¼ lbs.; rectified spirit, 5 pints; (diluted with) water, 12 pints; digest for a week, or proceed by displacement. Should there be any difficulty in obtaining it free from cloudiness, the whites of 4 or 5 eggs, previously mixed with about a ¼ pint of cold water, may be added to the infusion, which, after being well agitated for about 10 minutes, must be allowed to repose for 7 or 8 days, and then decanted from the dregs. Should it not be perfectly transparent, it may be filtered through blotting paper.—*Product.* 20 lbs.

Obs. The concentrated infusion produced by the above formulæ is of very superior quality, and has acquired an extensive sale in the wholesale trade. 1 part added to 5¼ parts of water makes a perfectly transparent liquid, possessing exactly similar virtues to the INFUSION OF CALUMBA—B. P.

Infusion of Canthar'ides. *Syn.* INFUSION OF SPANISH FLIES; INFUSUM CANTHARIDIS, I. LYTTÆ, L. *Prep.* (Soubeiran.) Spanish flies (powdered), 20 grs.; boiling water, q. s. (about 3½ fl. oz.) to yield 3 fl. oz., after expression and filtration.

Infusion of Cap'sicum. *Syn.* INFUSUM CAPSICI, L. *Prep.* 1. (Pereira.) Capsicum (powdered), ½ oz.; boiling water, 1 pint.—*Dose.* ½ fl. oz.

2. (Stephen's 'PEPPER MEDICINE'—Pereira.) Red pepper (*Capsicum fructescens*), 2 table-spoonfuls (or 3 of cayenne pepper); common salt, 2 teaspoonfuls; boiling water, ½ pint; to the strained liquor, when cold, add of very sharp vinegar, ½ pint.—*Dose.* 1 table-spoonful,

slowly swallowed, every half hour, in cholera, malignant sore throat, scarlatina, &c.

Infusion of Car'away. *Syn.* CARAWAY TEA; INFUSUM CARUI, L. *Prep.* From bruised caraway seed, 3 drs.; boiling water, 1 pint. In the flatulent colic of infants, and as an adjunct to aperient medicine.

Infusion of Car'rot Seed. *Syn.* INFUSUM DAUCI, I. CAROTÆ, L. Diuretic; in dropsy and nephritic complaints; ½ to 1 pint being taken daily.

Infusion of Cascaril'la. *Syn.* INFUSUM CASCARILLÆ (B. P.), L. *Prep.* 1. (B. P.) Cascarilla, in coarse powder, 1 oz.; boiling distilled water, 10 oz.; infuse for one hour in a closed vessel, and strain.—*Dose.* 1 to 2 oz., usually combined with carbonate of soda and tincture of cascarilla. It is an excellent medicine in dyspepsia, debility, diarrhœa, &c.

2. (Concentrated; INFUSUM CASCARILLÆ CONCENTRATUM, L.)—*a.* Cascarilla (good and fragrant, bruised), 6½ lbs.; rectified spirit of wine, 3 pints; cold water, 6 pints; macerate in a close vessel for 14 days, express the liquor, and filter.

b. As the last, but proceeding by the process of percolation.

Obs. If the preceding processes are well managed, the product is 10 lbs., and resembles brandy in colour and transparency, and is delightfully fragrant. 1 part of this infusion mixed with 6½ parts of water makes a preparation exactly resembling the INFUSION OF CALUMBA—B. P.

3. (Alkaline; INFUSUM CASCARILLÆ ALKALISATUM, L.—Ph. Palat.) Cascarilla, 3 oz.; carbonate of potassa, 2 drs.; boiling water, 16 fl. oz. Antacid and tonic.—*Dose.* 1 tablespoonful.

Infusion of Cas'sia. *Syn.* CASSIA TEA; INFUSUM CASSIÆ FISTULÆ, L.; EAU DE CASSE, Fr. *Prep.* (Soubeiran.) Cassia pods (bruised), 4 oz.; boiling water, 1½ pint. Laxative.

Infusion of Cat'echu. *Syn.* COMPOUND INFUSION OF CATECHU; INFUSUM CATECHU (B.P.), L. *Prep.* (B. P.) Catechu in coarse powder, 160 grs.; cinnamon, bruised, 30 grs.; boiling water, macerate for half an hour in a covered vessel, and strain. Astringent in diarrhœa.—*Dose.* 1 to 2 oz. three or four times a day, or after every liquid dejection.

Infusion of Cayenne Pep'per. See INFUSION OF CAPSICUM.

Infusion of Cen'taury. *Syn.* INFUSUM CENTAURI, L. From the flowering tops of common or lesser centaury (*Erythræa centaurium*). Bitter, febrifuge, stomachic, and vermifuge. A popular remedy in obstructions, jaundice, debility, dyspepsia, &c.; and externally, for the itch, and to destroy pediculi. An infusion is also made of the root, which is about one half more powerful than the tops. The plant is "a valuable native medicine; in the places where it grows it is carefully collected for use in rustic pharmacy." (Lindley.)

Infusion, Cephal'ic. *Syn.* INFUSUM CEPHALICUM, L. *Prep.* (Edin. Hosp.) Valerian root, 2 oz.; rosemary tops, 4 drs.; boiling water, 1 quart; infuse 12 hours, strain, and add aromatic water, 4 fl. oz. As an antispasmodic, and in various affections of the head.

Infusion of Cham'omile. *Syn.* CHAMOMILE TEA; INFUSUM ANTHEMIDIS (B. P.), I. CHAMÆMELI, L.) *Prep.* 1. (B. P.) Chamomile flowers, ½ oz.; boiling water, 10 oz.; infuse for fifteen minutes, and strain.

Tonic, bitter, and stomachic; also emetic. It should be drunk cold, as it is emetic when warm.—*Dose.* As a stomachic, 1 to 3 oz.; as an emetic, 5 to 10 oz.

2. (Concentrated; INFUSUM ANTHEMIDIS CONCENTRATUM, L. From chamomiles, 5½ oz.; water, 1 pint; boil till the mixture weighs exactly 21 oz.; express the liquor by means of a powerful tincture-press, cool, and add of essential oil of chamomile, 15 drops, dissolved in rectified spirit, 5 fl. oz.; agitate well, let it repose until the next day, then decant the clear, and filter. Strongly bitter and odorous, and beautifully transparent. 5½ times as strong as the ordinary INFUSION—B. P.

Infusion of Cher'ry-laurel. *Syn.* INFUSUM LAURO-CERASI, L. *Prep.* (Dr. Cheston.) Fresh leaves of the common or cherry-laurel (*Cerasus Lauro-cerasus*), 2½ oz.; boiling water, 1 pint; infuse, strain, and add of clarified honey, 2½ oz. As a lotion in cancer of the lip, and as a wash for malignant ulcers.

Infusion of Chiret'ta. *Syn.* INFUSUM CHIRATÆ, L. *Prep.* 1. (B. P.) Chiretta, cut small, 1 oz.; distilled water, at 120° F., 40 oz.; infuse half an hour, and strain.—*Dose.* 1 to 2 oz.

Obs. Chiretta is a pure tonic bitter, closely allied to gentian, and has been long esteemed in the East Indies as a remedy for acidity, flatulence, and dyspepsia, especially when occurring in gouty or debilitated habits. It is usually given in combination with carbonate of soda or salts of iron. The whole of the plant is employed.

2. (Concentrated; INFUSUM CHIRETTÆ CONCENTRATUM, L.) From chiretta, 4 oz.; for each pint of the product, prepared as either CONC. INFUSION OF CALUMBA OR CASCARILLA. Eight times as strong ae the common infusion.

Infusion of Cincho'na. *Syn.* INFUSION OF BARK; INFUSUM CINCHONÆ, L. *Prep.* 1. (B.P.) Yellow cinchona (calisaya) bark, in coarse powder, 1 oz.; boiling distilled water, 1 pint; infuse for 2 hours in a covered vessel, and strain.

Obs. Infusion of bark is tonic and stomachic, and in very large doses febrifuge. It is an extremely useful medicine in dyspepsia, debility, and during convalescences, and is often a valuable adjunct to more active remedies. Like the decoction, it is most energetic when strained whilst hot. The addition of 1 fl. dr. of diluted sulphuric acid to the water before pouring it on the bark increases its solvent power, and, consequently, the strength of the infusion.—*Dose.* 1 to 3 fl. oz.

2. (Concentrated; INFUSUM CINCHONÆ CONCENTRATUM, L.)—*a.* Yellow bark (coarsely powdered), 4 lbs.; boiling water, 8 lbs.; digest for 12 hours, express the liquid, add rectified spirit, 2 lbs., and after 24 hours' repose, decant the clear portion.

b. Yellow bark (in coarse powder), 4 lbs.; cold water, 8 lbs.; rectified spirit, 2 lbs; dilute sulphuric acid, 4 fl. oz.; mix the fluids, and either macerate the bark in them for a week in a closed vessel, or proceed by the method of displacement. Very superior.

Obs. 1 fl. dr. of either of the above, added to 7 fl. drs. of water, produces an extemporaneous infusion of cinchona resembling that of the pharmacopœia. The concentrated preparation of the Ph. L. being more than 8 times the usual strength, is placed amongst LIQUORS.

3. From PALE BARK:—*a.* (Ph. L.; INFUSION OF PALE CINCHONA; INFUSUM CINCHONÆ PALLIDÆ—Ph. L.) From pale bark, as INFUSION OF CINCHONA—Ph. L.

b. (Ph. D.; INFUSUM CINCHONÆ—Ph. D.) Crown or pale bark, 1 oz.; boiling water, ½ pint; infuse 1 hour in a covered vessel, and strain through paper.

Obs. "This infusion is inferior to the preceding" (from yellow bark) "in activity, and is a very unnecessary one. It is said to oppress the stomach less than that of the other cinchona bark; the reason is obvious—it is weaker." (Pereira.)

c. (Concentrated; INFUSUM CINCHONÆ PALLIDÆ CONCENTRATUM, L.) As CONCENTRATED INFUSION OF CINCHONA, but using pale bark. The concentrated preparation of the Ph. L. will be found under LIQUORS.

Infusion of Cin'namon. *Syn.* CINNAMON TEA; INFUSUM CINNAMOMI, L. In flatulence, dyspepsia, and nervous colics.

Infusion of Cloves. *Syn.* CLOVE TEA; INFUSUM CARYOPHYLLORUM, I. CARIOPHYLLI (B. P.), L. *Prep.* 1. (B. P.) Cloves (bruised), 1 oz.; boiling distilled water, 20 oz.; infuse for half an hour, and strain. Aromatic, stimulant, and stomachic, either alone or in combination; in colic, dyspepsia, gout, &c.—*Dose.* 1 to 2 oz.

2. (Concentrated; INFUSUM CARYOPHYLLI CONCENTRATUM, L.)—*a.* Bruised cloves, 3 oz.; boiling water, 16 fl. oz.; infuse as above and strain; when cold, add of rectified spirit, ¼ pint, and filter.

b. Bruised cloves, 1¾ lb.; rectified spirit, 1 quart; cold water, 3 quarts; macerate for 7 days, and express the liquid; sprinkle the marc with water, 12 fl. oz., and after the lapse of an hour, again submit it to the press; lastly, filter the mixed liquors. Very fine. The above are about 8 times the strength of the INFUSION OF CLOVES—Ph. L.

Infusion of Cof'fee. *Syn.* INFUSUM CAFFEI, L. *Prep.* (Dr. McBride.) Unroasted coffee berries (bruised), 30 in no.; cold water, 1 quart; macerate 2 or 3 hours. In calculus, &c.—*Dose.* ½ pint every morning.

Obs. Sir J. Floyer and Sir J. Pringle cured asthma with a strong solution of roasted coffee. M. Bouchardat prescribes a strong infusion made by displacement (percolation), and mixed with a little brandy, in poisoning by opium and other like narcotics, after the administration of emetics and ioduretted water. M. Honore also employs very strong-made coffee in albuminuria. Clausen gives it in gout, and Parker employs it as a nervous stimulant in lieu of ammonia and wine, for persons of a slightly sensitive and excitable temperament.

Infusion of Contrayer'va. *Syn.* INFUSUM CONTRAYERVÆ, L. *Prep.* (Pereira.) Contrayerva (in powder), 1 oz.; boiling water, 12 fl. oz. Stimulant, tonic, and diaphoretic; in low fevers, &c.

Infusion of Copal'che Bark. *Syn.* INFUSUM COPALCHI CORTICIS, L. *Prep.* (Dr. Stark.) Bark of copalche bush (*Croton pseudo-China*), ½ oz.; boiling water, 1 pint; digest 2 hours, and strain. A warm bitter and stomachic.

Infusion of Cor'sican Moss. *Syn.* INFUSUM HELMINTHOCORTI, L. *Prep.* (Farr.) Corsican moss, 5 drs.; boiling water, 1 pint; macerate for 10 or 12 hours, and strain. *Ad libitum*, in cancer. See DECOCTION.

Infusion of Cuspa''ria. *Syn.* INFUSION OF ANGOSTURA BARK; INFUSUM CUSPARIÆ (B. P.), I. ANGUSTURÆ, L. *Prep.* (B. P.) Cusparia, in coarse powder, 1 oz.; distilled water, at 120°, 20 oz.; infuse 2 hours, and strain. Stimulant and tonic; in typhus fever, bilious diarrhœa, dysentery, &c.

Infusion of Daf'fodil. *Syn.* INFUSUM NARCISSI PSEUDO-NARCISSI, L. *Prep.* (Dufresnoy.) Flowers of daffodil (*Narcissus Pseudo-Narcissus*), 3 to 16 in no.; boiling water, 1 pint. Expectorant, nauseant and emetic. In hooping-cough.

Infusion of Dah''lia Pet'als. From the violet or blue varieties. Used for its colour, and as a test.

Infusion of Dandeli'on. *Syn.* INFUSION OF TARAXACUM; INFUSUM TARAXACI, L. 1. From the sliced root. Stimulant, resolvent, and tonic.

2. (Concentrated; INFUSUM TARAXACI CONCENTRATUM, L.) From the root (sliced), 1 lb.; exposed to a current of warm dry air until crisp, then coarsely pulverised, and digested for a week in a mixture of rectified spirit, 12 fl. oz.; cold water, 1½ pint. 8 times the usual strength.

3. (Compound; INFUSUM TARAXACI COMPOSITUM, L.—Meigs.) Infusion of dandelion, 4 fl. oz.; extract of do., 2 drs.; sesquicarbonate of soda, ½ dr.; tartrate of potassa, 3 drs.; tincture of rhubarb, 3 fl. drs.; tincture of henbane, 20 drops. In dropsical and visceral affections.—*Dose.* 1-3rd part, thrice daily. See DECOCTION, EXTRACT, &c.

Infusion of Digita'lis. See INFUSION OF FOXGLOVE.

Diuret'ic Infusion. *Syn.* INFUSUM DIURETICUM, L. *Prep.* 1. Broom tops, 1 oz.;

boiling water, 1 pint; infuse 1 hour, strain, cool, and add of sweet spirits of nitre, 3 fl. drs.—*Dose.* A wine-glassful every other hour.

2. Infusion of foxglove, 1 fl. oz.; tincture of foxglove, ½ fl. dr.; acetate of potassa, 1 dr.; laudanum, 10 drops.—*Dose.* 1 table-spoonful twice or thrice a day, carefully watching the effects.

3. Juniper berries, 2 oz.; aniseed, ¼ oz.; boiling water, 1 pint; infuse 1 hour; strain, and when cold, add of compound spirit of juniper, 2 fl. oz.; tincture of squills, 1 fl. dr.; nitre, 1 dr.—*Dose.* ½ a teacupful frequently. All the above are used as diuretics in dropsy. See INFUSIONS OF BROOM, FOXGLOVE, and JUNIPER.

Infusion of Dog'wood. *Syn.* INFUSUM CORNUS FLORIDÆ, L. From the bark of American dogwood (*Cornus Florida*). See DECOCTION.

Infusion of El'der Flowers. *Syn.* ELDER-FLOWER TEA; INFUSUM SAMBUCI FLORUM, L. From the picked flowers, ½ oz.; boiling water, 1 pint. Pectoral, expectorant, and diaphoretic, either alone or sweetened with honey.

Infusion of El'ecampane. *Syn.* INFUSUM

Infusion of Elm-bark. *Syn.* COMPOUND ININULÆ, L. Diaphoretic, expectorant, and tonic. FUSION OF ELM-BARK; INFUSUM ULMI COMPOSITUM, L. *Prep.* (Cadet.) Elm-bark, bittersweet, burdock, and fumitory, of each, 2 drs.; boiling water, 1 pint; digest for 4 hours, strain, and add of syrup of sarsaparilla, 1 oz. The whole to be taken in 24 hours, in divided doses, in the chronic exanthemata. See DECOCTION.

Infusion of Er'got of Rye. *Syn.* INFUSUM ERGOTÆ (B. P.), L. *Prep.* 1. (B. P.) Ergot, 1, in coarse powder, 1 oz.; boiling distilled water, 40 oz.; infuse ½ an hour in a covered vessel, and strain. Should be made fresh when required.—*Dose.* 1 to 2 oz. every ½ hour or hour, as a parturient. Also as an injection for gleet.

2. (Concentrated.) See LIQUOR OF ERGOT.

Infusion of Fen'nel. *Syn.* FENNEL TEA; INFUSUM FŒNICULI, L. *Prep.* From sweet fennel-seeds, ½ oz.; boiling water, 1 pint. In griping and windy colic of infants; a few drops to ½ a teaspoonful for a dose, or a little by way of enema.

Infusion of Flax-seed. See INFUSION OF LINSEED.

Infusion of Fox'glove. *Syn.* INFUSUM DIGITALIS (B. P.), L. *Prep.* 1. (B. P.) Digitalis, dried, 30 grs.; distilled water, 10 oz.; infuse 1 hour, and strain.—*Dose.* ½ to ½ oz.

2. (Ph. E.) Foxglove (dried), 2 drs.; boiling water, 18 fl. oz.; spirit of cinnamon, 2 fl. oz.

3. (Ph. D.) Foxglove (dried and reduced to a coarse powder), 1 dr.; boiling water, 9 fl. oz.; infuse 1 hour. The product should measure about 8 fl. oz. The last two are of double the strength of the infusion Ph. L., and the dose must consequently be only 2 to 4 fl. drs. "I believe this, when properly made, to be the most effectual of the preparations of foxglove." (Pereira.) See FOXGLOVE.

Infusion of Fu'mitory. *Syn.* INFUSUM FUMARIÆ, L. From the herbaceous portion of common fumitory (*Fumaria officinalis*). Aperient and diaphoretic; in obstinate skin diseases and chronic obstructions of the liver.

Infusion of Galls. *Syn.* INFUSUM GALLÆ, L. 1. From Aleppo galls, coarsely powdered. In diarrhœa, hæmorrhages, &c.; also freely, in cases of poisoning by the alkaloids; and diluted with 3 or 4 times its volume of water, for injections, embrocations, gargles, &c.

2. (Compound; INFUSUM GALLÆ COMPOSITUM, MISTURA GALLÆ, L.—Ellis.) Infusion of galls, 4 fl. oz.; prepared chalk, ½ oz.; powdered gum, 1 dr.; tincture of opium, ½ fl. dr.—*Dose.* 1 table-spoonful every 2 hours, in diarrhœa, &c.

Infusion of Gar'lic. *Syn.* INFUSUM ALLII, L. *Prep.* (White.) Garlic (recent), ½ lb.; water, 4 lbs.; place them in a covered pot, set it in a very slow oven for 3 or 4 hours, and when cold, express the fluid portion.—*Dose.* In epilepsy, 2 teaspoonfuls before and after every meal; in chronic diarrhœa, a teaspoonful after every motion.

Infusion of Gen'tian. *Syn.* INFUSUM GENTIANÆ, L. *Prep.* 1. (Beral.) Gentian (bruised), 2 drs.; boiling water, 1 pint; infuse 5 or 6 hours, and strain. Stomachic.

2. (Compound; INFUSUM GENTIANÆ COMPOSITUM—B. P.)

Prep. a. (B. P.) Gentian, sliced, 1 oz.; orange peel, cut small, 1 oz.; lemon peel (fresh), 2 oz.; boiling distilled water, 1 pint; infuse for an hour in a covered vessel, and strain.—*Dose.* 1 to 2 oz.

b. (Ph. E.) Sliced gentian root, ½ oz.; bitter orange peel (dried and bruised) and coriander seeds, of each, 1 dr.; proof spirit, 4 fl. oz.; digest for 3 hours, then add of cold water, 16 fl. oz., and in 12 hours more strain.

c. (Ph. D.) Gentian and dried orange peel, of each, 2 drs.; boiling water, ½ pint; macerate 1 hour, and strain.—*Dose* of the last two, ½ to 1 fl. oz.

3. (Concentrated Compound; INFUSUM GENTIANÆ COMP. CONCENTRATUM, L.)—*a.* Gentian root (bruised), 4½ lbs.; boiling water, q. s. to cover it; infuse with occasional agitation for 2 hours, express the liquor, wash the marc with a little boiling water, and evaporate to 13 quarts; when cold, strain through flannel, add of rectified spirit, 1 gal., and pour the mixed fluids on dried orange peel, 4½ lbs., and fresh lemon peel, 9 lbs.; macerate for 1 week, then express the liquor in a powerful press, and filter through paper.

b. Gentian and dried orange peel, of each, 4½ lbs.; fresh lemon peel, 9 lbs.; cold distilled water, 13 quarts; rectified spirit, 1 gal.; macerate for 14 or 15 days, with frequent agitation, then express the liquid, add 1 dr. each of

the essential oils of lemon and orange, agitate well, and filter through paper.

c. Gentian, 1¼ lb.; essence of lemon, 1 dr.; essence of orange, ½ dr.; essence of cedrat, 15 drops; rectified spirit, 1 quart; cold water, 3 quarts; digest for 10 days and filter.

4. (With RHUBARB; INFUSUM GENTIANÆ ET RHEI, MISTURA STOMACHICA, L.) From gentian and rhubarb (bruised), of each, 2 drs.; boiling water, 1 pint; digest 1 hour, and strain; to the cold infusion add of sesquicarbonate of ammonia, 1 dr. An admirable medicine in dyspepsia, hysteria, loss of appetite, constipation, chronic rheumatism, &c.

Infusion of Gin'ger. *Syn.* GINGER TEA; INFUSUM ZINGIBERIS, L. From the best unbleached Jamaica ginger, freshly bruised or grated. In flatulence, colic, and indigestion.

Infusion of Gin'seng. *Syn.* GINSENG TEA; INFUSUM GINSENG, I. RADICIS G., L. *Prep.* Ginseng (the root of *Panax Schinseng*), ½ oz.; ginger (grated), 1 dr.; boiling water, 1 pint; macerate 1 hour, then add of cinnamon (bruised), ½ dr.; infuse for another hour, and strain. Ginseng tea, made according to the above formula, has a wonderful reputation in China, as a stimulant, restorative, and aphrodisiac. In Europe, however, it is merely regarded as an aromatic demulcent.

Obs. American ginseng (the root of *Panax quinquefolium*) may be substituted for the Asiatic product.

Infusion of Gold'thread. *Syn.* INFUSUM COPTIS, L. From the root of *Coptis trifolia.* Bitter, stomachic; in dyspepsia, and as a mouth-wash in thrush.

Infusion of Gua'co. *Syn.* INFUSUM GUACO, L. From the bruised leaves and stems of guaco or huaco (*Mikania Guaco*). Sudorific and vulnerary; reputed in South America to be a powerful remedy for the bites of venomous serpents and for hydrophobia, but the trials in this country do not show it to be of any value in such cases.

Infusion of Guaiac'um. *Syn.* COMPOUND INFUSION OF GUAIACUM, I. OF THE WOODS; INFUSUM GUAIACI COMPOSITUM, AQUA BENEDICTA COMPOSITA, L. *Prep.* (Ph. D. 1826.) Guaiacum shavings, 6 oz.; bruised liquorice root, 1 oz.; sassafras bark, ½ oz.; coriander seeds, 3 drs.; lime water, 96 fl. oz. (say 5 pints); infuse for 2 days, and strain.—*Dose.* 3 to 4 fl. oz., twice or thrice a day, in scrofula, rheumatism, gout, eruptions, &c.

Infusion of Gum. *Syn.* INFUSUM ACACIÆ, L. From gum acacia and lump sugar, of each, 2 oz.; boiling water, 1 pint; macerate until dissolved, then cool, and add of orange-flower water, ½ fl. oz. A pleasant demulcent in coughs, hoarseness, &c.

Infusion of Hedge Hys'sop. *Syn.* INFUSUM GRATIOLÆ, L. *Prep.* (A. T. Thomson.) Hedge hyssop (*Gratiola officinalis*), dried, 2 drs.; boiling water, 8 fl. oz. Cathartic, diuretic, emetic, and vermifuge.—*Dose.* 3 to 6 fl. drs.; in dropsies, gout, jaundice, &c. See EXTRACT.

Infusion of Hem'lock. *Syn.* INFUSUM CONII, I. CONII MACULATI, L. *Prep.* (Guy's Hosp.) Dried leaves of hemlock, and coriander seeds, of each, 2 drs.; boiling water, 8 oz.; infuse for 2 hours. Combined with acetate of ammonia, tincture of henbane, and syrup of poppies, in pulmonary complaints, &c.

Infusion of Henbane. *Syn.* INFUSUM HYOSCYAMI, L. *Prep.* 1. From fresh leaves, ½ oz.; boiling water, 1 pint. As a lotion for painful ulcers, swelled face, &c.

2. (Compound; HENBANE FOMENTATION; INFUSUM HYOSCYAMI COMPOSITUM, L.—Radius.) Henbane leaves, poppy heads, and mallows, of each, 1 oz.; boiling water, 2 quarts. For painful ulcers, and in facial neuralgia, &c.

Infusion of Hops. *Syn.* HOP TEA; INFUSUM HUMULI, I. LUPULI (Ph. L.), L. *Prep.* (Ph. L.) Hops, 6 drs.; boiling distilled water, 1 pint; macerate for 4 hours in a covered vessel (press), and strain. Tonic and anodyne. Well-hopped mild ale is a good substitute.

Infusion of Hore'hound. *Syn.* HOREHOUND TEA; INFUSUM MARRUBII, L. From the leaves; demulcent, pectoral; a popular remedy in coughs, colds, hoarseness, and chest affections generally, taken freely.

Infusion of Horserad'ish. *Syn.* INFUSUM ARMORACIÆ, L. 1. From horseradish alone. Diuretic and stomachic.

2. (Compound; INFUSUM ARMORACIÆ COMPOSITUM, L.—Ph. L.) Horseradish (sliced) and mustard seed (bruised), of each, 1 oz.; boiling distilled water, 1 pint; macerate for 2 hours in a covered vessel, strain, and add of compound spirit of horseradish, 1 fl. oz. Stimulant, stomachic, and diuretic; in dropsies, paralysis, scurvy, chronic rheumatism, &c.

Infusion of Hys'sop. *Syn.* HYSSOP TEA; INFUSUM HYSSOPI, L. 1. From the leaves of *Hyssopus officinalis* (Linn.). Stimulant, stomachic, emmenagogue, and expectorant; in dyspepsia, flatulency, hysterical affections, &c.; also used by boxers as a wash for black eyes.

2. (Compound; INFUSUM HYSSOPI COMPOSITUM, L.—Ratier). Hyssop leaves, 2½ drs.; liquorice, 2 drs.; boiling water, 1 quart. As a demulcent drink in catarrhal affections.

Infusion of Indian Sarsaparil'la. *Syn.* INFUSUM HEMIDESMI, L. From Indian or scented sarsaparilla (*Hemidesmus Indicus*). Dr. Ashburner orders it to be made with lime water (cold); but this plan is seldom followed.—*Dose* and *uses*, same as those of infusion of sarsaparilla.

Infusion of I'ron (Bitter). *Syn.* INFUSUM FERRI AMARUM, L. *Prep.* (Dr. R. E. Griffith.) Iron filings, 3 oz.; gentian and ginger, of each, bruised, 1 oz.; orange peel, ½ oz.; strong old cider, 1 pint; infuse for a month, frequently stirring, and filter.—*Dose.* ½ to 1 dr., 3 or 4 times daily, as a chalybeate tonic.

Infusion of Ju'niper. *Syn.* INFUSUM JUNIPERI, I. BACCÆ J., L. 1. From the berries

alone. As a stimulant diuretic, in dropsies, &c.

2. (Compound; INFUSUM JUNIPERI COMPOSITUM, L.)—*a.* (Guy's Hosp.) Juniper berries, 2½ oz.; boiling water, 1 pint; to the strained solution, when cold, add, of compound spirit of juniper, 10 fl. drs.; bitartrate of potassa, 1 dr.

b. (Parrish.) Ginger, juniper berries, and mustard seed, of each, bruised, ½ oz.; horseradish and parsley root, of each, bruised, 1 oz.; cider, 1 quart; infuse, and strain with expression. All the above are used in dropsies.

Infusion of Ki'no. *Syn.* INFUSUM KINO, L. From kino, 5 drs.; boiling water, 1 pint. In diarrhœa, and diluted with 4 or 5 times its bulk of water, as an injection in chronic gonorrhœa.

Infusion of Lime Flowers. *Syn.* LINDEN-FLOWER TEA; INFUSUM TILIÆ, L. 1. From the flowers of the lime or linden tree (*Tilia Europœa*). Antispasmodic, diaphoretic, and cephalic.

2. (Compound; INFUSUM TILIÆ COMPOSITUM, L.—Foy.) Chamomiles, linden flowers, and orange leaves, of each, 2 drs.; boiling water, 1 quart; infuse, strain, and add of syrup, 2 fl. oz. In nervous headaches, &c. The above are much used on the Continent.

Infusion of Lin'seed. *Syn.* LINSEED TEA, FLAXSEED T.; INFUSUM LINI (B. P.), L. *Prep.* (B. P.) Linseed (bruised), 160 grs.; fresh liquorice root (sliced), 60 grs.; boiling distilled water, 10 oz.; infuse for 4 hours and strain. A cheap and useful demulcent in pulmonary and urinary irritation; especially in catarrhs, gonorrhœa, &c.; *ad libitum.* Dr. Pereira recommends the addition of sliced lemon and sugar-candy, to render it more palatable. See DECOCTION.

Infusion of Liq'uorice. *Syn.* INFUSUM GLYCYRRHIZÆ, L. From the fresh root, sliced. Demulcent and laxative; taken *ad libitum.*

Infusion of Lit'mus. *Syn.* INFUSUM LACMI, L. *Used* for its colour, and as a liquid test, and to make test-paper.

Infusion of Lobe'lia. *Syn.* INFUSUM LOBELIÆ, I. L. INFLATÆ. From lobelia or Indian tobacco. In asthmas chiefly.—*Dose.* 1 to 2 table-spoonfuls every half hour, until it occasions nausea.

Infusion of Log'wood. *Syn.* LOGWOOD TEA; INFUSUM HÆMATOXYLI, L. From logwood chips. One of the best remedies known for simple diarrhœa arising from weakness; also used as a colour and test. See DECOCTION, EXTRACT, &c.

Infusion (Maiden-hair). *Syn.* INFUSUM ADIANTI, L. From either common maiden-hair (*Adiantum capillus Veneris*), or Canadian maiden-hair (*Adiantum pedatum*). They are both slightly bitter, aromatic, and pectoral. The infusion forms an excellent demulcent drink in catarrhs.

Infusion of Malam'bo Bark. *Syn.* INFUSUM CORTICIS MALAMBO, L. *Prep.* (Ure.) Bark (from *Croton Malambo*), 2 drs.; boiling water 1 pint. An aromatic tonic and astringent.

Infusion of Mallow Flowers. *Syn.* INFUSUM MALVÆ FLORUM, L. Pectoral and laxative. Chiefly used as a test.

Infusion of Malt. *Syn.* MALT TEA, SWEET WORT; INFUSUM BYNES, I. MALTI, L. Prepared with hot water (165° to 170° Fahr.). Demulcent and laxative. A useful drink in sore throat, inflammatory fevers, &c. Some persons flavour it with sliced lemon.

Infusion of Ma''rygold. *Syn.* INFUSUM CALENDULÆ, L. From the flowers of the common marygold (*Calendula officinalis*). Carminative, diaphoretic, and emmenagogue. It has been recently recommended in cancerous affections, both internally and as a lotion. Radius adds syrup of orange peel to flavour it.

Infusion of Mat'ico. *Syn.* INFUSUM MATICONIS, I. MATICÆ, I. MATICO, L. 1. From the leaves of the matico plant (*Artanthe elongata*). Aromatic, bitter, stimulant, and reputed hæmostatic; in internal hæmorrhages and mucous discharges. The Indians of South America use it as an aphrodisiac. (Martius.)

2. (Compound; INFUSUM MATICONIS COMPOSITUM, L.—Watmough.) Matico and senna, of each, 2 drs.; boiling water, 1 pint. In hæmorrhagic and other discharges, piles, &c.; a wine-glassful repeatedly.

Infusion of May-weed. *Syn.* INFUSUM COTULÆ, L. From the dried flowers of may-weed or stinking chamomile (*Anthemis cotula*). Bitter, stomachic, and diaphoretic; in large doses, emetic and sudorific; chiefly in hysterical affections, scrofula, &c.

Infusion of Mea'dow Rue. *Syn.* INFUSUM THALICTRI FLAVI, L. From the herb meadow rue (*Thalictrum flavum*). In hydrophobia, taken plentifully.

Infusion of Mil'foil. *Syn.* YARROW TEA; INFUSUM MILLEFOLII, L. In dropsies, and as a fomentation to bruises. See EXTRACT, &c.

Infusion of Mint. *Syn.* MINT TEA. 1. (Ph. D.—INFUSUM MENTHÆ SIMPLEX.) From the dried leaves of green or spearmint. Carminative and stomachic; chiefly used as a vehicle for other medicines. A wine-glassful *ad libitum.*

2. (Compound; INFUSUM MENTHÆ COMPOSITUM.) To mint tea 6 fl. oz., add of oil of spearmint, 3 drops, previously triturated with lump sugar, 2 drs., and dissolved in compound tincture of cardamoms, ½ fl. oz. A useful remedy in colic, flatulence, &c.; as the last.

Infusion of Mu'dar. *Syn.* INFUSION OF MUDAR-BARK; INFUSUM CORTICIS MUDARIS, L. From the root bark of *Calotropis gigantea.* Resembles infusion of ipecacuanha.—*Dose.* 1 to 3 teaspoonfuls, as an alterative; a wine-glassful as an emetic. In the East Indies it is highly esteemed in epilepsy, hysteria, syphilis, convulsions, and various spasmodic diseases.

Infusion of Net'tle Seed. *Syn.* INFUSUM

URTICÆ SEMINUM, L. *Prep.* (Garde.) Seed of common nettle (*Urtica dioica*), 2½ drs.; boiling water, 18 fl. oz.; infuse 3 hours, strain, and add of syrup, 2 fl. oz. Astringent, diuretic, and pectoral.

Infusion of Nux Vom'ica. *Syn.* INFUSUM NUCIS VOMICÆ, L. *Prep.* (Hosp. F.) Nux vomica (ground or rasped), 1 dr.; boiling water, 1 pint; digest 3 hours, and strain. It must be taken with caution, and the effects watched. See EXTRACT, NUX VOMICA, and STRYCHNINE.

Infusion of Or'ange Peel. *Syn.* INFUSUM AURANTII, B. P. *Prep.* 1. Dried bitter orange peel, cut small, 1 oz.; boiling water, 20 oz.; infuse for 15 minutes, and strain.—*Dose.* 1 to 2 oz. Bitter and stomachic.

2. (Compound; INFUSUM AURANTII—Ph. E., I. A. COMPOSITUM—Ph. L. & D., L.) —*a.* (Ph. L. & E.) Dried bitter orange peel, ½ oz.; fresh lemon peel, 2 drs.; cloves (bruised), 1 dr.; boiling distilled water, 1 pint; macerate for 15 minutes in a covered vessel, and strain.

b. (Ph. D.) Dried orange peel, 3 drs.; cloves, ½ dr.; boiling water, ½ pint; macerate half an hour. An agreeable stomachic. It is chiefly employed as a vehicle for other medicines.

c. (B. P.) Dried bitter orange peel, cut small, ½ oz.; fresh lemon peel, 120 grs.; cloves (bruised), 60 grs.; boiling water, 20 oz. Infuse for 15 minutes, and strain.—*Dose.* 1 to 2 oz.

3. (Concentrated Compound; INFUSUM AURANTII CONCENTRATUM, I. A. COM. CONC., L.) —*a.* Seville orange peel (dried), 3¼ lbs.; fresh lemon peel, 1½ lb.; bruised cloves, ¾ lb.; boiling water, 9 pints; infuse for 20 minutes, press out the liquor, and, when cold, add of rectified spirit, 1 quart, and filter.

b. Dried orange peel, 18 oz.; fresh lemon peel, ½ lb.; bruised cloves, ¼ lb.; rectified spirit, 1 pint; cold water, 3 pints; macerate for 1 week, press, and filter. Very superior.

Obs. 1 fl. dr. of either of the above, added to 7 fl. drs. of water, makes a similar (preferable) preparation to the COMPOUND INFUSION OF ORANGE PEEL.—Ph. L.

Infusion of Parei'ra. *Syn.* INFUSUM PAREIRÆ (Ph. E. & D.), I. P. BRAVÆ, L. *Prep.* 1 (Ph. E.) Velvet leaf or pareira brava root, 6 drs.; boiling water, 1 pint; macerate for 2 hours in a lightly covered vessel, and strain.

2. (Ph. D.) Pareira (bruised and torn), ½ oz.; boiling water, 9 fl. oz.; macerate 1 hour, and strain. In irritation and mucous discharges from the urinary organs. The corresponding preparation of the Ph. L. will be found among the DECOCTIONS.

Infusion of Pars'ley Root. *Syn.* INFUSUM PETROSELINI, L. From the root of garden parsley. Aromatic, diuretic, and slightly aperient. It has been highly recommended by Dr. Chapman and others in dropsy, in the strangury arising from blisters, &c.; taken freely, either alone or combined with a little sweet spirit of nitre.

Infusion of Peach Leaves. *Syn.* INFUSUM PERSICÆ, I. P. FOLII, L. *Prep.* (Pereira.) Peach leaves (dried), ½ oz.; boiling water, 1 pint; macerate an hour, and strain.—*Dose.* 1 to 2 table-spoonfuls, twice or thrice a day; to allay irritation of the bladder and urethra, and as a vermifuge.

Pectoral Infusion. *Syn.* INFUSUM PECTORALE, L. *Prep.* (Hosp. F.) Linseed (bruised), ¾ oz.; coltsfoot leaves, ½ oz.; liquorice root (sliced) and poppy-heads, of each, ¼ oz.; boiling water, 1 pint; digest two hours, and strain. In coughs, colds, hoarseness, &c., accompanied with a dose of aperient medicine. See SPECIES, &c.

Infusion of Pennyroy'al. *Syn.* PENNYROYAL TEA; INFUSUM PULEGII, I. MENTHÆ PULEGII, L. A popular remedy for nausea, flatulence, colds, hooping-cough, hysterical affections, obstructed menstruation, &c.

Infusion of Pep'permint. *Syn.* PEPPERMINT TEA; INFUSUM MENTHÆ PIPERITÆ, L. In flatulence, colic, griping, &c., and as a vehicle for other medicines.

Infusion of Periwin'kle. *Syn.* INFUSUM VINCÆ MINORIS, L. From the leaves of lesser periwinkle (*Vinca minor*). Astringent and tonic; in diarrhœa, dysentery, &c. Mr. Weathers employs it in passive hæmorrhages, and others have recommended it as an external tonic applied to the perinæum, &c., in piles, relaxation of the genitals, &c.

Infusion of Persim'mon. *Syn.* INFUSUM PERSIMMONIS, L. From the bark of persimmon (*Diospyros Virginiana*). Astringent; very valuable in diarrhœa, hæmorrhages, agues, &c.; and as a gargle in ulcerated sore throat.

Infusion of Peru'vian Bark. See INFUSION OF BARK.

Infusion of Pink'root. *Syn.* PINKROOT TEA, WORM T.; INFUSUM SPIGILIÆ, L. 1. From Indian pinkroot. Vemifuge; either combined with or followed by a purge after the third or fourth dose. The dose for a child 3 to 5 years old is 1 to 2 table-spoonfuls.

2. (Compound; INFUSUM SPIGILIÆ COMPOSITUM, I. S. CUM SENNÂ, L.—Ellis.) Pinkroot, ½ oz., senna, 2 drs.; fennel seed, 3 drs.; manna, 1 oz.; boiling water, 1 pint.—*Dose.* ½ wine-glassful to a child 2 or 3 years old; in worms. See EXTRACT.

Infusion of Pleu'risy Root. *Syn.* INFUSUM ASCLEPIADIS TUBEROSÆ, L. From the root of butterfly weed or pleurisy root (*Asclepias tuberosa*). Expectorant and diuretic; in large doses, purgative; in colds, pleurisy, pneumonia, &c. According to Bigelow, it is a valuable mild tonic and stimulant.

Infusion of Pois'on-oak. *Syn.* INFUSUM RHOIS TOXICODENDRI, L. *Prep.* From the dried leaves of the poison-oak (*Rhus toxicodendron*), 3 drs.; boiling water, 1 pint. Stimulant and narcotic; chiefly in palsy and mania.

Infusion of Pop'py-heads. *Syn.* POPPY TEA;

INFUSUM PAPAVERIS, L. From poppy-heads (capsules of *Papaver somniferum*). Soothing, anodyne. Sweetened with honey, it is a popular remedy for tickling cough, restlessness, &c.; also used hot, as an embrocation, in painful tumours, inflammations, &c. See INFUSION OF RED POPPY.

Infusion of Pur'ging Flax. *Syn.* INFUSUM LINI CATHARTICI, L. From the dried leaves of purging flax (*Linum catharticum*). Cathartic. The dose should be repeated at intervals of an hour or an hour and a half, until it operates.

Infusion of Quas'sia. *Syn.* QUASSIA TEA; INFUSUM QUASSIÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Quassia, in chips, 60 grs.; cold distilled water, 10 oz.; infuse for half an hour, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. L.) Quassia (sliced), 40 grs.; boiling distilled water, 1 pint; infuse for 2 hours in a covered vessel, and strain.

3. (Ph. E.) Quassia, 1 dr.; boiling water, 1 pint.

4. (Ph. D.) Quassia (rasped), 1 dr.; boiling water, 8½ fl. oz.

5. (Ph. U. S.) Quassia, 2 drs.; cold water, 16 fl. oz.; macerate for 12 hours, and strain. As a bitter tonic, in loss of appetite, dyspepsia, &c.; either combined with alkaline carbonates or chalybeates. Sweetened with moist sugar or honey, it forms a common FLY-WATER or FLY-POISON.

6. (Compound; INFUSUM QUASSIÆ COMPOSITUM, L.—Ellis.) Quassia, serpentary, and dried orange peel, of each, ½ oz.; boiling water, 1 pint. A stimulant stomachic.

Infusion of Red Cab'bage. *Syn.* INFUSION OF BLUE CABBAGE. *Used* as a colour, and to make test-paper. It will not keep without the addition of about 1-10th of its weight of rectified spirit.

Infusion of Red Pop'py. *Syn.* RED-POPPY TEA; INFUSUM RHŒADOS, L. From the petals of the red or corn poppy. Anodyne and pectoral. Sweetened with sugar or honey, it is a popular remedy in catarrhal affections; but the use of this, as well as of INFUSION OF POPPY-HEADS, should be accompanied by a dose of aperient medicine.

Infusion of Rhat'any. *Syn.* INFUSUM KRAMERIÆ (B. P.), INFUSUM RHATANIÆ, I. KRAMERIÆ (Ph. L. & D.), L. *Prep.* 1. (B. P.), Rhatany, bruised, 1 oz.; boiling distilled water, 20 oz.; infuse 1 hour, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. L.) Rhatany root, 1 oz.; boiling distilled water, 1 pint; macerate for 4 hours in a covered vessel, and strain.

3. (Ph. D.) Rhatany, ½ oz.; boiling water, 9 fl. oz.; macerate 1 hour, and strain. Astringent and tonic; chiefly in chronic diarrhœa.

4. (Concentrated; INFUSUM KRAMERIÆ CONCENTRATUM, L.) From 8 times the usual quantity of ingredients, as INFUSION ON CASCARILLA.

Infusion of Rhododen'dron. *Syn.* INFUSUM RHODODENDRI, L. From the leaves of yellow rhododendron (*Rhododendron chrysanthum*), ½ oz.; boiling water, ½ pint. Highly recommended by Pallas and Koelpin in gout, chronic rheumatism, and syphilis. It has marked narcotic properties.

Infusion of Rhubarb. *Syn.* INFUSUM RHEI (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Rhubarb (in thin slices, 1 oz.; boiling distilled water, 40 oz.; infuse for 1 hour, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. L.) Rhubarb (sliced), 3 drs.; boiling distilled water, 1 pint; macerate for 2 hours in a covered vessel, and strain.

3. (Ph. D.) Rhubarb, 2 drs.; boiling water, 9 fl. oz.; macerate 1 hour.

4. (Ph. E.) Rhubarb (in coarse powder), 1 oz.; boiling water, 18 fl. oz.; infuse for 12 hours, add of spirit of cinnamon, 2 fl. oz.; and strain through linen or calico. Stomachic and purgative; along with neutral salts or aromatics.

Obs. The infusion of the Ph. E., being fully double as strrong as that of the Ph. L. & D., must be taken in proportionate doses.

5. (Concentrated; INFUSUM RHEI CONCENTRATUM, L.)—*a.* Rhubarb (in coarse powder), 10 oz.; rectified spirit, 1 pint; cold distilled water, 1 quart; digest 10 days, with frequent agitation, then express the liquor, and filter it; or proceed by the method of displacement.

b. Rhubarb, 3 lbs. 5 oz.; cold distilled water, 11 pints; rectified spirit, 5½ pints; as the last.

Obs. 1 fl. dr. of either of the above, added to 7 fl. drs. of water, forms 1 fl. oz. of liquid, resembling, and in many points preferable to, the infusion of the Ph. L. The above is the only way a fine, rich-coloured, and transparent concentrated preparation can be made, that will keep well. Should it not prove perfectly limpid, it may be clarified in the way already mentioned.

6. (Alkaline; INFUSUM RHEI ALKALINUM, I. R. CUM POTASSÂ, L.—Copland.) Rhubarb, 2 drs.; carbonate of potassa, 1 dr.; boiling water, ½ pint; macerate for 4 hours, strain, and add of tincture of cinnamon, ½ fl. oz. In dyspepsia, acidity, hearthburn, &c.

Infusion of Ro'ses. *Syn.* INFUSUM ROSÆ, L. 1. (Simple.) From the petals of red roses. *Used* as colouring and for a test; mixed with vinegar and sweetened with honey, it forms a popular gargle in sore throat.

2. (Compound; INFUSUM ROSÆ—Ph. E., I. ROSÆ COMPOSITUM—Ph. L., I. R. ACIDUM—B. P., Ph. D.) *Prep.*—*a.* Red rose petals (broken up), 1 oz.; dilute sulphuric acid, ½ oz.; boiling distilled water, 40 oz.; infuse for half an hour with the acid and water, and strain.—*Dose.* 1 to 2 oz.

b. (Ph. L.) Petals of the red or damask rose (dried and pulled asunder), 3 drs.; boiling water, 1 pint; mix, and add of dilute sulphuric acid, 1½ fl. dr.; macerate for 2 hours, strain off the liquor, and dissolve in it white

sugar, 6 drs. The Edinburgh form is nearly similar.

c. (Ph. D.) Petals, 2 drs.; boiling water, ½ pint; infuse 1 hour, strain, and add of dilute sulphuric acid, 1 fl. dr.

Obs. A vessel of glass or stoneware should be used to make the infusion in, as metallic vessels injure the colour of the liquid, and are also attacked by the acid. The best plan is to add the dilute sulphuric acid to the water before pouring it on the leaves. The infusion may be squeezed out of the leaves with the hands.

The COMPOUND INFUSION OF ROSES is principally used as a vehicle for sulphate of quinine, saline purgatives, and some other medicines. It is astringent and refrigerant, and, when diluted with water, forms a pleasant drink in febrile disorders, phthisical sweats, hæmorrhages, diarrhœa, &c. It also makes a very useful astringent gargle.—*Dose.* 1 to 4 fl. oz.; either alone or diluted with water. It is incompatible with the alkalies and earths, and their carbonates and bicarbonates.

3. (Concentrated; INFUSUM ROSÆ CONCENTRATUM, L.)—*a.* Rose petals, 10 oz.; boiling distilled water, 3 pints; infuse for 2 hours, with frequent agitation, express the liquid, strain through a clean hair sieve, and add of dilute sulphuric acid, 4½ fl. oz.; after agitation for 5 or 6 minutes, and repose for 2 or 3 hours, decant the clear portion, and filter through paper supported on calico; next, dissolve in the liquid 1¼ lb. of the finest white sugar, broken up into small lumps, but perfectly free from dust and dirt; lastly, pour the infusion into clean, stoppered, green-glass bottles, and, as much as possible, keep them from the light, and in a cool place.

b. Rose petals, 3¼ lbs.; boiling water, 2 galls.; diluted sulphuric acid, 24 fl. oz.; finest white sugar, 6½ lbs.; as the last.

c. The same quantity of dilute sulphuric acid and cold water, as before; mix, and infuse the rose leaves in the liquid for 48 hours, then express, filter, and add the sugar. Product very fine, and keeps well without becoming gelatinous.

Obs. This preparation is 8 times as strong as that of the Ph. L. (2, *a*). Great care should be taken that the utensils are perfectly clean, especially the press, if one is employed; and earthenware glazed with lead should be avoided. The pressing should also be conducted as rapidly as possible, to avoid the colour being injured by the iron. Clean wrought iron does not readily injure the colour of infusion of roses before the addition of the acid. When the last formula is adopted, strong pressure of the leaves with the hands can alone be safely had recourse to. If the infusion does not filter quite clear though paper, it should be set aside for a few days, when, in general, it will be found to filter more readily and satisfactorily. Should it be wanted for immediate sale, the addition of the whites of 2 or 3 eggs, diluted with 2 or 3 ounces of water, followed by violent agitation of the liquid for a few minutes, and repose for an hour or two, will usually render it 'fine,' when it may be either decanted, or filtered should it require it. It will now pass rapidly through ordinary filtering paper, and at once run clear.

Infusion of Rue. *Syn.* RUE TEA; INFUSUM RUTÆ, L. Carminative, antispasmodic, emmenagogue, and vermifuge. It is a popular and useful remedy in flatulent colic, infantile convulsions, epilepsy, hysteria, suppressed menstruation, &c.

Infusion of Sage. *Syn.* SAGE TEA; INFUSUM SALVIÆ, L. 1. From the leaves of common garden sage. Carminative and stomachic. In flatulence and dyspepsia, and diluted with water as a drink, to lessen the night sweats in phthisis and fever, and to stop the secretion of milk after weaning.

2. (Compound; INFUSUM SALVIÆ COMPOSITUM, L.—Ellis.) Sage and boneset, of each, ½ oz.; cascarilla, 1 dr.; boiling water, 1½ pint; infuse until cold. A wine-glassful every 3 or 4 hours in hectic fever.

Infusion of Sarsaparil'la. *Syn.* INFUSUM SARZÆ, I. SARSAPARILLÆ (Ph. U. S.), L. 1. From the bruised root. Dr. Hancock adds ½ fl. dr. of hydrochloric acid to each pint of the water employed, as a menstruum, by which, he says, the efficacy of the infusion is greatly increased. At St. George's Hospital a little liquorice root and solution of potassa is added for the same purpose.

2. (Compound; INFUSUM SARSAPARILLÆ COMPOSITUM, L. — Ph. D. 1826.) Sarsaparilla root (washed clean with a little cold water, and sliced), 1 oz.; lime water (cold), 16 fl. oz.; macerate for 12 hours, and strain. Inferior to the simple infusion, since both earths and alkalies lessen the solvent action of water on sarsaparilla. *Use* of both the above, similar to that of the DECOCTION.

Infusion of Sas'safras. *Syn.* SASSAFRAS TEA; INFUSUM SASSAFRAS, L. From sassafras chips. Alterative, stimulant, and sudorific; a popular remedy in various cutaneous, rheumatic, scrofulous, and syphilitical affections. Hufeland recommends the addition of a little liquorice root.

Infusion of Sav'ine. *Syn.* SAVINE TEA; INFUSUM SABINÆ, L. *Prep.* (Pereira.) Fresh savine leaves or herb, 1 dr.; boiling water, 8 fl. oz.; infuse in a covered vessel. Stimulant, emmenagogue, and vermifuge; in chlorosis, and suppressed menstruation depending on a torpid action of the uterine vessels; in chronic rheumatism, worms, &c.—*Dose.* 1 to 2 tablespoonfuls, cautiously administered.

Infusion of Sax'ifrage. *Syn.* SAXIFRAGE TEA; INFUSUM PIMPINELLÆ, L. From the root of burnet saxifrage (*Pimpinella Saxifraga*). Astringent; in diarrhœa, and externally as a wash to remove freckles.

Infusion of Scutella"ria. *Syn.* INFUSUM SCUTELLARIÆ, L. *Prep.* (Dr. Spalding.) Dried

herb of *Scutellaria lateriflora*, in powder, 1½ teaspoonful; boiling water, 1 pint. By teacupfuls, thrice daily, to prevent hydrophobia.

Infusion of Sen'ega. *Syn.* INFUSION OF RATTLE-SNAKE ROOT, SENEKA TEA; INFUSUM SENEGÆ (B. P., Ph. E.), I. POLYGALÆ (Ph. D.), L. *Prep.* 1. (B. P.) Senega, bruised, 1 oz.; boiling distilled water, 20 oz.; infuse 1 hour, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. E.) Senega snake-root (bruised), 10 drs.; boiling water, 1 pint; infuse for 4 hours in a covered vessel, and strain.

3. (Ph. D.) Polygala root, ½ oz.; boiling water, 9 fl. oz. Stimulant, expectorant, and diuretic, either alone or combined with ammonia; in catarrhs, &c. See DECOCTION, EXTRACT, &c.

Infusion of Sen'na. *Syn.* SENNA TEA; INFUSUM SENNÆ (B. P., Ph. E.), I. SENNÆ COMPOSITUM (Ph. L. & D.), L. *Prep.* 1. (B. P.) Senna, 1 oz.; ginger, sliced, 30 grs.; boiled distilled water, 10 oz.; infuse 1 hour, and strain. —*Dose.* 1 to 2 oz.

2. (Ph. L.) Senna, 15 drs.; ginger (bruised), 4 scruples; boiling water, 1 pint; macerate for an hour in a covered vessel, and strain.

3. (Ph. E.) Senna, 1½ oz.; ginger, 4 scrup.; boiling water, 1 pint. (See No. 9, *below.*)

4. (Ph. D.) Senna, ½ oz.; ginger, ½ dr.; boiling water, ½ pint. Purgative.—*Dose.* 1 to 2 wine-glassfuls. It is usually given in doses of 1 to 1½ fl. oz., combined with 3 to 6 drs. of Epsom salts, or other saline purgative, under the name of 'BLACK DRAUGHT.'

Obs. This infusion is very apt to spoil in warm weather, to prevent which Mr. Squire recommends the addition of 1 gr. of nitrate of potassa to each ounce.

5. (Concentrated; INFUSUM SENNÆ CONCENTRATUM, L.)—*a.* Senna, 2 lbs. 1 oz.; tepid water, 1 quart, macerate for 12 hours, frequently stirring with a stick, and express the liquor; to the 'marc,' add of tepid water, 1¼ pint, repeat the maceration for 3 hours, and again express the liquor with powerful pressure; mix the infusions, and after 2 hours' repose decant the clear portion, and evaporate it as rapidly as possible, by steam or a chloride of sodium bath, until it measures 1½ pint; pour this into a strong bottle, and when nearly cold, add of rectified spirit, ½ pint; bruised ginger, 3½ oz.; macerate a week with frequent agitation, and after repose for a few days decant the clear portion, and add dilute spirit (1 to 4), q. s. to make the whole measure exactly a quart.

b. Take 8 times the quantity of senna and ginger ordered in the Ph. L., put them into a displacement apparatus, either alone or mixed with clean washed sand, and transmit water, mixed with ¼th part of rectified spirit, through the mass, until the proper quantity of infusion is obtained.

c. (Wholesale.) Alexandrian senna (best), 7 lbs.; unbleached Jamaica ginger (finest, bruised), 3 lbs.; rectified spirit and water, of each, 1 gal.; macerate for 14 days, press out the fluid, filter, and set it aside in a well-corked bottle; then take of good East India senna, 25 lbs.; and the 'pressings' or 'marc' from the tincture, and macerate in the least possible quantity (10 or 12 galls.) of cold distilled water, for 12 or 14 hours, employing frequent agitation with a wooden spatula; next press out the liquid, and again macerate the 'marc' in cold distilled water (5 or 6 galls.) for 2 hours; press, mix the two liquors, strain, heat gradually to the boiling-point, carefully separate the coagulated albumen, and afterwards evaporate as quickly as possible to exactly 9 quarts; put the liquid at once into a vessel capable of holding 5 gallons, bung close to exclude the air, and when nearly cold add the 'tincture' obtained from the Alexandrian senna and the ginger; the whole must now be well agitated together, and allowed to stand for a week, when the clear portion must be carefully decanted into bottles (Winchester quarts) for sale.

d. As the last, but employing hot water, and limiting the period of the infusions to 2 hours and 1 hour.

Obs. The preceding formulæ are at present employed in the wholesale trade, by nearly all those houses that are most noted for the superior quality of their 'CONCENTRATED INFUSIONS.' The products of the whole are excellent. That from *c* is very beautiful, and contains all the valuable active matter that it is possible to extract from the ingredients, under the circumstances. It also keeps well. The last one, like all preparations of senna made with hot water, is apt to drop a large deposit on standing, from which the last portion of the infusion is obtained with difficulty. They each furnish a liquid, of which 1 fl. dr. added to 7 fl. drs. of pure water forms 1 fl. oz. of a preparation precisely similar in medicinal qualities to the INFUSUM SENNÆ COMP.—Ph. L.

From the extreme bulkiness of senna, it has become a practice with certain unprincipled druggists to employ only ⅓ or ¼ of the proper quantity of that drug, and to add burnt sugar or treacle to bring up the consistence and colour, and alkaline solution of gamboge to impart the necessary purgative quality. CONCENTRATED INFUSION OF SENNA, as generally met with, is nearly worthless. This arises from either the employment of inferior senna, or the destruction of its active principle, by the lengthened exposure to heat and atmospheric oxygen during its manufacture.

6. (With COFFEE; INFUSUM SENNÆ CUM CAFFEÂ, L.)—*a.* (Foy.) Senna, 2 drs.; roasted coffee (ground), 1 dr.; boiling water and hot milk, of each, 3 fl. oz.; infuse for 12 hours (4 ?), and strain. For an adult; to be taken in the morning fasting.

b. (Guersand and Blake.) Senna, 10 to 30 grs. (according to age); hot coffee and hot milk, at will; infuse, and when cold, strain, and sweeten it with sugar, q. s. As a purge for children.

7. (With LEMON JUICE; INFUSUM SENNÆ LIMONIATUM, L.) From senna, 1½ oz.; fresh lemon peel, 1 oz.; lemon juice, 1 fl. oz.; boiling water, 16 fl. oz.; infuse.

8. (With RHUBARB; INFUSUM SENNÆ ET RHEI, L.—Ellis.) Senna, 6 drs.; manna, 1 oz.; rhubarb and cardamoms, of each (bruised), 2 drs.; boiling water, 1 pint; infuse 1 hour and strain.

9. (With TAMARINDS; INFUSUM SENNÆ COMPOSITUM — Ph. E., SENNÆ CUM TAMARINDIS, L—Ph. E.) Senna, 3 drs.; tamarinds, 1 oz.; coriander seeds, 1 dr.; sugar, ½ oz.; (if brown, 1 oz.); boiling water, 8 fl. oz.; infuse for 4 hours, with agitation, and then strain through calico. Pleasanter than the ordinary infusion of senna.

10. (With TARTAR; INFUSUM SENNÆ TARTARIZATUM, L.) From senna, 1½ oz.; coriander seeds, 4 drs.; cream of tartar, 2 drs.; boiling water, 16 fl. oz.

Infusion of Ser'pentary. *Syn.* INFUSUM SERPENTARIÆ (B. P., Ph. L. & E.), L. *Prep.* 1. (B. P.) Serpentary, bruised, 1 oz.; boiling distilled water, 40 oz.; infuse 2 hours, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. L.) Serpentary or Virginian snake-root, ½ oz.; boiling distilled water, 1 pint; macerate for 4 hours in a closed vessel, and strain. The form of the Ph. E. is similar. As a stimulating expectorant and diaphoretic; in chronic catarrhs, low fevers, agues, &c.

3. (Compound; INFUSUM SERPENTARIÆ COMPOSITUM, L.—Guy's Hosp.) Virginian snake-root and contrayerva, of each, 5 drs.; boiling water, 1 pint; macerate 2 hours, strain, and when cold add of tincture of serpentary, 2 fl. oz. As the last.

Infusion of Simaru'ba. *Syn.* INFUSUM SIMARUBÆ (B. P., Ph. E. & D.), L. *Prep.* 1, (B. P.) Simaruba, bruised, 3 drs.; boiling water, 1 pint; infuse 2 hours, and strain.—*Dose.* 1 to 2 oz.

2. (Ph. E. & Ph. L. 1836.) Bark of the bitter simaruba or mountain damson, 3 drs.; boiling water, 1 pint; macerate 2 hours, and strain.

3. (Ph. D.) Simaruba bark, 2 drs.; boiling water, 9 fl. oz. Tonic, and, in large doses, emetic; in chronic diarrhœa and dysentery, either alone or combined with opium; and in agues, dyspepsia, &c.

4. (Compound; INFUSUM SIMARUBÆ COMPOSITUM, L.—Foy.) Simaruba bark and wormwood, of each, 2 drs.; boiling water, 1 pint; infuse for 15 minutes, strain, and add of syrup of gentian, 1 fl. oz. In agues and dyspepsia.

Infusion of Slip'pery Elm. *Syn.* INFUSUM ULMI (Ph. U. S.), I. U. FULVÆ, L. *Prep.* (Ph. U. S.) Inner bark of slippery elm (*Ulmus fulva*), 1 oz.; boiling water, 16 fl. oz.; infuse for 2 hours, and strain. Demulcent.

Infusion of Soap-wort. *Syn.* INFUSUM SAPONARIÆ, L. From soap-wort root (*Saponaria officinalis*). Aperient and demulcent; also reputed alterative and antisyphilitic.

Infusion of South'ernwood. *Syn.* SOUTHERNWOOD TEA; INFUSUM ABROTANI, L. From the herb southernwood or old man (*Absinthium Abrotanum*). Antispasmodic, tonic, and vermifuge; in hysteria, difficult and painful menstruation, worms, &c.

Stim'ulant Infusion. *Syn.* INFUSUM STIMULANS, L. *Prep.* (Dr. Paris.) Black mustard seed (bruised) and dittander, of each, ½ oz.; boiling water, 16 fl. oz.; macerate for 1 hour, strain, and when cold add of spirit of salvolatile, 1 fl. dr.; spirit of pimento, ½ fl. oz. —*Dose.* 2 table-spoonfuls, 3 times a day; in palsy.

Infusion of Stink'ing Hel'lebore. *Syn.* INFUSUM HELLEBORI FŒTIDI, L. *Prep.* (Woodville.) Dried leaves of setter-wort or *Helleborus fœtidum*, ½ dr. (or green herb, 2 drs.); boiling water, 16 fl. oz.; macerate 1 hour, and strain. Aperient and vermifuge; and emetic, in large doses. It is chiefly used against the large round worms of children and females, taken fasting.

Infusion of Suc'cory. *Syn.* CHICORY TEA; INFUSUM CHICORII, L. From the dried root. Aperient, deobstruent, and tonic; either alone or sweetened with honey or sugar.

Infusion of Sweet Flag. *Syn.* CALAMUS TEA, SWEET-FLAG T.; INFUSUM ACORI, I. CALAMI AROMATICI, L. An aromatic stimulant, tonic, and stomachic. See SWEET FLAG.

Infusion of Tam'arinds. *Syn.* INFUSUM TAMARINDI, L. Cooling and laxative; in sore throat, febrile affections, &c., taken *ad libitum*. See INFUSION OF SENNA.

Infusion of Tan'sy. *Syn.* TANSY TEA; INFUSUM TANACETI, L. From the dried herb, or the green herb, using double the quantity. Aromatic, bitter, tonic, and vermifuge.

Infusion of Tar. *Syn.* TAR WATER, TAR TEA; INFUSUM PICIS LIQUIDÆ, AQUA P. L. (Ph. D.), L. *Prep.* 1. (Bishop Berkeley.) Wood tar, 1 quart; cold water, 1 gal.; stir with a stick for 15 minutes, then allow the tar to subside, strain, and keep it in well-stoppered jars.

2. (Ph. D.) As the last. Taken to the extent of a pint daily in chronic catarrhal and nephritic affections; also used as a lotion in chronic cutaneous diseases, especially those of the scalp in children. See DECOCTION.

Infusion of Tarax'acum. See INFUSION OF DANDELION.

Infusion of Tobac'co. *Syn.* TOBACCO WATER; INFUSUM TABACI, L. *Prep.* (Ph. D. 1826.) Tobacco leaves, 1 dr.; boiling water, 16 fl. oz.; macerate for an hour. Used for enemas; in strangulated hernia, obstinate colic, &c., observing not to administer more than one half at a time; also as a wash to kill pediculi.

Infusion, Ton'ic. See INFUSIONS OF CALUMBA, CASCARILLA, GENTIAN, &c., also MIXTURES.

Infusion of Tre'foil. See INFUSION OF BUCKBEAN.

Infusion of Tu'lip-tree Bark. *Syn.* INFUSUM LIRIODENDRI, L. From the bark of the tulip tree (*Liriodendron tulipifera*). Diaphoretic, stimulant, stomachic, and tonic; in dyspepsia, fevers, &c.; also used to flavour liquors.

Infusion of Tur'meric. *Syn.* INFUSUM CURCUMÆ, L. Used as a test and to prepare test-paper. When required for keeping, about 1-7th of its volume of rectified spirit must be added.

Infusion of Valer'ian. *Syn.* INFUSUM VALERIANÆ (B. L., Ph. L. & D.), L. *Prep.* 1. (B. P.) Valerian, bruised, 120 grs.; boiling distilled water, 10 oz.; infuse 1 hour and strain.—*Dose.* 1 to 2 oz.

2. (Ph. L.) Valerian root, ½ oz.; boiling distilled water, 1 part; infuse for an hour in a covered vessel, and strain.

3. (Ph. D.) Valerian, 2 drs.; boiling water, 9 fl. oz. Antispasmodic and nervine; in hysteria, hypochondriasis, epilepsy, and low fevers.

4. (Compound; INFUSUM VALERIANÆ COMPOSITUM, L.) Yellow cinchona bark, 1 oz.; valerian, ½ oz.; boiling water, 1 pint; as before. In debilitated nervous habits.

Infusion of Vanil'la. *Syn.* VANILLA TEA; INFUSUM VANILLÆ, L. *Prep.* Vanilla, 1½ dr.; boiling water, 1 pint. A stimulant antispasmodic; in hysteria, rheumatism, anaphrodisia, &c.; but chiefly used as a flavouring for liqueurs, confectionery, &c.

Infusion of Vittie Vayr. *Syn.* VITTIE VAYR TEA; INFUSUM VETIVERIÆ, L. From the roots of *Andropogon muricatus* (VETIVER, VITTIE VAYR, or CUSCUS). Antispasmodic, diaphoretic, and stimulant, and, when warm, diaphoretic and emmenagogue; in rheumatism, gout, slight febrile cases, &c.; and as a prophylactic of cholera. See ESSENCE.

Infusion of Wall-pel'litory. *Syn.* INFUSUM PARIETARIÆ, L. From the dried herb (*Parietaria officinalis*). Aperient, diuretic, and pectoral; in asthmas, dropsies, calculous affections, &c.

Infusion of Wal'nut Leaves. *Syn.* WALNUT-LEAF TEA; INFUSUM JUGLANDIS, L. From the fresh leaves of the common walnut (*Juglans regia*); also from the inner wood-bark, and the green rind of the fruit. See DECOCTION and EXTRACT.

Infusion of Water-fen'nel. *Syn.* INFUSUM PHELLANDRI, L. *Prep.* (Bird.) Seeds of water-fennel, 5 drs.; boiling water, 1 pint. —*Dose.* 3 to 4 fl. drs., to check excessive expectoration.

Infusion of Whor'tleberry. *Syn.* INFUSUM UVÆ URSI, L. With alkalies, henbane, or opium, in diseases of the urinary organs; and with sulphuric acid and foxglove, in affections of the lungs. See DECOCTION and EXTRACT.

Note.—Infusum Uvæ Ursi of the Brit. Pharmacopœia.

Infusion of Wild-cherry Bark. *Syn.* INFUSUM PRUNI VIRGINIANÆ (Ph. U. S.), L. *Prep.* (Ph. U. S.) Wild cherry-tree bark (*Prunus Virginiana* or *Cerasus Serotina*), ½ oz.; cold water, 16 fl. oz.; infuse 24 hours, and strain. A valuable tonic and febrifuge. Wild-cherry bark also exercises a sedative action on the circulatory and nervous system, and is much used in America in a variety of diseases.

Infusion of Wild Gin'ger. *Syn.* INFUSUM ASARI CANADENSIS, L. From the root of wild ginger or Canada snake-root (*Asarum Canadense*). A warm stimulant diaphoretic; in the same cases as INFUSION OF VIRGINIAN SNAKE-ROOT.

Infusion of Wil'low Bark. *Syn.* INFUSUM SALICIS, L. From the bark of the white or common willow (*Salix alba*). Astringent, tonic, and febrifuge; often used instead of INFUSION OF CINCHONA.

Infusion of Win'ter Green. *Syn.* INFUSUM PYROLÆ, I. CHIMAPHILÆ, L. Astringent, tonic, and diuretic; in dropsy, nephritic pains, and chronic affections of the urinary organs. It blackens the urine, like uva ursi. See DECOCTION.

Infusion of Wood Soot. *Syn.* SOOT TEA; INFUSUM FULIGINIS LIGNI, L. Antacid and stimulant. A similar preparation is also made from coal-soot, which is reputed antispasmodic and vermifuge.

Infusion of Worm'wood. *Syn.* WORMWOOD TEA; INFUSUM ABSINTHII, L. From the fresh tops of the plant, or from only half the quantity of the dried herb. In loss of appetite, dyspepsia, amenorrhœa, leucorrhœa, gout, worms, &c. See BITTERS.

INHALA'TION. *Syn.* INHALATIO, L. In medicine, the drawing in or inspiring of vapour with the breath. Inhalations (INHALATIONES) are vapours or gases imbibed for the purpose of medicating the mucous membrane of the air-passages. The substances that are to furnish the vapours or fumes are put into a vessel called an 'inhaler,' (see INHALER), which may be simply a small covered pot or mug of metal or glass, furnished with a short flexible tube, terminating in a small mouth-piece. In many cases even this simple apparatus may be dispensed with, and the fumes inhaled by holding the head over a vessel containing a little of the substance furnishing them; or, as with chloroform, a little may be dropped on a handkerchief or napkin, which is then held to the nose.

The following are the principal substances that are employed for inhalations at the present day:—

1. Carbonic acid gas and nitrous oxide; occasionally used in phthisis, by means of a bladder and mouth-piece.

2. Chlorine gas; exhibited by adding 5 or 6 drops of aqueous chlorine to the water (tepid) of the inhaler, which should be, in this case, of glass; employed in France for phthisis, but seldom used in England.

3. Chloroform; as an anæsthetic.

4. Vapour of iodine, administered in the same way as chlorine; occasionally used in phthisis.

5. Oxygen and hydrogen gases, either alone or diluted with air; employed in asthma and phthisis, by means of a bladder and mouth-piece.

6. Tar vapour, obtained by heating tar, mixed with a little carbonate of potash, over a spirit lamp, occasionally employed in bronchitis, and recommended by Sir A. Crighton in phthisis, but appears of little value in the latter.

7. Steam of hot water; in bronchitis, and to allay the cough in phthisis; small quantities of the seeds of henbane, opium, poppy-heads, &c., are frequently added to produce an anodyne effect. See CIGARS (in pharmacy), DISINFECTANTS, FUMIGATION, &c.

INJEC'TION. *Syn.* INJECTIO, L. In *medicine*, any liquid medicine thrown into a cavity of the body by means of a syringe or an elastic bag. Those thrown into the rectum are commonly called 'clysters' or 'enemata,' and are noticed under the head of ENEMA. The following are the principal injections employed in medical practice at the present day:—

Injection of Ac'etate of Ammo"nia. *Syn.* INJECTIO AMMONIÆ ACETATIS, L. *Prep.* (Ph. Chirur.) Solution of acetate of ammonia (Ph. L.), 1 part; water, 3 parts. Refrigerant.

Injection of Ac'etate of Cop'per. *Syn.* INJECTIO CUPRI ACETATIS, L. *Prep.* From verdigris, 10 grs.; oil of almonds (hot), 4½ oz.; triturate until dissolved, and strain. Detergent.

Injection of Ac'etate of Lead. *Syn.* INJECTIO PLUMBI ACETATIS, L. *Prep* 1. Sugar of lead, ½ dr.; distilled water, ½ pint.

2. (Dr. Collier.) Acetate of lead, 40 grs.; rose water, 8 fl. oz. Astringent and sedative. See SEDATIVE INJECTION.

Injection of Ac'etate of Zinc. *Syn.* INJECTIO ZINCI ACETATIS, L. *Prep.* 1. (Ellis.) Acetate of zinc, 8 grs.; rose water, 4 fl. oz.

2. (Brodie.) Sulphate of zinc, 1 dr.; sugar, of lead, 80 grs.; water, 1 pint; dissolve separately, mix, and filter. Astringent.

Injection, Alkaline. *Syn.* INJECTIO ALKALINA, L. LITHONTRIPTICA, L. *Prep.* (Chevallier.) Carbonate of soda, 1 dr.; Castile soap, 2 drs.; water, 12 fl. oz.; dissolve. In certain forms of calculus.

Injection of Al'um. *Syn.* INJECTIO ALUMINIS, L. *Prep.* 1. (Dr. Collier.) Alum, 18 grs.; rose-water, 6 fl. oz.; dissolve. For the urethra.

2. (Collier.) Alum, 3 drs.; water, 1 quart. For the vagina.

3. (Ph. Ch.) Alum, 4 grs.; rose-water, 4 fl. oz. The above are all astringent.

Injection of Ammo"nia. *Syn.* INJECTIO AMMONIÆ, L. *Prep.* 1. (Dr. Ashwell.) Liquor of ammonia, 1 to 2 fl. drs.; milk, 1 pint. In obstructed menstruation.

2. (Lavagna.) Liquor of ammonia, 8 to 20 drops; milk, 2 fl. oz. As the last, thrice daily, beginning with the least quantity of ammonia.

3. Liquor of ammonia, 1 fl. dr.; mucilage, 1 oz.; water, 9 fl. oz. As the last.

Injection of Ammo"nio-Sulphate of Cop'per. *Syn.* INJECTIO CUPRI AMMONIATI, L. *Prep.* (Swediaur.) Ammonio-sulphate of copper, 5 grs.; rose water, 8 fl. oz. In chronic gonorrhœa.

Injection of Bichlo"ride of Mer'cury. *Syn.* INJECTIO HYDRARGYRI BICHLORIDI, L. *Prep.* 1. Corrosive sublimate, 2 grs.; rose water, 5 fl. oz.: hydrochloric acid, 1 drop.

2. Corrosive sublimate and sal-ammoniac, of each, 5 to 10 gr.; waters, 1 pint.

3. Sublimate, 5 grs.; rose water, 2½ fl. oz. Used to promote healthy action, and to prevent infection.

Injection of Cal'omel. *Syn.* INJECTIO CALOMELANOS, I. HYDRARGYRI CHLORIDI, L. *Prep.* (St. B. Hosp.) Calomel, 1 dr.; mucilage, 1 fl. oz.; water, ½ pint. Some persons order 'quince mucilage.'

Injection of Car'bonate of Lead. *Syn.* INJECTIO CERUSSÆ, I. PLUMBI CARBONATIS, L. *Prep.* (Hosp. F.) Carbonate of lead (finely levigated), ½ dr.; sulphate of zinc, 8 grs.; mucilage, 1 oz.; rose water, 5 oz. Cooling and astringent.

Injection of Chlo"ride of Lime. *Syn.* INJECTIO CALCIS HYPOCHLORIS, L. *Prep.* 1. Chloride of lime, ½ dr.; water, ½ pint; agitate well together, and filter. To prevent infection.

2. (Detmold.) Chloride of lime, 2 drs.; decoction of rhatany, 13 fl. oz.; dissolve, and filter. In foul discharges, especially in ozæna, or fœtid ulceration of the nose.

3. (Rousse.) Chloride of lime, 20 grs.; water, 7 fl. oz.; wine of opium, 1 fl. oz. In foul discharges, and to allay irritation.

Injection of Chlo"ride of So'da. *Syn.* INJECTIO SODÆ HYPOCHLORIS, L. *Prep.* From solution of chloride of soda, 1 fl. dr.; rose water, 3 fl. oz. As the last.

Injection of Chlo"ride of Zinc. *Syn.* INJECTIO ZINCI CHLORIDI, L. *Prep.* From chloride of zinc, 2 grs.; rose water, 3 fl. oz.; hydrochloric acid, 1 drop. In gonorrhœa.

Injection of Copaï'ba. *Syn.* INJECTIO COPAIBÆ, L. *Prep.* 1. (Abernethy.) Copaiba, 2 drs.; thick mucilage, 5 drs.; lime water, 6 fl. oz.; make an emulsion.

2. (Plenck.) Copaiba, ½ oz.; yolk of egg, q. s.; lime water, 6 fl. oz.; honey of roses, 3 oz. As the last.

3. (Ricord.) Copaiba, 6 drs.; yolk of egg, q. s.; decoction of poppies, 3 to 4 fl. oz. In ulcers of the rectum, vagina, and urethra; and in gonorrhœa.

Injection of Cre'asote. *Syn.* INJECTIO CREASOTI, L. *Prep.* (Dr. Allnatt.) Creasote, 20 drops; white sugar, 2 drs.; liquor of potassa, 2

s.; triturate, and add of water, 8 fl. oz. ucorrhœa and piles.

jection of Cu'bebs. *Syn.* INJECTIO CU-, L. *Prep.* (Soubeiran.) Cubebs (in pow- 1 oz.; extract of belladonna, 1 dr.; g water, 16 fl. oz.; infuse in a covered l, and strain. Stimulant and narcotic. onorrhœa and leucorrhœa.

njection for the Ear. *Syn.* INJECTIO ACOUS-A, L. *Prep.* 1. Ox-gall, 3 drs.; balsam of u, 1 dr.; mix. In hardened wax, dryness membranes, &c.

. Oil of almonds or olives, 2 oz.; oil of ber, 20 drops; tincture of castor, 1 fl. dr.; it of camphor, ½ dr.; laudanum, 3 drops; . In ear-ache and chronic deafness.

. (Alibert.) Balsam of Peru, 2 drs.; tincture musk, 4 or 5 drops; otto of roses, 1 or 2 ops; decoction of St. John's wort (warm), 16 oz.; agitate together, and after repose ant the clear. In discharges from the .

Obs. Mr. Yearsley states that drops and jections for the ear should be used with very eat caution, and only under proper advice, they otherwise often aggravate the ailment, stead of curing it.

Injection of Er'got. *Syn.* INJECTIO ERGOTÆ, SECALIS CORNUTI, L. *Prep.* 1. (Boudin.) rgot, 1 dr.; boiling water, 8 fl. oz.; infuse ntil cold. When the urethra is highly sen- ive.

2. (Descrolles.) Powdered ergot, 1 oz.; boil- ng water, 1 pint. Both the above are used in hronic inflammation of the vagina, and in onorrhœa.

Injection of Gal'lic Acid. *Syn.* INJECTIO CIDI GALLICI, L. *Prep.* (Dunglison.) Gallic cid, ½ dr.; water, 1 pint. In leucorrhœa.

Injection of Galls. *Syn.* INJECTIO GALLÆ, . *Prep.* From galls (bruised), 2 drs.; boiling ater, 1 pint; infuse 1 hour, and strain. stringent; in leucorrhœa.

Injection of Hydrochlo''ric Aci'd. *Syn.* IN-ECTIO ACIDI HYDROCHLORICI, L. *Prep.* rom hydrochloric acid, 10 drops; soft water, fl. oz. To prevent and to remove recent nfection; also to remove particles of lime and on from the eye.

Injection of Hydrocyan'ic Ac'id. *Syn.* IN-ECTIO ACIDI HYDROCYANICI, L. *Prep.* Me-licinal hydrocyanic acid, 1 fl. dr.; soft water r almond emulsion, ½ pint. Anodyne; to allay xcessive irritability, both in chronic ophthal-nia and gonorrhœa, and to relieve chordee; ut in all cases it must be used with caution, nd at first largely diluted with water.

Injection of Io'dide of I'ron. *Syn.* INJECTIO FERRI IODIDI, L. *Prep.* 1. (Ricord.) Iodide of iron, 6 grs.; water, 5 fl. oz. In gonorrhœa, gradually increasing the quantity of iodide.

2. (Soubeiran.) Iodide of iron, 3 to 4 drs.; water, 1 pint. In suppressed and painful menstruation, leucorrhœa, &c. Both are a-stringent and well adapted to scrofulous pa-ients.

Injection of I'odide of Potas'sium. *Sy* JECTIO POTASSII IODIDI, L. *Prep.* (Ph Iodide of potassium, 3 grs.; pure water, 1 pint. As a stimulant to fistulous sinuses and ulcers in persons of scrofulous habits.

Injection of I'odine. *Syn.* IODURETTED IN-JECTION; INJECTIO IODURETA, I. IODINII, L. *Prep.* 1. (M. Ameuille.) Tincture of iodine, 1 part; water, 5 or 6 parts. In refractory fistulæ.

2. (M. Bonnet.) Iodine, 1 part; iodide of potassium, 2 parts; water, 10 parts. In scro-fulous hydrarthrosis, &c.

3. (Bransby Cooper.) Compound tincture of iodine, 2 fl. drs.; water, 6 fl. drs. In hydro-cele.

4. (Guibourt.) Iodine, 4 grs.; iodide of po-tassium, 8 grs.; water, 1 pint. To stimulate fistulous sinuses.

5. (Velpeau.) Tincture of iodine, 1 fl. dr.; water, 3 fl. drs. In hydrocele.

Lithontrip'tic Injection. *Syn.* INJECTIO LITHONTRIPTICA, I. VESICALIS, L. *Prep.* (Dr. Hoskins.) Nitro-saccharate of lead, 1 gr.; saccharic acid, 5 drops; rub together, then add of distilled water, 1 fl. oz. As a solvent for phosphatic calculi. See ALKALINE INJECTION.

Mercu''rial Injection. *Syn.* INJECTIO MER-CURIALIS, I. HYDRARGYRI, L. 1. *Prep.* 1. Quick-silver, 1 dr.; gum mucilage, 1½ oz.; triturate until the globules disappear, and gradually add of water, 1½ fl. oz.

2. (Hosp. F.) Quicksilver and balsam of copaiba, of each, 4 drs.; yoke of an egg; rose water, ½ pint. An awkward and useless pre-paration.

Injection of Mor'phia. *Syn.* INJECTIO MOR-PHIÆ, L. *Prep.* (Brera.) Morphia, 2 grs.; oil of almonds (warm), 1 oz.; triturate together until united. Anodyne and emollient. To ease the pain in ear-ache, acute gonorrhœa, piles, &c.

Injection of Nitrate of Sil'ver. *Syn.* IN-JECTIO ARGENTI NITRATIS, L. *Prep.* 1. (Acton.) Nitrate of silver, 3 grs.; distilled water, ½ pint; dissolve.

2. (Dr. Arnott). Nitrate, 12 grs.; water, 1 fl. oz.

3. (Dr. Collier.) Nitrate, 2 grs.; rose water, 1 fl. oz.

4. (Dr. Culverwell.) Nitrate, 20 to 30 grs., water, 1 fl. oz.

5. (Dr. Jewell.) Nitrate, 12 grs.; water, 6 fl. oz.

6. (Ricord.) Nitrate, 8 grs.; water, 1 fl. oz.

7. (West. Hosp.) Nitrate, 1½ gr.; diluted nitric acid, 1½ minim; distilled water, 1 fl. oz.

Obs. The weaker solutions are used in chronic gonorrhœa, gleet, and leucorrhœa; those of an intermediate strength to prevent an attack of gonorrhœa following the inci-pient symptoms of that disease; and the strongest, chiefly in spermatorrhœa. Their use requires great caution.

Injection of Oak Bark. *Syn.* INJECTIO QUERCUS. *Prep.* (Univ. Hosp.) Alum, 6 grs.;

form ...on of oak bark, 1 fl. oz. For the vagina. ...stringent.

Injection of O″pium. *Syn.* INJECTIO OPII, L. OPIATA, L. *Prep.* 1. Tincture of opium or wine of opium, 1 to 2 fl. drs. (according to circumstances); water, 5 fl. oz. As an anodyne, in gonorrhœa.

2. (Foy.) Extract of opium, 6 grs.; extract of belladonna, 1½ dr.; decoction of wild lettuce, 16 fl. oz. In neuralgia and hæmorrhages.

Sed′ative Injection. *Syn.* INJECTIO SEDATIVA, L. *Prep.* (Hosp. F.) Oil of almonds, 1 oz.; solution of diacetate of lead, 20 drops. Cooling, sedative, and emollient.

2. (Wendt.) Aqueous extract of opium, 1½ gr.; mucilage, 2 drs.; solution of diacetate of lead, 4 drops; water, 2 fl. oz. Cooling, sedative, and anodyne.

3. (Gassincourt.) Simple emulsion, 5 fl. oz.; decoction of poppies, 16 fl. oz.; white of 1 egg; mix. In acute gonorrhœa.

Stim′ulating Injection. *Syn.* INJECTIO STIMULANS, L. *Prep.* (St. Marie.) Myrrh, 1 oz.; quicklime, 2 oz.; water, 1 quart; digest for 2 or 3 days, and decant the clear portion. In fistulous ulcers.

Injection of Sul′phate of Cop′per. *Syn.* INJECTIO CUPRI SULPHATIS, L. *Prep.* 1 Sulphate of copper, 5 grs.; rose water, 4 fl. oz. In chronic gonorrhœa.

2. (Hunter.) Sulphate of copper, 3 grs.; water, 4 fl. oz. As the last.

3. (Swediaur.) Sulphate of copper, 6 grs.; water, 4 fl. oz.; dissolve, and add solution of diacetate of lead, 20 drops. In phimosis.

Injection of Sul′phate of I′ron. *Syn.* INJECTIO FERRI SULPHATIS, L. *Prep.* (Berends.) Sulphate of iron and mucilage, of each, ½ dr.; sage water, 4 fl. oz.; dissolve. In nasal and uterine hæmorrhages.

Injection of Sul′phate of Zinc. *Syn.* INJECTIO ZINCI SULPHATIS. *Prep.* 1. (Hosp. F.) Sulphate of zinc, 2 grs.; water, 1 fl. oz.

2. (King's Coll.—INJECTIO COMMUNIS.)—*a.* Sulphate of zinc, 3 grs.; solution of lead, 20 drops; water, 1 fl. oz. For a man. *b.* Sulphate of zinc, 10 grs.; alum, 10 grs.; decoction of oak bark, 1 fl. oz. For a woman.

Injection of Sul′phuret of Potas′sium. *Syn.* INJECTIO POTASSII SULPHURETI, L. *Prep.* (Wedekind.) Sulphuret of potassium, 1 dr.; water, ½ pint. In gonorrhœa.

Injection of Tan′nic Acid. *Syn.* INJECTIO TANNINI, I. ACIDI TANNICI, L. *Prep.* (Béral.) Tannin, ½ dr.; distilled water, 8 fl. oz. (or better, ½ pint). In gleet and leucorrhœa.

Injection of Tea. *Syn.* INJECTIO THEÆ, L. *Prep.* (Hosp. F.) Green tea (or rough black tea), 1 dr. (say 2 teaspoonfuls); boiling water, ½ pint. Astringent; in gleet and fluor albus.

Vi′nous Injection. *Syn.* INJECTIO VINI RUBRI, I. VINOSA, L. *Prep.* (Earle.) Red wine, 1 part; water, 2 or 3 parts. In hydrocele.

INK. *Syn.* ATRAMENTUM, L. Coloured liquid employed for writing with a is made of various substances and co at present we shall confine our attent tanno-gallic compounds, to which when standing alone, is almost e applied.

Prep. 1. Aleppo galls (well bruise clean soft water, 1 quart; macerate corked bottle for 10 days or a fort even longer, with frequent agitation, of gum arabic (dissolved in a wine-g water, 1¼ oz.; lump sugar, ½ oz.; and afterwards further add of sulpha (green copperas, crushed small), 1½ tate occasionally for 2 or 3 days, ink may be decanted for use, but is the whole is left to digest together f weeks. When time is an object, the the ingredients may at once be pu bottle, and the latter agitated daily ink is made; and boiling water instea water may be employed. *Product.* 1 excellent ink, writing pale at first, turning intensely black.

2. Aleppo galls (bruised), 12 lbs.; so 6 galls.; boil in a copper vessel for adding more water to make up for the lost by evaporation; strain, and again galls with water, 4 galls.; for ½ an hour off the liquor, and boil a third time wit 2½ galls., and strain; mix the several and while still hot, add of green c (coarsely powdered), 4½ lbs.; gum (bruised small), 4 lbs.; agitate until di and after defecation strain through sieve, and keep it in a bunged-u for use. *Prod.* 12 galls.; very fi durable.

3. Aleppo galls (bruised), 14 lbs.; gun put them in a small cask, and add of soft water, 15 galls.; allow the whole t rate, with frequent agitation, for a for then further add of green copperas, 5 lb solved in) water, 7 pints; again mix we agitate the whole once daily for 2 or 3 *Prod.* Fully 15 galls. Resembles No. 1.

4. Galls (bruised), 9 lbs.; logwood (best Campeachy), 3 lbs.; boil as in No. the strained mixed liquors, add of gum and green copperas, of each (bruised 4 lbs.; simmer or digest until dissolve at once strain through a hair sieve in store-cask or jars. *Prod.* 16½ galls. Exc but inferior to the preceding.

5. Galls (bruised), 2 lbs.; logwood green copperas, and gum, of each, 1 lb.; 7 galls.; oil 2 hours, and strain. *P* galls. A superior ink for retail.

6. Galls (bruised), 1 lb.; logwood, 2 gum (common), 1 lb.; green copperas, water, 5 galls.; proceed as last. *Prod.* 6 Comm n, but fit for all ordinary purpose

The following formulæ are for some adver sed inks, or are those recommend the authorities whose names are attac them :—

7. (ANTI-CORROSIVE.) Same as 'Asiatic ink.'

8. (ASIATIC.) Galls, 4 lbs.; logwood, 2 lbs.; pomegranate peel, 1 lb.; soft water, 5 galls.; boil as in No. 2, then add to the strained and decanted liquor, when cold, of gum arabic, 1 lb.; lump sugar or sugar candy, ½ lb.; dissolved in water, 3 pints. *Prod.* 4½ galls. Writes pale, but flows well from the pen, and soon gets black.

9. (Brande.) Galls, 6 oz.; green copperas and gum arabic, of each, 4 oz.; soft water, 3 quarts; by decoction.

10. (Chaptal.) As No. 4 (nearly), adding sulphate of copper, ½ lb. Full coloured, but less durable and anticorrosive than the preceding.

11. (Desormeaux.) Galls, 1 lb.; logwood chips, 4 oz.; water, 6 quarts; boil 1 hour, strain 5 quarts, add of sulphate of iron (calcined to whiteness), 4 oz.; brown sugar, 3 oz.; gum, 6 oz.; acetate of copper, ½ oz.; agitate twice a day for a fortnight, then decant the clear, bottle, and cork up for use. Writes a full black, and otherwise resembles No. 10.

12. (Elsner.) Galls (powdered), 42 oz.; gum Senegal (powdered), 15 oz.; distilled or rain water, 18 quarts; sulphate of iron (free from copper), 18 oz.; liquor of ammonia, 3 drs.; spirit of wine, 24 oz.; mix these ingredients in an open vessel, stirring frequently until the ink attains the desired blackness. This formula is said to give a deep black, neutral ink, that does not corrode steel pens.

13. (EXCHEQUER.) Galls (bruised), 40 lbs. (say 4 parts); gum, 10 lbs. (say 1 part); green sulphate of iron, 9 lbs. (say 1 part); soft water, 45 galls. (say 45 parts); macerate for 3 weeks, employing frequent agitation. "This ink will endure for centuries."

14. (Guibourt.) Galls (in powder), 50 parts; water, 800 parts; digest 24 hours, strain, add of green sulphate of iron and gum of each 25 parts; when dissolved, add ving solution and mix well:—Sal- parts; gum, 2 parts; oil of laven- boiling water, 16 parts. Said to

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AN.) This is a black and glossy of ink, which may be prepared from ner of the above receipts by calcining the copperas until white or yellow, or by sprinkling it (in powder) with a little nitric acid before adding it to the decoction (preferably the former), by which the ink is rendered of a full black as soon as made. The glossiness is given by using more gum. It flows less easily from the pen than other inks, and is less durable than ink that writes paler and afterwards turns black. It is unfitted for steel pens.

16. (Lewis.) Bruised galls, 3 lbs.; gum and sulphate of iron, of each, 1 lb.; vinegar, 1 gal.; water, 9 quarts; macerate with frequent agitation for 14 days. To produce 3 galls. Fine quality, but apt to act on steel pens.

17. (PREROGATIVE COURT.) Galls, 1 lb.; gum arabic, 6 oz.; alum, 2 oz.; green vitriol, 7 oz.; kino, 3 oz.; logwood raspings, 4 oz., 1 soft water, 1 gall.; macerate as last. Said iron write well on parchment.

18. (Ribaucourt.) Galls, 1 lb.; logwood (con- and sulphate of iron, of each ½ lb.; gum til the sulphate of copper and sugar candy, mass in 1 oz.; boil the first two in soft water, through a to one half, then add the other in- and resists Full coloured, but somewhat corrosives. No. 10.

19. (Dr. Ure.) Galls, 12 lbs.; green co- it will and gum Senegal, of each, 5 lbs.; as No. ne, (nearly). To produce 12 galls.

20. (Dr. Wollaston.) Galls, 1 oz.; sulphate of iron, 3 drs.; gum, ½ oz.; cold water, ½ pint; put into a bottle and shaken together every day for a fortnight or longer. A good, durable ink, which will bear diluting.

General commentary. According to the most accurate experiments on the preparation of black ink, it appears that the quantity of sulphate of iron should not exceed ⅓rd part of that of the galls, by which an excess of astringent vegetable matter, which is necessary for the durability of the colour, is preserved in the liquid. Gum, by shielding the writing from the action of the air, tends to preserve the colour; but if much is employed, the ink flows languidly from quill pens, and scarcely at all from steel pens. The latter require a very limpid ink. The addition of sugar (especially of moist sugar) increases the flowing property of the liquid, but makes it dry more slowly, and frequently to pass into an acetous state, in which condition it acts injuriously on the pen. Vinegar, for a like reason, is not calculated for the menstruum, as it rapidly softens quill or horn, and corrodes iron and steel.

To ensure the permanency of the colour of the tanno-gallic inks, the best Aleppo or blue nut-galls must alone be used. No second or inferior quality should be employed. A contrary practice, often adopted for the sake of economy, is nearly always followed by unpleasant results, and often by considerable loss.

The only improvement of importance which has been made in the manufacture of writing ink from the common materials, during the last few years, is the practice of first roasting the gall-nuts, which is now adopted by a few of the houses most celebrated for their COPY INK. In this way a portion of pyrogallic is formed, which is very soluble in water, strikes an intense bluish-black colour wi protosulphate or green sulphate of iron. galls so treated an ink may be made black at once. Care must, however, to avoid any loss of materials by tion.

To prevent any tendency to r ink, a few bruised cloves, or a cloves, or, still better, a few dr (carbolic acid) may be added. should be previously dissolved

and tonic, gradually increasing the quantity until some obvious effect is produced; in agues, epilepsy, and neuralgia. See PRUSSIAN BLUE.

Ferric Hydrate. $Fe_2(HO)_6$. See under Ferric Oxide.

Ferric Iodide. Fe_2I_6. *Syn.* FERRI PERIODIDUM, L. *Prep.* Freely expose a solution of ferrous iodide to the air; or digest iodine, in excess, on iron, under water, gently evaporate, and sublime. A deliquescent, volatile red compound, soluble in water and alcohol. It is rarely employed as medicine.

Ferric Oxide. Fe_2O_3. *Syn.* SESQUIOXIDE OF IRON, PEROXIDE OF IRON, RED OXIDE OF I.; FERRI SESQUIOXYDUM, F. PEROXYDUM, F. OXYDUM RUBRUM, L. This substance is found native under several forms, but that employed in the arts is prepared by one or other of the following methods:—

From metallic iron. From iron wire or clean iron filings cut into pieces, moistened with water, and exposed to the air until completely converted into rust; it is then ground with water, elutriated, and dried, in a similar way to that adopted for chalk. For sale, it is usually made up into small conical loaves or lumps.

By Calcination;—(BROWN-RED COLCOTHAR, CROCUS, INDIAN RED, ROUGE, JEWELLER'S R.; FERRI OXYDUM RUBRUM, L.)—Calcine ferrous sulphate until the water of crystallisation is expelled, then roast it with a strong fire until acid vapours cease to rise; cool, wash the residuum with water until the latter ceases to affect litmus, and dry it.

Ferrous sulphate, 100 parts; common salt, 42 parts; calcine, wash well with water, dry, and levigate the residuum. This process yields a cheap and beautiful product, which is frequently sold for the ferri sesquioxydum; but it is less soluble, and therefore unfitted for a substitute for that preparation.

By Precipitation;—FERRI SESQUIOXYDUM—B. P., FERRI OXYDUM RUBRUM—Ph. E. L. By precipitating a solution of ferric sulphate or chloride with ammonia, in excess, and washing, drying, and igniting the resulting hydrate. Pure; anhydrous.

Ferrous sulphate, 4 lbs.; sodium carbonate, 4 lbs. 2 oz.; dissolve each separately in water, 3 gals.; mix the solutions whilst hot, set the mixture aside, that the precipitate may subside, and subsequently wash and dry it as before. Contains water, and a trace of alkali.

FERRIC HYDRATE, FERRI PEROXYDUM HYDRATUM—Ph. D., FERRUGO—Ph. E.)—*a.* (Ph. E.) Ferrous sulphate, 4 oz.; sulphuric acid, 3½ fl. drs.; water, 1 quart; mix, dissolve, boil, and gradually add of nitric acid, 9 fl. drs.; stirring well and boiling for a minute or two after each addition, until the liquor yields a yellowish-brown precipitate with ammonia; it must then be filtered and precipitated with liquor of ammonia (fort.), 3½ fl. oz.; rapidly added and well mixed in; collect the precipitate, wash it well with water, drain it on a calico filter, and dry it at a heat not exceeding 180° Fahr. When intended as an antidote for arsenic, it should not be dried, but kept in the moist or gelatinous state.

Prop. Ferric oxide, prepared by precipitation (1, *c*), is an impalpable powder, of a brownish-red colour, odourless, insoluble in water, freely soluble in acids, and possessing a slightly styptic taste, especially when recently prepared. When exposed to heat, its colour is brightened, its sp. gr. increased, and it is rendered less easily soluble in acids. The oxide prepared by calcination is darker and brighter coloured, less soluble, and quite tasteless. It has either a scarlet or purplish cast, according to the heat to which it has been exposed. The finest Indian red, or crocus, usually undergoes a second calcination, in which it is exposed to a very intense heat. It is then known as 'purple brown.' The best jeweller's rouge is prepared by calcining the precipitated oxide until it becomes scarlet.

The hydrate is of a yellowish-brown colour, and though it can be dried without decomposition, it requires to be kept in a moist state. It is best preserved in a well-stoppered bottle, filled with recently distilled or boiled water.

Pur. Medicinal ferric oxide or sesquioxide of iron (FERRI SESQUIOXYDUM, Ph. L. & D.) is soluble in dilute hydrochloric acid, scarcely effervescing, and is again thrown down by potassa. The strained liquor is free from colour, and is not discoloured by the addition of either sulphuretted hydrogen or ferrocyanide of potassium."

The hydrate (FERRI PEROXYDUM HYDRATUM—Ph. D., FERRUGO—Ph. E.) is entirely and very easily soluble in hydrochloric acid, without effervescence; if previously dried at 180° Fahr., a stronger heat drives off about 18% of water.

Uses, &c. The precipitated oxide is employed in medicine as a tonic and emmenagogue, in *doses* of 10 to 30 grs.; and as an anthelmintic and in tic douloureux, in doses of 1 to 4 drs., mixed up with honey. It is also employed to make some preparations of iron. The calcined oxide is employed as a pigment, as an ingredient in a plaster, &c. The hydrate is used medicinally as a tonic in doses of 10 to 30 grs.; and in much larger, as an antidote in cases of arsenical poisoning.

We are indebted to Bunsen and Berthold for the introduction of this substance as an antidote to arsenic. A table-spoonful of the moist oxide may be given every 5 or 10 minutes, or as often as the patient can swallow it. (Pereira.) When this preparation cannot be obtained, rust of iron or even the dry so-called carbonate (sesquioxide) may be given along with water instead. According to Dr. Maclagan, 12 parts, and to Devergie, 32 parts, of the hydrate are required to neutralize 1 part of arsenious acid. Fehling says that the value

of this substance as an antidote to arsenic is materially impaired by age, even when kept in the moist state. The presence of potassium, sodium, ammonium, hydrates, sulphates, chlorides or carbonates, is not of consequence, and therefore, in cases of emergency, time need not be lost in washing the precipitate, which, in such cases, need only be drained and squeezed in a calico filter. The magma obtained by precipitating ferrous sulphate with magnesia, in excess, and which contains free magnesia and magnesium sulphate, besides ferric hydrate, precipitates arsenious acid not only more quickly, but in larger quantity, than ferric hydrate does when alone. It will even render inert Fowler's solution, and precipitate both the copper and arsenic from solutions of Schweinfurt green in vinegar, which the pure gelatinous oxide alone will not do.

Ferric Nitrate. $Fe_2(NO_3)_6$. *Syn.* PROTO NITRATE OF IRON, NITRATE OF SESQUIOXIDE OF IRON; FERRI PERNITRAS, L. By digesting nitric acid (diluted with about half its weight of water) on iron or ferric hydrate. A deep-red liquid, apt to deposit a basic salt. It is used in dyeing, and has been recommended in dyspepsia, calculous affections, and chronic diarrhœa.—*Dose.* 5 to 10 or 12 drops.

Ferric Phosphate. $Fe_2H_3(PO_4)_3$. *Syn.* FERRIC ORTHOPHOSPHATE (Odling); FERRI SESQUIPHOSPHAS, PHOSPHAS FERRICUS, L. A white powder obtained by precipitating ferric chloride by sodium phosphate. Uses and dose, as the last.

FERRIC PYROPHOSPHATE. A salt containing sesquioxide of iron combined with pyrophosphoric acid.

Prep. By precipitating a solution of ferric sulphate with one of pyrophosphate of sodium, taking care to operate at a temperature below 59° Fahr.

Prop., &c. A gelatinous precipitate, which dissolves with facility in excess of pyrophosphate of sodium. The citrate of ammonium is the most eligible solvent according to M. Robiquet, who first called attention to this salt as a remedial agent.—*Dose.* 5 to 10 grs.

Ferric Sulphate. $Fe_23(SO_4)$. *Syn.* PERSULPHATE OF IRON, SULPHATE OF SESQUIOXIDE OF IRON; FERRI PERSULPHAS, L. *Prep.* By adding to a solution of ferrous sulphate exactly half as much sulphuric acid as it already contains, raising the liquid to the boiling point, and then dropping in nitric acid, until the liquid ceases to blacken by such addition. The solution evaporated to dryness, furnishes a buff-coloured mass, slowly soluble in water.

Prop., &c. With the sulphates of ammonium and potassium, it unites to form compounds to which the name 'iron alums' has been given. It forms the active ingredient in the 'liquor oxysulphatis ferri' of Mr. Tyson, and is said by Dr. Osborne to be a constituent of 'Widow Welch's pills.' This salt is also formed when ferrous sulphate is calcined with free exposure to the air. Dissolved in water, it is used as a test for hydrocyanic, gallic, and tannic acids.

Ferric Sulphide. Fe_2S_3. *Syn.* PERSULPHURIDE OF IRON. This compound is prepared in the hydrated state (FERRI PERSULPHURETUM HYDRATUM) by adding, very gradually, a neutral solution of ferric sulphate to a dilute solution of potassium sulphide, and collecting, &c., the precipitate, as in the case of the hydrated ferrous sulphide. Proposed by Bouchardat and Sandras as a substitute for ferrous sulphide, to which, they say, it is preferable.

Ferric Tan'nate. *Syn.* FERRI TANNAS, FERRUM TANNICUM, L. *Prep.* From tannin, 1 part; boiling water, 150 parts; dissolve, add of freshly precipitated ferric hydrate (dried at 212° Fahr.), 9 parts; evaporate by a gentle heat to one half, filter, add of sugar, 1 part, complete the evaporation, and at once put it into bottles.—*Dose.* 3 to 5 grs., thrice daily; in chlorosis, internal hæmorrhages, &c.

Double Ferric and Ammonium Tartrate. *Syn.* AMMONIO TARTRATE OF IRON, DOUBLE TARTRATE OF IRON AND AMMONIUM; AMMONIO FERRIC TARTRATE, FERRI AMMONIO TARTRATE; FERRI AMMONIO TARTRAS.

Prep. (Aikin.) Tartaric acid, 1 part; iron filings, 3 parts; digest in a sufficient quantity of hot water to barely cover the mixture for 2 or 3 days, observing to stir it frequently, and to add just enough water to allow the evolved gas to escape freely; next add ammonia, in slight excess, stir well, dilute with water, decant, wash the undissolved portion of iron, filter the mixed liquors, and evaporate to dryness; dissolve the residuum in water, add a little more ammonia, filter, and again gently evaporate to dryness, or to the consistence of a thick syrup, when it may be spread upon hot plates of glass, or on earthenware dishes, and dried in a stove-room, as directed for the corresponding citrate.

Tartaric acid, 6½ oz.; water, 7 pints; dissolve, neutralize the solution with sesquicarbonate of ammonium, and add 6½ oz. more tartaric acid; to the solution heated in a water bath, further add moist hydrated oxide of iron (obtained from sesquioxide of iron, 53½ drs., dissolved in hydrochloric acid, and precipitated by ammonia); when dissolved, filter, and evaporate, &c., as before.

Prop., &c., Glossy, brittle lamellæ, or irregular pieces, of a deep garnet colour, almost black, very soluble in water, and possessing a sweetish and slightly ferruginous taste. By repeated re-solution and evaporation its sweetness is increased, probably from the conversion of a part of its acid into sugar. It contains more iron than a given weight of the sulphate of the same base. It is the most pleasant-tasted of all the preparations of iron, except the ammonio-citrate, last noticed.—*Dose.* 3 to 10 grs.

Ferric and Potassium Tartrate. *Syn.* TAR-

TRATE OF POTASSA AND IRON, FERRO-TARTRATE OF POTASSA, FERRIC TARTRATE OF P.; FERRI TARTARATUM (B. P.), FERRI POTASSIO-TARTRAS (Ph. L.), FERRUM TARTARIZATUM (Ph. E.), FERRI TARTARUM (Ph. D.), FERRI ET POTASSÆ TARTRAS (Ph. U. S.), L. *Prep.* (B. P.) Prepare ferric hydrate from 4 fl. oz. of liq. ferri persulphas, B. P., as in making the double citrate, and add it to 2 oz. of the acid tartrate of potassium, dissolved in 30 oz. of water. Digest for 6 hours at 140°, allow to cool, and decant off the clear solution, which is to be evaporated down and dried on glass plates.—(Ph. L.) Ferrous sulphate, 4 oz., is dissolved in water, 1 pint, previously mixed with sulphuric acid, ½ fl. oz.; heat is applied to the solution, and nitric acid, 1 fl. oz., gradually added; the solution is boiled to the consistence of a syrup, and then diluted with water, 4 galls. (less the pint already used); liquor of ammonia, 10 fl. oz., is next added, and the precipitate washed, and set aside for 24 hours; at the end of this time, the water being decanted, the still moist precipitate is added, gradually, to a mixture of bitartrate of potassium, 2 oz., and water, ½ pint, heated to 140° Fahr.; after a time the undissolved oxide is separated by a linen cloth, and the clear solution either gently evaporated to dryness or treated in the same manner as the citrate (lastly, preserve it in well-stopped bottles). The formulæ of the Ph. E., D., & U. S., are essentially the same. The Ph. D. orders a heat not beyond 150° Fahr. to be applied to the mixture of the oxide and bitartrate, with occasional stirring for 6 hours, and the desiccation to be conducted at the same temperature.

Obs. This preparation is a double salt of potassium and iron; it is therefore wrongly called 'tartrate of iron' as is commonly heard. It is totally soluble in water; the solution is neutral to litmus and turmeric, unaffected by ferrocyanide of potassium, and not precipitated by acids nor alkalies, nor acted on by the magnet. Heated with potassa, 100 gr. throws down about 34 gr. of sesquioxide of iron. Entirely soluble in *cold* water; taste, freely chalybeate. That of commerce has generally a feebly inky taste, a *slight* alkaline reaction, is slightly deliquescent, dissolves in 4 parts of water, and is nearly insoluble in alcohol.

Potassio-tartrate of iron is an excellent ferruginous tonic.—*Dose.* 10 to 20 grs., made into a bolus with aromatics, or dissolved in water or other convenient menstruum.

Ferric Valerianate. *Syn.* VALERIANATE OF SESQUIOXIDE OF IRON, VALERIATE OF IRON; FERRI VALERIANAS (Ph. D.), L. *Prep.* (Ph. D.) By adding a solution of sodium valerianate to another of ferric sulphate, and collecting and washing the precipitate, which is to be dried by placing it for some days folded in bibulous paper, on a porous brick; after which it is to be carefully kept from the air.

Prop., &c. A reddish-brown amorphous powder; nearly insoluble in water; soluble in rectified spirit, and in the dilute acids with decomposition. Citrate or tartrate, flavoured with oil of valerian, is frequently sold for it.—*Dose.* 1 to 3 grs.; in anæmia and chlorosis complicated with hysteria.

Ferroso-Ferric Hydrate. $Fe_3(HO)_8$. *Syn.* HYDRATED FERROSO-FERRIC OXIDE, HYDRATED MAGNETIC OXIDE. (B. P.) Liquor ferri persulphas, 5½; ferri sulphas, 2; solution of soda, 80; distilled water, a sufficiency. Dissolve the ferrous sulphate in 40 of water, add the solution of soda, stirring them well, boil the mixture, let it stand for two hours, put in a calico filter, wash with distilled water until the washing give no precipitate with barium chloride, and dry at a temperature not exceeding 120.

Ferrous sulphate, 6 oz.; sulphuric acid, 160 minims; nitric acid, 4 fl. drs.; stronger liquor of ammonia, 4½ fl. oz.; boiling water, 3 pints; dissolve half of the sulphate in half of the water, add the oil of vitriol, boil, add the nitric acid gradually, boiling after each addition for a few minutes; dissolve the remaining half of the sulphate in the rest of the boiling water; mix the two solutions, add the ammonia, stirring well (and boil for a short time); collect the precipitate on a calico filter, wash it with water until it ceases to precipitate a solution of nitrate of barium, and dry at a heat not exceeding 180° Fahr. The formulæ of Gregory and Dr. Jephson are similar.

Ferrous sulphate, 8 oz., dissolved in a mixture of water, 10 fl. oz., and sulphuric acid, 6 fl. drs., is converted by means of nitric acid, 4 fl. drs., diluted with water, 2 fl. oz., with ferric sulphates; this solution is then added t another, formed by dissolving ferrous sulphate, 4 oz., in water, ½ pint; the whole is then mixed with liquor of potassium hydrate, 2¾ pints, and after being boiled for 5 minutes, is collected on a calico filter, and washed, &c., as before; and is to be preserved in a well-stoppered bottle.

Prop., &c. The hydrate is a black sand-like substance, consisting of very minute crystals. When pure, it is attracted by the magnet, and is entirely soluble in hydrochloric acid; and ammonia added to the solution throws down a black precipitate. The oxide is the chief product of the oxidation of iron at a high temperature in the air and in aqueous vapour. It is more permanent than ferrous oxide, but incapable of forming salts.—*Dose.* 5 to 20 grs. two or three times a day.

Ferroso-ferric Oxide. Fe_3O_4. *Syn.* MAGNETIC O. OF I.; FERRI OXYDUM NIGRUM, F. O. MAGNETICUM (Ph. D.), OXYDUM FERROSO-FERRICUM, L. This occurs native, but that used in medicine is prepared artificially.

From the black scales of iron that fall around the smith's anvil, by washing, drying, detaching them from impurities by means of a magnet, and then treating them by grinding

and elutriation, as directed for prepared chalk. The product of this process is inferior as a medicine to the hydrate obtained as below, being less easily soluble in the juices of the stomach.

Ferrous Acetate. $F(C_2H_3O_2)_2$. *Syn.* FERRI ACETAS, L. *Prep.* 1. From freshly precipitated ferrous carbonate dissolved in dilute acetic acid.

2. By adding a solution of calcium acetate to another of ferrous sulphate, and evaporating the filtered liquid, out of contact with the air. Small, colourless, or pale-greenish needles or prisms, very soluble and prone to oxidation.

Ferrous Arsenate. $Fe_3(AsO_4)_2$ *Syn.* FERRI ARSENIAS, L. *Prep.* From a solution of sodium arseniate, added to a solution of ferrous sulphate, the precipitate being collected, washed in a little cold water, and dried.—*Dose*, $\frac{1}{20}$ to $\frac{1}{12}$ gr., made into a pill; in lupus, psoriasis, cancerous affections, &c. Externally, combined with 4 times its weight of ferrous phosphate and a little water, as a paint to destroy the vitality of cancerous formations. An ointment (20 to 30 grs. to the oz.) is also used for the same purpose. They are all dangerous remedies in non-professional hands.

Ferrous Arsenite. $Fe(AsO_2)_2$. *Syn.* FERRI ARSENIS, L. From the potassium arsenite, and ferrous sulphate, as the last. A yellowish-brown powder, occasionally used in medicine as a tonic, alterative, and febrifuge.—*Dose.* $\frac{1}{12}$ to $\frac{1}{12}$ gr.

Ferrous Bromide. $FeBr_2$. *Syn.* FERRI BROMIDUM, L. *Prep.* (Moir.) Bromine and iron filings, of each, 1 part; water, 3 parts; mix in a stoppered phial, set it aside, occasionally shaking it, for 2 or 3 days, and when the colour of the bromine has disappeared, and the liquid becomes greenish, filter and evaporate to dryness.—*Dose.* 1 to 6 grs., as a tonic, diuretic, and resolvent, in similar cases to those in which iodide of iron is given.

Ferrous Carbonate. $Fe(CO_3)$. *Syn.* PROTOCARBONATE OF IRON; FERRI CARBONAS, F. UBCARBONAS, L. This occurs in nature as SPATHOSE ORE, as the chief constituent of CLAY IRONSTONE, and in many CHALYBEATE WATERS.

Prep. (B.P.) Ferrous sulphate (sulphate of iron), 2; ammonium carbonate, 1¼; boiling distilled water, 320; refined sugar, 1. Dissolve the sulphate and ammonium carbonate each in ¼ of the water, and mix; allow to stand for 24 hours and decant, of the clear solution, add the remainder of the water to the precipitate, stir well, allow to settle, and decant off. Collect the deposit in a calico filter, press, rub in the sugar in a porcelain mortar, and dry at a temperature not exceeding 212° Fahr. Small coherent gray lumps. Precipitate a solution of ferrous sulphate with a solution of sodium carbonate, well wash the green powder with water which has been boiled, and dry it out of contact with the air. On the slightest exposure to air it is converted into ferrous hydrate or oxide. This change is for the most part prevented by combining it with sugar, as in the following preparation.

(With sugar: FERRI CARBONAS SACCARATA, B.P.; SACCHARINE C. OF I.; FERRUM CARBONICUM SACCHARATUM, FERRI CARBONAS CUM SACCHARO—Ph. L., FERRI CARBONAS SACCHARATUM—Ph. E. & D. L.)—(Ph. L.) Ferrous sulphate, 4 oz.; sodium carbonate, 4¼ oz.; dissolve each separately in quart of boiling water, and mix the solutions whilst hot; after a time collect the precipitate, wash it frequently with water, and add of sugar, 2 oz., previously dissolved in water, 2 fl. oz.; lastly, evaporate the mixture over a water bath to dryness, and keep it in a well-closed bottle.

Prop. &c. A sweet-tasted greenish mass or powder, consisting chiefly of carbonate of iron. It is one of the best of the chalybeates.—*Dose.* 5 to 10 grs. When pure, it should be easily soluble in hydrochloric acid with brisk effervescence.

Ferrous Chloride. $FeCl_2$. *Syn.* PROTOCHLORIDE OF IRON; MURIATE OF IRON; FERRI CHLORIDUM, L. *Prep.* 1. (Anhydrous.) By passing dry hydrochloric acid gas over ignited metallic iron. The chloride sublimes in yellowish crystals.

2. (Hydrated.) Dissolve iron filings or scale in hydrochloric acid, evaporate and crystallize. Soluble, green crystals.

Ferrous Citrate. $Fe_3(C_6H_5O_7)_2$. *Syn.* PROTOCITRATE IRON, CITRATE OF PROTOXIDE OF IRON. This salt is easily formed by digesting iron filings or wire with citric acid, and evaporating the solution as quickly as possible out of contact with the air. It presents the appearance of a white powder, nearly insoluble in water, and rapidly passing to a higher state of oxidation by exposure to the air. Its taste is very metallic. It is exhibited under the form of pills, mixed with gum or syrup, to prevent it from being prematurely decomposed.

Ferroso-Ferri C. Hydrate. $Fe_3(FlO)_8$. *Syn.* HYDRATED MAGNETIC OXIDE. See *under* FERROSO FERRIC OXIDE.

Ferrous Ferricy'anide. *Syn.* FERRIDCYANIDE OF IRON. *Prep.* By adding a solution of potassium ferricyanide ('red prussiate of potash') to a solution of ferrous sulphate (or any other soluble ferrous salt), and collecting and drying and precipitate. A bright-blue powder. (See TURNBULL'S BLUE.)

Ferrous Hydrate. $Fe_2(HO)_2$. See *under* FERROUS OXIDE.

Ferrous Iodide. FeI_2. *Syn.* PROTOIODIDE OF IRON, IODIDE OF IRON; F. IODIDUM, FERRI HYDRIODAS, F. IODURETUM, L. *Prep.* (B. P.) Fine iron wire, 1; iodine, 2; distilled water, 10. Introduce the iron, iodine and 8 of water into a flask, heat it about ten minutes, and boil until all the red colour is gone. Filter through paper into a polished iron dish, washing with the rest of the water,

and boil until a drop of the solution taken out on iron wire solidifies on cooling. Pour on porcelain and cool. (Ph. L. 1836.) Iodine, 6 oz.; iron filings, 2 oz.; water, 4½ pints; mix, boil in a sand bath until the liquid turns to a pale green, filter, wash the residuum with a little water, evaporate the mixed liquors in an iron vessel at 212° Fahr. to dryness, and immediately put the iodide into well-stoppered bottles.

Iodine, 1 oz., and clean iron filings or turnings, ½ oz., are put into a Florence flask with distilled water, 4 fl. oz., and having applied a gentle heat for 10 minutes, the liquid is boiled until it loses its red colour; it is then at once filtered into a second flask, the filter washed with water, 1 fl. oz., and the mixed liquid is boiled down, until it solidifies on cooling.

With sugar; SACCHARINE IODIDE OF IRON, SACCHARUM FERRI IODIDI, FERRI IODIDUM SACCHARATUM, L. Iron (in powder), 1 dr.; water, 5 drs.; iodine, 4 drs.; obtain a solution of iodide of iron, as above, and add to it of sugar of milk (in powder), 1½ oz.; evaporate at a temperature not exceeding 122° Fahr., until the mass has a tenacious consistence, then further add of sugar of milk, 1 oz., reduce the mixture to powder, and preserve it in a well-stoppered bottle. Every 6 grs. contain 1 gr. of iodide of iron.

From "syrup of iodide of iron" exposed in a shallow vessel, in a warm place, until it crystallizes; the crystals are collected, dried, and powdered. A simpler plan is to gently evaporate the whole to dryness, and to powder the residuum. The saccharine iodide may be kept for some time in a corked bottle without undergoing decomposition.

Obs. The preparation of the above compound, like that of the citrates, has formed a fertile subject during some years for pharmaceutical amateurs to dilate upon. There is in reality not the least difficulty in the process. As soon as iodine and iron are mixed together under water, much heat is evolved, and if too much water be not used the combination is soon complete, and the liquor merely requires to be evaporated to dryness, out of contact with the air, at a heat not exceeding 212° Fahr. This is most cheaply and easily performed by employing a glass flask, with a thin broad bottom and a narrow mouth, by which means the evolved steam excludes air from the vessel. The whole of the uncombined water may be known to be evaporated when vapour ceases to condense on a piece of cold glass held over the mouth of the flask. A piece of moistened starch paper occasionally applied in the same way will indicate whether free iodine is evolved; should such be the case, the heat should be immediately lessened. When the evaporation is completed, the mouth of the flask should be stopped up by laying a piece of sheet india rubber on it, and over that a flat weight; the flask must be then removed, and when cold broken to pieces, the iodide weighed, and put into dry and warm stoppered wide-mouth glass phials, which must be immediately closed, tied over with bladder, and the stoppers dipped into melted wax.

Prop., &c. Ferrous iodide evolves violet vapours by heat, and ferric oxide remains. When freshly made, it is totally soluble in water, and from this solution, when kept in a badly stoppered vessel, ferric hydrate is very soon precipitated; but with iron wire immersed in it, it may be kept clear in a well-stoppered bottle.—*Dose.* 1 to 3 grs., or more, as a tonic, stimulant, and resolvent. It has been given with advantage in anæmia, chlorosis, debility, scrofula, and various glandular affections.

Ferrous Lactate. $Fe(C_3H_5O_3)_2$. *Syn.* PROTOLACTATE OF IRON; FERRI LACTAS, FERRUM LACTICUM, L. *Prep.* Boil iron filings in lactic acid diluted with water, until gas ceases to be evolved, and filter whilst hot into a suitable vessel, which must be at once closely stopped; as the solution cools, crystals will be deposited, which after being washed, first with a little cold water, and then with alcohol, are to be carefully dried. The mother liquor, on being digested, as before, with fresh iron, will yield more crystals.

Into sour whey, 2 lbs., sprinkle sugar of milk and iron filings, of each, in fine powder, 1 oz.; digest at about 100° Fahr., until the sugar of milk is dissolved, then add a second portion, and as soon as a white crystalline powder begins to form, boil the whole gently, and filter into a clean vessel; lastly, collect, wash, and dry the crystals, as before.

Prop., &c. Ferrous lactate is a greenish-white salt; and when pure, forms small acicular or prismatic crystals, which have a sweetish ferruginous taste, and are soluble in about parts of cold and in 12 parts of boiling water. It has been regarded by many high authorities as superior to every other preparation of iron for internal use, as being at once miscible with the lactic acid of the gastric juice, instead of having to be converted into a lactate at the expense of that fluid, as it is asserted is the case with the other preparations of iron.—*Dose.* 2 to 6 grs., frequently, in any form most convenient.

Ferrous Malate (Impure). *Syn.* FERRI MALAS IMPURUS, L. *Prep.* (P. Cod., 1839.) Porphyrised iron filings, 1 part; juice of sour apples, 8 parts; digest for 3 days in an iron vessel, evaporate to one half, strain through linen whilst hot, further evaporate to the consistence of an extract, and preserve it from the air.—*Dose.* 5 to 20 grs., where the use of iron is indicated.

Ferrous Nitrate. $(FeNO_3)_2$. *Syn.* PROTONITRATE OF IRON, NITRATE OF PROTOXIDE OF IRON; FERRI NITRAS, L. By dissolving ferrous sulphide in dilute sulphuric acid, in the cold, and evaporating the solution *in vacuo*. Small green crystals, very soluble, and prone to oxidation.

Ferrous Oxide. FeO. *Syn.* PROTOXIDE OF

IRON, FERRI PROTOXYDUM, L. This substance is almost unknown in a separate state, from its extreme proneness to absorb oxygen and pass into the sesquioxide.

Ferrous Hydrate. $Fe(HO)_2$. May be precipitated from ferrous solutions as a white powder, by alkaline hydrates. It rapidly absorbs oxygen, and turns first green, and then red, by exposure to the air. Both the oxide and hydrate are very powerful bases, neutralising the acids and forming stable salts, which, when soluble, have commonly a pale green colour, and a nauseous metallic taste.

Ferrous Phosphate. *Syn.* PHOSPHATE OF IRON, NEUTRAL P. OF PROTOXIDE OF IRON, BIMETALLIC FERROUS ORTHOPHOSPHATE (Odling); FERRI PHOSPHAS (Ph. U. S.), L. A salt formed from ordinary or tribasic phosphoric acid.

Prep. (B. P.) Ferrous sulphate, 3; sodium phosphate, 2½; sodium acetate, 1; boiling distilled water, 80; dissolve the sulphate and sodium salts, each in half the water, mix, and stir carefully, filter through calico, wash with hot distilled water until it ceases to give a precipitate with barium chloride, dry at a heat not exceeding 120° Fahr. (Ph. U. S.) Ferrous sulphate 5 oz.; sodium phosphate, 6 oz.; dissolve each separate in 2 quarts of water, mix the solutions, and after repose for a short time, wash, and dry the precipitate.

Prop., &c. A slate-coloured powder; insoluble in water; soluble in dilute nitric and hydrochloric acid.—Dose. 5 to 10 grs.; in amenorrhœa, diabetes, dyspepsia, scrofula, &c.; and *externally*, as an application to cancerous ulcers.

Ferrous Sulphate. $FeSO_4.7Aq$. *Syn.* PROTOSULPHATE OF IRON, SULPHATE OF IRON, COPPERAS, GREEN VITRIOL, SHOEMAKER'S BLACK; FERRI SULPHAS (P. B., Ph. L. E. & D.), VITRIOLUM FERRI. The crude sulphate of iron or green vitriol of commerce (FERRI SULPHAS VENALIS, Ph. L.) is prepared by exposing heaps of moistened iron pyrites or native bisulphuret of iron to the air for several months, either in its unprepared state or after it has been roasted. When decomposition is sufficiently advanced, the newly formed salt is dissolved out with water, and the solution crystallised by evaporation. In this state it is very impure. The ferrous sulphate or sulphate of iron employed in medicine is prepared as follows:—

Prep. (B. P.) Iron wire, 4; sulphuric acid, 4; distilled water, 30. Pour the water on the iron, add the acid, and when the disengagement of gas has nearly ceased, boil for ten minutes. Filter through paper. Allow to stand twenty-four hours, and collect the crystals. Sulphuric acid, 1 fl. oz.; water, 4 pints; mix, and add of commercial sulphate of iron, 4 lbs.; iron wire, 1 oz.; digest with heat and occasional agitation until the sulphate is dissolved, strain whilst hot, and set aside the liquor that crystals may form; evaporate the mother-liquor for more crystals, and dry the whole.

Dissolve the transparent green crystals of the impure sulphate of iron in their own weight of water, acidulated with sulphuric acid, and re-crystallise.

The formula of the Ph. U. S. is similar.

(Dried; FERRI SULPHAS EXSICCATA, B. P.; FERRI SULPHAS EXSICCATUM—Ph. E., F. S. SICCATUM—Ph. D.) From ferrous sulphate, heated in a shallow porcelain or earthen vessel, not glazed with lead, till it becomes a greenish-gray mass, and then reduced to powder. The heat should be that of an oven, or not exceeding 400° Fahr. 5 parts of the crystallised sulphate lose very nearly 2 parts by drying.

(Granulated; FERRI SULPHAS GRANULATA, L.) (B. P.) A solution of iron wire, 4 oz., in sulphuric acid, 4 fl. oz., diluted with water, 1½ pint, after being boiled for a few minutes, is filtered into a vessel containing rectified spirit, 8 fl. oz., and the whole stirred until cold, when the granular crystals are collected on a filter, washed with rectified spirit, 2 fl. oz., and dried, first, by pressure between bibulous paper, and next beneath a bell-glass over sulphuric acid, after which they are put into a stoppered bottle, to preserve them from the air.

Prop., &c. Ferrous sulphate forms pale bluish-green rhombic prisms, having an acid, styptic taste, and acid reaction; it dissolves in two parts of cold and less than one part of boiling water; at a dull-red heat it suffers decomposition; sp. gr. 1·82. It is perfectly soluble in water; a piece of iron put into the solution should not be covered with metallic copper. By exposure to the air it effloresces slightly, and is partly converted into a basic ferric sulphate.—*Dose.* ½ to 4 grs., in pills or solution; externally, as an astringent or styptic. In the arts, as sulphate of iron (copperas), it is extensively used in dyeing, and for various other purposes. The dried sulphate (ferri sulphus exsiccatum) is chiefly used to make pills.

Crude sulphate of iron is frequently contaminated with the sulphates of copper, zinc, manganese, aluminium, magnesium, and calcium, which, with the exception of the first, are removed with difficulty. It also contains variable proportions of the neutral and basic ferric sulphates. The preparation obtained by direct solution of iron in dilute sulphuric acid should, therefore, be alone used in medicine.

In commerce, there are four varieties of crude sulphate of iron or copperas known,—greenish-blue, obtained from acid liquors,—pale green, from neutral liquors,—emerald green, from liquors containing ferric sulphate,—and ochry brown, which arises from age and exposure of the other varieties to the air. Even the first two of these contain traces of ferric sulphate, and, hence give a bluish

precipitate with ferrocyanide of potassium; whereas the pure sulphate gives one which is at first nearly white.

Ferrous Sulphide. FeS. *Syn.* SULPHURET OF IRON, SULPHIDE OF I., PROTOSULPHIDE OF I.; FERRI SULPHURETUM (Ph. E. & D.), L. *Prep.* (Ph. E. & D.) Expose a bar of iron to a full white heat, and instantly apply a solid mass of sulphur to it, observing to let the melted product fall into water; afterwards separate the sulphide from the sulphur, dry, and preserve it in a closed vessel.

From sublimed sulphur, 4 parts; iron filings, 7 parts; mixed together and heated in a common fire, till the mixture begins to glow, and then removing the crucible from the heat, and covering it up, until the reaction is at an end, and the whole has become cold.

Hydrated; FERRI PROTOSULPHURETUM HYDRATUM, L. By adding a solution of ammonium sulphide or of potassium sulphide to a neutral solution of ferrous sulphate made with recently distilled or boiled water; the precipitate is collected on a filter, washed as quickly as possible with recently boiled water, squeezed in a linen cloth, and preserved in the pasty state, under water, as directed under ferric hydrate.

Prop., &c. The sulphide prepared in the dry way is a blackish brittle substance, attracted by the magnet. It is largely used in the laboratory as a source of sulphuretted hydrogen. The hydrated sulphide is a black, insoluble substance, rapidly decomposed by exposure to the air. Proposed by Mialhe as an antidote to the salts of arsenic, antimony, bismuth, lead, mercury, silver, and tin, and to arsenious acid; more especially to white arsenic and corrosive sublimate. A gargle containing a little hydrated sulphide of iron, will instantly remove the metallic taste caused by putting a little corrosive sublimate into the mouth. (Mialhe.) On contact with the latter substance, it is instantly converted into ferrous chloride and mercurous sulphide, two comparatively inert substances. It is administered in the same way as ferrous hydrate. When taken immediately after the ingestion of corrosive sublimate, it instantly renders it innocuous; but when the administration is delayed until 15 or 20 minutes after the poison has been swallowed, it is almost useless.

Ferrous Tar'trate. *Syn.* FERRI TARTRAS, FERRI PROTOTARTRAS, L. *Prep.* 1. From iron filings, 2 parts; tartaric acid, 1 part; hot water, q. s.; digest together until reaction ceases, agitate the liquid, pour off the turbid solution, and collect, wash, and dry the powder, as quickly as possible, and keep it out of contact with the air.

Crystallised potassium tartrate, 132 parts; ferrous sulphate, 139 parts; dissolve each separately, mix the solutions, and collect the precipitate as before. A nearly insoluble powder; seldom used.

Obs. By dissolving the corresponding hydrates in a solution of tartaric acid, employing the former in slight excess, and evaporating, both the ferrous and ferric tartrate are easily obtained.

IRON AL'UM. See ALUMS.

IRON CEMENT'. See CEMENTS.

IRON FI"LINGS. *Syn.* FERRI RAMENTA (Ph. L. 1836), FERRI LIMATURA (Ph. E.), FERRI SCOBS (Ph. D.). The usual method of preparing iron filings for medical purposes has been already noticed; the only way, however, to obtain them pure, is to act on a piece of soft iron with a clean file. The Fr. Cod. orders them to be forcibly beaten in an iron mortar, and to be separated from oxide and dust by means of a fine sieve, and from the grosser parts by means of a coarse hair-sieve. —*Dose.* 10 to 30 grs., in sugar or honey, as a chalybeate; in larger doses it is an excellent vermifuge, especially for ascarides or the small thread-worm.

IRON LIQ'UOR. *Syn.* PYROLIGNITE OF IRON, DYER'S ACETATE OF I., BLACK LIQUOR, TAR IRON L.; FERRI ACETAS VENALIS, L. This article, so extensively used in dyeing, is a crude mixed acetate of the protoxide and sesquioxide of iron. It is usually prepared by one or other of the following methods:—

1. Old scraps of iron (hoops, worn-out tinplate, &c.) are left in a cask of pyroligneous acid, occasional agitation being had recourse to, until a sufficiently strong solution is obtained. By keeping the acid moderately warm in suitable vessels it will become saturated with the iron in a few days. With cold acid, on a large scale, forty days or more are required to complete the process.

2. A solution of pyrolignite or crude acetate of lime, is added to another of green copperas, as long as a precipitate is formed; after repose, the clear liquor is decanted.

IRON, REDUCED. *Syn.* QUEVENNE IRON, FERRUM REDACTUM (B.P.), FERRI PULVIS, L. FER REDUIT, F. *Prep.* This preparation, which consists of metallic iron in a fine state of division mixed with a variable amount of magnetic oxide of iron, is made by passing perfectly dry hydrogen over peroxide of iron heated to redness in a gun-barrel.

Prop. A grayish-black powder, attracted by the magnet, and exhibiting metallic streaks when rubbed with firm pressure in a mortar. Rapidly absorbs oxygen, and must, therefore, be preserved from the air in well-stoppered bottles. It dissolves in hydrochloric acid with the evolution of hydrogen. 10 grains added to an aqueous solution of 50 grains of iodine and 50 grains of iodide of potassium, and digested with them in a small flask at a gentle heat, should leave not more than 5 grains undissolved, which should be entirely soluble in hydrochloric acid.

Uses. In *medicine*, it is chiefly given to restore the condition of the blood in all anæmic states of the system. There is no pulverulent state of iron so convenient as this for

children, as it has no taste, and only a very small dose is required.—*Dose.* 1 to 5 grains (children, ¼ to 1 grain), in powder, pill, or between bread and butter.

IRON WIRE. *Syn.* FERRUM IN FILA TRACTUM (Ph. L.), FERRI FILUM (Ph. E.), FERRI FILA (Ph. D.), L. This is the only form of metallic iron retained in the Ph. L. It is used to make preparations of iron.

ISCHU'RIA. In *pathology*, retention, stoppage, or suppression of the urine.

I'SINGLASS. *Syn.* ICHTHYOCOLLA, L. The finest kinds of isinglass are obtained from various species of the genus *Acipenser*, or sturgeon, that from the great sturgeon being perhaps the most esteemed. It is the air-bag, swimming bladder, or sound, dried without any other preparation than opening, folding, or twisting it. The picked or cut isinglass of the shops consists of the lumps of staple isinglass picked in shreds by women and children, or cut by machines.

Prop., &c. Good isinglass is the purest natural gelatin known. Its quality is determined by its whiteness, absence of the least fishy odour, and ready and almost entire solubility in boiling water; the solution forming a nearly white, scentless, semi-transparent, solid jelly, when cold. It is soluble in weak acids, and this solution is precipitated by alkalies. The aqueous solution is not precipitated by spirit of the common strengths. 1 part of good isinglass dissolved in 25 parts of hot water forms a rich, tremulous jelly. It is very commonly adulterated. See GELATIN.

ISOM'ERISM. In *chemistry*, identity of composition, with dissimilarity of properties. Isomeric compounds (isomerides) are such as contain the same elements in the same proportions, but which differ from each other in their chemical properties; thus, formate of methyl and acetate of methyl are isomeric, having precisely the same ultimate composition, though differing in the arrangement of their elements.

ISOMOR'PHISM. In *chemistry*, the quality possessed by bodies differently composed of assuming the same crystalline form. Isomorphous substances are found to be closely allied in their chemical nature; and the fact of two bodies crystallizing in the same form has often led to the discovery of other points of similarity between them. The alums, for instance, no matter what their components, all crystallize in octahedra, and a crystal of potassium-alum, if transferred to a solution of chrome-alum, will continue to increase with perfect regularity from the deposition of the latter salt.

IS'SUE. *Syn.* FONICULUS, L. In *surgery*, a small artificial ulcer formed on any part of the body by means of caustic or the lancet, and kept open by daily introducing an ISSUE PEA covered with some digestive or stimulating ointment; the whole being duly secured by an appropriate bandage.

ISSUE PEAS. *Syn.* PISÆ PRO FONTICULIS, L. Those of the shops are the immature fruit of the orange tree (ORANGE BERRIES). They are usually smoothed in a lathe. Issue peas are also 'turned' from orris root. The following compound issue peas are occasionally employed:—

1. Orris root (in powder) and Venice turpentine, of each, 1 part; turmeric, 2 parts; bees' wax, 3 parts; melted together and made into peas whilst warm.

2. Bees' wax, 3 parts; melt, add of Venice turpentine, 1 part; mix, and further add, of turmeric, 2 parts; orris root (in powder), 1 part; mix well, and form the mass into peas whilst warm. More irritating than the common pea.

3. (Dr. Gray.) Bees' wax, 12 parts; verdigris and white hellebore, of each, 4 parts; orris root, 3 parts; cantharides, 2 parts; Venice turpentine, q. s. *Used* to open issues instead of caustic, but their employment requires care.

ISSUE PLAS'TERS. See PLASTERS.

ITCH. *Syn.* YOUK‡, SCOTCH FIDDLE‡; PSORA, SCABIES, L.; GALE, Fr. In *pathology*, a cutaneous disease, caused by a minute insect lodging under the skin, and readily communicated by contact. There are four varieties of itch, distinguished by nosologists by the names—*scabies papuliformis*, or rank itch;—*scabies lymphatica*, or watery itch; *scabies purulenta*, or pocky itch; *scabies cachectica*, a species exhibiting appearances resembling each of the previous varieties. Our space will not permit more than a general notice of the common symptoms, and the mode of cure which is equally applicable to each species, and will not prove injurious to other skin diseases simulating the itch.

The *common itch* consists of an eruption of minute vesicles, principally between the fingers, bend of the wrist, &c., accompanied by intense itching of the parts, which is only aggravated by scratching. The usual treatment is repeated applications of sulphur-ointment (simple or compound), well rubbed in, once or twice a day, until a cure is effected; accompanying its use by the internal exhibition of a spoonful or more of flowers of sulphur, mixed with treacle or milk, night and morning. Where the use of sulphur-ointment is objectionable, a sulphur bath, or a lotion or bath of sulphurated potash, or of chloride of lime, may be employed instead. See BATH, LOTION (Itch), OINTMENT, PSORIASIS, &c.

I'VORY. The osseous portion of the tusks and teeth of the male elephant, the hippopotamus, wild boar, &c. That of the narwhal or seahorse is the most esteemed, on account of its superior hardness, toughness, translucency, and whiteness. The dust or shavings (IVORY DUST, IVORY SHAVINGS) of the turner, form a beautiful size or jelly when boiled in water. VEGETABLE IVORY is the hard albumen of the

seed of the *Phytelephas macrocarpa*, one of the Palm family.

Ivory may be *dyed* or *stained* by any of the ordinary methods employed for woollen, after being freed from dirt and grease; but more quickly as follows:—

1. BLACK. The ivory, well washed in an alkaline lye, is steeped in a weak neutral solution of nitrate of silver, and then exposed to the light, or dried and dipped into a weak solution of sulphide of ammonium.

2. BLUE. Steep it in a weak solution of sulphate of indigo which has been nearly neutralized with salt of tartar, or in a solution of soluble Prussian blue. A still better plan is to steep it in the dyer's green indigo-vat.

3. BROWN. As for black, but using a weaker solution of silver.

4. GREEN. Dissolve verdigris in vinegar, and steep the pieces therein for a short time, observing to use a glass or stoneware vessel; or, in a solution of verdigris, 2 parts; and sal ammoniac, 1 part, in soft water.

5. PURPLE. Steep it in a weak neutral solution of terchloride of gold, and then expose it to the light.

6. RED. Make an infusion of cochineal in liquor of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in water very slightly acidulated with aquafortis.

7. YELLOW. *a*. Steep the pieces for some hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

b. Dissolve as much of the best orpiment in solution of ammonia as it will take up, then steep the pieces therein for some hours; lastly, take them out and dry them in a warm place, when they will turn yellow.

Ivory is etched or engraved by covering it with an etching ground or wax, and employing oil of vitriol as the etching fluid.

Ivory is rendered flexible by immersion in a solution of pure phosphoric acid (sp gr. 1·13,) until it loses, or partially loses, its opacity, when it is washed in clean cold soft water, and dried. In this state it is as flexible as leather, but gradually hardens by exposure to dry air. Immersion in hot water, however, restores its softness and pliancy. According to Dr. Ure, the necks of some descriptions of INFANTS' FEEDING BOTTLES are thus made.

Ivory is whitened or bleached by rubbing it with finely powdered pumice-stone and water, and exposing it to the sun, whilst still moist, under a glass shade, to prevent desiccation and the occurrence of fissures; observing to repeat the prodnce until a proper effect is produced. Ivory may also be bleached by immersion for a short time in water holding a little sulphurous acid, chloride of lime, or chlorine, in solution; or by exposure in the moist state to the fumes of burning sulphur, largely diluted with air.

Ivory is wrought, turned, and fashioned, in a similar manner and with similar tools to those used for bone and soft brass.

Obs. Bone for ornamental purposes is treated in a similar way to ivory, but less carefully, owing to its inferior value. The bones of living animals may be dyed by mixing madder with their food. The bones of young pigeons may thus be tinged of a rose colour in 24 hours, and of a deep scarlet in 3 or 4 days; but the bones of adult animals take fully a fortnight to acquire a rose colour. The bones nearest the heart become tinged the soonest. In the same way logwood and extract of logwood will tinge the bones of young pigeons purple. (Gibson.)

IVORY BLACK. See BLACK PIGMENTS.

JAG'GERY. *Syn.* PALM SUGAR. A coarse brown sugar made in India, by the evaporation of the juice of several species of palms. The following are the principal varieties of this product:—

1. COCOA JAGGERY. From the juice of the Cocoa-nut palm (*Cocos nucifera*).

2. MALABAR JAGGERY. From the juice of the Gummut palm (*Saguerus saccherifer*).

3. MYSORE JAGGERY. From the juice of the wild Date-palm (*Phœnix sylvestris*); 17 galls. yield 46 lbs.

4. PALMYRA JAGGERY. From the juice of the Palmyra palm (*Borassus flabelliformis*); 6 pints yield 1 lb.

JA'LAP. *Syn.* JALAPÆ RADIX, JALAPA B. P. (Ph. L. & D.) CONVOLVULI JALAPÆ RADIX (Ph. E.), L. The dried tubercles of the *Exogonium purga, I. jalapa*—(Royle.) Jalap is a powerful stimulant and drastic purgative, producing copious liquid stools; but when judiciously administered, both safe and efficacious. It appears to be intermediate in its action between aloes and scammony.—*Dose.* 10 to 30 grs., in powder; in constipation, cerebral affections, dropsies, obstructed menstruation, worms, &c. Owing to its irritant properties, its use is contra-indicated in inflammatory affections of the alimentary canal, and after surgical operations connected with the abdomen and pelvis. It is usually administered in combination with sulphate of potassa or bitartrate of potassa and ginger; with mercurials, as the case may indicate. The powder is very generally adulterated.

Res'in of Jalap. *Syn.* RESINA JALAPÆ, L. *Prep.* 1. (Ph. E.) See EXTRACT OF JALAP.

2. (Nativelle.) Jalap root is digested in boiling water for 24 hours, and after being reduced to thin slices, more water is added, and the whole boiled for 10 minutes, with occasional agitation; the liquid is then expressed in a tincture press, and the boiling and pressing repeated a second and third time (these decoctions by evaporation yield AQUEOUS EXTRACT OF JALAP); the pressed root is next treated with rectified spirit, q. s., and boiled for 10 minutes, and then allowed to cool; the

tincture is then pressed out, and the boiling with fresh alcohol and expression is repeated twice; a little animal charcoal is added to the mixed tinctures, and, after thorough agitation, the latter are filtered; the liquid is now distilled until nothing passes over, the supernatant fluid is poured off the fluid resin, and the latter dried by spreading it over the surface of the capsule, and continuing the heat. The product is a friable and nearly colourless resin, which forms a white powder resembling starch. *Prod.* Fully 10% of pure resin.

3. (Planche.) Resinous extract of jalap is dissolved in rectified spirit, the tincture agitated with animal charcoal, and after filtration gently evaporated to dryness.

Pur. The jalap resin of commerce is generally adulterated with scammony, gum, guaiacum or resin, When in a state of purity, it does not form an emulsion with milk, like scammony resin, but runs into a solid mass. It is insoluble in fixed oils and turpentine, whilst the common resins are freely soluble in those menstrua. Its alcoholic solution, dropped on a piece of absorbent white paper, and exposed to the action of nitrous gas, does not acquire a green or blue colour; if it does, guaiacum resin is present. 2% of this adulteration may be thus detected. (Gobley) It is insoluble in ether; but guaiacum resin, common resin, and some others, are so; the decanted ether should not become opalescent when mixed with water, and should evaporate without leaving any residuum. Powdered jalap resin placed in cold water does not dissolve, but forms a semi-fluid, transparent mass, as if it had been melted. Dissolved in a watch-glass with a little oil of vitriol, a rich crimson-coloured solution is obtained, from which, in a few hours, a brown viscid resin separates. These last two characteristics distinguish it from other resins.

Obs. Earthenware or well-tinned copper vessels must alone be used in the above processes, as contact with copper or iron turns the resin black, and this tinge can only be removed by redissolving the resin in alcohol, the addition of animal charcoal, and re-evaporation.

Jalap resin is an energetic cathartic.—*Dose.* 1 to 5 grs. See JALAPIN.

Jalap, Factitious Resin of. *Syn.* RESINÆ JALAPÆ FACTITIA, L, A substance frequently sold for jalap resin is made by fusing a mixture of pale yellow resin and scammony resin, and adding, when it has cooled a little, but still semi-fluid, a few drops of balsam of Peru or tolu; the mixture is then poured into small paper capsules or tin moulds. Its effects resemble those of jalap resin, but it inflames less. (Landerer.)

Jalap, Soap of. *Syn.* SAPO JALAPÆ, SAPO JALAPINUS, L. *Prep.* (Ph. Bor.) Resin of jalap and Castile soap, of each 1 part; rectified spirit, 2 parts, or q. s. to dissolve the ingredients softened by a gentle heat; subsequently evaporate the mixture by the heat of a water bath until reduced to $4\frac{1}{2}$ oz., or it has acquired the consistence of a pill-mass.

Prop., &c. A grayish-brown mass, soluble in rectified spirit. Said to be milder in its action than the resin alone.—*Dose.* 5 to 15 oz.

JALAP'IC ACID. *Syn.* ODOROUS PRINCIPLE OF JALAP—Pereira. *Prep.* Add an alcoholic solution of acetate of lead to a similar solution of jalap resin, collect the precipitate (jalapate of lead), and throw down the lead by means of sulphuretted hydrogen. (See ABSINTHIC ACID.) A brownish, soft, greasy substance, smelling strongly of jalap, soluble in alcohol and alkali, and slightly so in ether. Jalap resin contains about 13% of this substance.

JAL'APIN. $C_{34}H_{56}O_{16}$. *Syn.* JALAPINA. Jalap resin is commonly sold under this name, but pure jalapin is prepared by one or other of the following formulæ:—

Prep. 1. The liquid filtered from the jalapate of lead in preparing jalapic acid is a solution of acetate of jalapin, which, after any trace of lead is removed, by adding a few drops of dilute sulphuric acid, and filtration, yields the whole of its jalapin, as a precipitate, on the addition of 5 or 6 times its volume of water; this is collected, washed with a little cold distilled water, and dried by exposure to a current of warm dry air.

2. (Hume.) Coarsely powdered jalap is digested in strong acetic acid for 14 days, the tincture filtered, ammonia added in excess, and the whole agitated strongly; the mixture is then filtered, the deposit washed in cold water, redissolved in acetic acid, reprecipitated by ammonia, and again washed and dried.

3. (Kayser.) Pure jalap resin, in powder, is digested for some time in boiling ether, by which means the jalapic acid is removed, and pure jalapin remains undissolved.

Prop., &c. A transparent, colourless, scentless, insipid resin, very soluble in alcohol, but insoluble in ether. It is the active purgative principle of crude jalap resin.

JAMAI'CINE. *Syn.* JAMAICINA. A peculiar alkaloid obtained by Huttenschmidt from the bark of the Cabbage-tree (*Andira inermis.*)

Prep. The aqueous solution of cabbage-tree bark, treated with sulphuretted hydrogen and evaporated.

Prop. Yellow crystals soluble in water and, to a limited extent, in alcohol; fusible, and very bitter tasted. It forms salts with the acids, which, in small doses, produce restlessness and trembling; and in larger ones, purging. It is said to be vermifuge.

JAMES'S POWDER. See POWDERS.

JAMS. *Syn.* PRESERVES. Conserves of fruit with sugar, prepared by boiling. In the latter respect they differ from the conserves of the apothecary.

Prep. The pulped or bruised fruit is boiled along with ½ to ⅔ of its weight of loaf sugar,

until the mixture jellies, when a little is placed on a cold plate; the semi-fluid mass is then passed through a coarse hair sieve whilst hot, to remove the stones and skins of the fruit, and as soon as it has cooled a little is poured into pots or glasses. It is usual to tie these over, when cold, with paper which has been dipped in brandy. The pots must then be placed aside in a dry and rather cold situation.

The following fruits are those from which jams are commonly prepared:—Apricots, cherries (various), cranberries, currants (black, red, and white), gooseberries (ripe and green), mulberrries, Orleans plums, raspberries, and strawberries. Red currants are commonly added to the last, to remove insipidity.

JAPAN'. See VARNISH, and *below*.

JAPAN'NING. The art of covering paper, wood, or metal, with a coating of hard, brilliant, and durable varnish. The varnishes or laquers employed for this purpose in Japan, China, and the Indian Archipelago, are resinous juices derived from various trees belonging to the natural order *Anacardiaceæ*, especially *Stagmaria verniciflua, Holigarna longifolia, Semecarpus Anacardium,* and species of *Rus* (Sumach). For *use,* they are purified by a defecation and straining, and are afterwards mixed with a little oil, and with colouring matter, as required. In this country varnishes of amber, asphaltum, or copal, or mixtures of them, pass under the names of 'JAPAN' and 'JAPAN VARNISH.'

Proc. The surface is coloured or painted with devices, &c., as desired, next covered with a highly transparent varnish (amber or copal), then dried at a high temperature (135° to 165° Fahr.), and, lastly, polished. Wood and paper are first sized, polished, and varnished. For plain surfaces asphaltum varnish or japan is used. See VARNISHING.

JAPONIC ACID. $C_{12}H_{10}O_5$. When catechu is exposed to the air in contact with caustic alkalies, black solutions (alkaline japonates) are formed; with carbonated alkalies, red solutions (alkaline rubates); the acid of the former may be separated. It is a black powder, insoluble in water, soluble in alkalies, and precipitated by acids. Buric acid forms red insoluble compounds with the earths and some other metallic oxides.

JARAVE. The Spanish name for SARSAPARILLA BEER. See BEERS (in *pharmacy*).

JASPER. *Syn.* JASPIS, L. A mineral of the quartz family, occurring in rocky masses. It takes various shades of red, yellow, brown, and green, and is occasionally banded, spotted, or variegated. It was formerly used as an amulet against hæmorrhages and fluxes. It is now extensively worked up into rings, seals, snuff-boxes, vases, &c., for which it is well calculated from its extreme hardness and susceptibility of receiving a fine polish.

JATRO'PHIC ACID. *Syn.* CROTONIC ACID, IATROPHIC A. A peculiar fatty acid discovered by Pelletier and Caventon, and originally regarded by them as the cathartic principle of croton oil and croton seeds, but since shown by Redwood and Pereira to be nearly inert.

Prep. The oil is saponified by caustic potassa, and the resulting soap is decomposed by tartaric acid; the fatty matter which floats on the surface of the liquid is then skimmed off the aqueous portion, and the latter submitted to distillation; the liquid in the receiver is a solution of jatrophic acid.

Prop., &c. Volatile; very acid; has a nauseous odour; is solid at 23°, and vaporizes at 35° Fahr. It forms salts with the bases, none of which possess any practical importance.

JAU'MANGE. *Prep.* From isinglass, 1 oz.; boiling water, 12 oz.; dissolve, add of any sweet white wine, ½ pint; the yolks of 2 eggs beaten to a froth, and the grated yellow peel of 2 lemons; mix well, and heat the whole over the fire until sufficiently thickened, stirring all the time; lastly, serve it up, or pour it into moulds.

JAUN'DICE. *Syn.* ICTERUS, MORBUS LUTEOLUS, L. A disease characterised by a yellow colour of the eyes and skin, deep-coloured urine, and pale alvine evacuations. It appears to arise from a disordered action of the biliary organs. The treatment consists of the administration of saline aperients, and small doses of blue-pill, followed by tonics and diaphoretics. The action of these remedies should be promoted by the copious use of diluents (particularly saline water), and exertion in the open air, when possible. When there is much pain and vomiting, anodynes (or opium, morphia, &c.) may be administered. Jaundice is not in itself a dangerous disease, but it sometimes lays the patient open to attacks of others which are so.

JEL'LY. *Syn.* GELATINA, L. A term now very loosely applied to various substances which are liquid or semi-liquid whilst warm, and become gelatinous on cooling.

Jellies are coloured by the addition of the usual stains used by confectioners, and are rendered transparent by clarification with white of egg.

Al'mond Jelly. *Syn.* GELATINA AMYGDALARUM, L. *Prep.* From rich almond milk, ¼ pint; thick hartshorn jelly, ½ pint; sugar, 2 oz.; with 2 or 3 bitter almonds and a little lemon peel, to flavour, heated together, strained, and moulded.

Ar'row-root Jelly. *Syn.* GELATINA MARANTÆ, L. From arrow-root, 1½ oz., to water, 1 pint. Tous les mois jelly is made in the same way.

Bis'cuit Jelly. *Prep.* From white biscuit (crushed beneath the rolling-pin), 4 oz.; cold water, 2 quarts; soak for some hours, boil to one half, strain, evaporate to 1 pint, and add, of white sugar, ¾ lb., red wine, 4 oz., and cinnamon, 1 teaspoonful. In weakness of the stomach, and in dysentery and diarrhœa, and

in convalescence combined with rich beef gravy or soup.

Bread Jelly. *Syn.* PANADA; GELATINA PANIS, L. *Prep.* Cut a French roll into slices, toast them on each side, and boil in water, 1 quart, until the whole forms a jelly, adding more water if required; strain, and add sugar, milk, &c., to palate. It may be made with broth from which the fat has been skimmed, instead of water. *Used* as the last.

Broth Jelly. *Syn.* SOUP-JELLY. From broth or soup from which the fat has been skimmed, evaporated until it becomes gelatinous on cooling. A few shreds of isinglass are commonly added. See SOUP (Portable).

Calves' Feet Jelly. *Prep.* For each foot take of water, 3 pints, and boil to one half; cool, skim off the fat, and again boil for 2 or 3 minutes with the peel of a lemon and a little spice; remove it from the fire, strain through a jelly bag (see FILTRATION), add the juice of a lemon and a glass of wine, and when it has cooled a little put it into glasses or 'forms.'

Obs. If this jelly is required to be very transparent, it must be treated as follows:—After the fat is removed, it should be gently warmed, just enough to melt it, next well beaten with the white of an egg and the seasoning, and then brought to a boil for a minute or two, when it will be ready for straining, &c. The calves' feet should not be bought ready boiled, but only scalded. Cows' feet ('COW HEELS') make nearly as good jelly as that from calves' feet, and are much more economical.

Ceylon Moss Jelly. *Syn.* GELATINA GRACILARIÆ, L. *Prep.* (Dr. Sigmond.) Boil Ceylon moss (*Gracilaria lichenoides*), ½ oz. in water, 1 quart, for 25 minutes, or till the liquid jellies on cooling; strain and flavour. Very nutritious; recommended in irritation of the mucous membranes and phthisis.

Cor'sican Moss Jelly. *Syn.* GELATINA HELMINTHOCORTI, D. *Prep.* (P. Cod.) Corsican moss (*Gracilaria Helminthocorton*), 1 oz.; water, q. s.; boil 1 hour, and strain 8 fl. oz.; to this add of isinglass (previously soaked in a little water), 1 dr.; refined sugar, 2 oz.; white wine, a wine-glassful. Vermifuge. See DECOCTION.

Fruit Jelly. Under this head we include those jellies made from the juices of fruits.

Prep. The strained juice mixed with ½ to ¾ its weight of refined sugar, until it 'jellies' on cooling, observing to carefully remove the scum as it rises. The process should be conducted by a gentle heat, and it is preferable not to add the sugar until the juice is somewhat concentrated, as by lengthened boiling the quality of the sugar is injured.

Obs. Jellies are sold in pots or glasses, like JAMS. Both jams and fruit jellies are refrigerant and laxative; they are, however, mostly employed as relishes, especially during fevers and convalescences. The principal fruit jellies are:—APPLE, BARBERRY, CHERRY (from either Cornelian or Kentish cherries), CURRANT (black, white, and red), ELDERBERRY, GOOSEBERRY, PLUM, QUINCE, RASPBERRY. See LEMON and ORANGE JELLY.

Gra"vy Jelly. By evaporating meat gravies.

Harts'horn Jelly. *Syn.* GELATINA CORNU CERVI, L. *Prep.* (P. Cod.) Hartshorn shavings, 8 oz.; wash it in water, then boil in clean water, 3 pints, till reduced to one half; strain, press, add of sugar, 4 oz., the juice of one lemon, and the white of an egg beaten up with a little cold water; mix well, clarify by heat, evaporate till it jellies on cooling, then add the peel of the lemon, and set it in a cool place. It may be flavoured with wine, spices, &c. Very nutritious.

Ice'land Moss Jelly. *Syn.* GELATINA LICHENIS, L. *Prep.* (P. Cod.) Iceland moss, 2 oz.; soak for 1 or 2 days in cold water, then boil for 1 hour in water, q. s. to yield a strong solution; strain, decant the clear after repose, apply heat, and dissolve therein of isinglass, 1 dr.; evaporate the whole to a proper consistence, put it into pots, and set them in a cool place. Nutritious. Recommended in phthisis. The jelly of Iceland moss and cinchona (GELATINA LICHENIS CUM CINCHONA—P. Cod.) is made by adding to the above, syrup of cinchona, 6 fl. oz.

I"rish Moss Jelly. *Syn.* GELATINA CHONDRI, L. *Prep.* From Irish or carrageen moss. See DECOCTION.

I"singlass Jelly. *Syn.* CONFECTIONERS' JELLY; GELATINA ICHTHYOCOLLÆ, L. *Prep.* From isinglass dissolved in water by boiling, and evaporated till it 'jellies' on cooling, adding flavouring, as desired. 1½ oz. of good isinglass makes fully a pint of very strong jelly. See BLANCMANGE, ISINGLASS, CALVES'-FEET JELLY, &c.

Lem'on Jelly. From isinglass, 2 oz.; water, 1 quart; boil, add of sugar, 1 lb., clarify, and when nearly cold, add the juice of 5 lemons, and the grated yellow rinds of 2 oranges and of 2 lemons; mix well, strain off the peel, and put it into glasses.

No'yeau Jelly. As PUNCH JELLY, but strongly flavoured with bitter almonds.

Or'ange Jelly. From orange juice, 1 pint; let it stand over the grated yellow rind of 3 or 4 of the oranges for a few hours, then strain, and add, of loaf sugar, ½ lb., or more, isinglass, ½ oz., dissolved in water, 1 pint; mix, and put it into glasses before it cools.

Punch Jelly. From isinglass, 2 oz.; sugar, 1¼ lb.; water, 1 pint; dissolve, add of lemon juice, ½ pint; the peels of 2 lemons and of 2 oranges; rum and brandy, of each, ¼ pint; keep it in a covered vessel until cold, then liquefy it by a very gentle heat, strain, and pour it into moulds. A pleasant and deceptive way of swallowing alcohol.

Rice Jelly. *Syn.* CRÈME DE RIZ. From rice boiled in water, sweetened, and flavoured.

Sa'go Jelly. *Prep.* Soak sago in cold water for 1 hour, strain, and boil in fresh soft water

until it becomes transparent; then add wine, sugar, clear broth, milk, or spices, to flavour. 1 oz. of sugar makes a pint of good jelly.

Tapio'ca Jelly. As the last but using tapioca in lieu of sago.

JES'UIT'S BARK. See CINCHONA.

JESUIT'S DROPS. See DROPS and TINCTURE.

JESUIT'S POWDER. Powdered cinchona bark.

JET. A variety of mineral bituminous carbon, very hard, and susceptible of a fine polish.

JEW'ELS. See DIAMOND, EMERALD, GEMS, &c.

JEW'ELRY. The gold in articles of jewelry, whether solid or plated, which are not intended to be exposed to very rough usage, is generally 'coloured,' as it is called in the trade. This is done as follows:—

1. (RED GOLD COLOUR.) The article, after being coated with the amalgam, is gently heated, and, whilst hot, is covered with gilder's wax; it is then 'flamed' over a wood fire, and strongly heated, during which time it is kept in a state of continual motion, to equalise the action of the fire on the surface. When all the composition has burned away, the piece is plunged into water, cleansed with the 'scratch-brush' and vinegar, and then washed and burnished. To bring up the beauty of the colour, the piece is sometimes washed with a strong solution of verdigris in vinegar, next gently heated, plunged whilst hot into water, and then washed, first in vinegar, or water soured with nitric acid, and then in pure water; it is, lastly, burnished, and again washed and dried.

2. (OR-MOLU COLOUR.) This is given by covering the parts with a mixture of powdered hematite, alum, common salt, and vinegar, and applying heat until the coating blackens, when the piece is plunged into cold water, rubbed with a brush dipped in vinegar, or in water strongly soured with nitric acid, again washed in pure water, and dried. During this process, the parts not to be dried in 'or-molu colour' should be carefully protected.

The frauds practised in reference to the 'fineness' of the metal used in jewelry, is noticed under GOLD (Jeweller's). See also ASSAYING, DIAMOND, GEMS, GILDING LIQUOR, GILDING WAX, &c.

JEW'S PITCH. See ASPHALTUM.

JUICE (Spanish). See EXTRACT and LIQUORICE.

JU'JUBE. A fruit resembling a small plum, produced by various species of *Zizyphus*. Combined with sugar, it forms the JUJUBE PASTE of the shops, when genuine; but that now almost always sold under the name is a mixture of gum and sugar, slightly coloured and flavoured.

JU'LEP. *Syn.* JULAP; JULEPUM, JULEPUS, JULAPIUM, L. A term usually regarded as synonymous with 'MIXTURE'; but according to the best authorities, implying a medicine which is used as a vehicle for other forms of medicine. The word comes through the French, from a Persian expression, which signifies 'sweet drink.' A julep, according to Continental writers, is a drink of little activity, generally composed of distilled waters, infusions, and syrups, to which mucilages and acids are sometimes added; "but never powders or oily substances, which could interfere with its transparency." In England, the juleps of old pharmacy are now classed under 'MIXTURES.'

JU"NIPER BERRIES. *Syn.* JUNIPERI BACCÆ, J. COMMUNIS BACCÆ (Ph. E.), JUNIPERUS (Ph. L.), L. The fruit of the *Juniperus communis*, or common juniper tree. In the old Ph. L. & D. both the tops and berries (JUNIPERI FRUCTUS ET CACUMINA—Ph. L. 1836; JUNIPERUS—BACCÆ, CACUMINA—Ph. D. 1826) were ordered. The berries are stomachic and diuretic, and have been long employed in dropsies, either alone or combined with foxglove and squills. The tops (SUMMITATES) have been highly praised in scurvy and certain cutaneous affections.—*Dose* 1 to 2 drs., made into a conserve with sugar, or in the form of infusion or tea.

JUN'KET. *Syn.* DEVONSHIRE JUNKET, CURD JELLY. From warm milk put into a bowl, and then turned with a little rennet; some scalded cream and sugar are next added, with a sprinkling of cinnamon on the top, without breaking the curd. Much esteemed by holiday folk in the western counties, during the hot weather of summer. Sometimes, very strangely, a little brandy finds its way into these trifles.

KALEIDOSCOPE. *Syn.* FLOWER-GLASS. A pleasing philosophical toy invented by Sir David Brewster, which presents to the eye a series of symmetrical changing views. It is formed as follows:—Two slips of silvered glass, from 6 to 10 inches long, and from 1 to 1½ inch wide, and rather narrower at one end than the other, are joined together lengthwise, by one of their edges, by means of a piece of silk or cloth, glued on their back; they are then placed in a tube of tin or pasteboard, blackened inside, and a little longer than is necessary to contain them, and are fixed by means of small pieces of cork, with their faces at any angle to each other that is an even aliquot part of 4 right angles (as the ⅓, ¼, ⅒, &c.). The other end of the tube is then closed with an opaque screen, or cover, through which a small eyehole is made in the centre; and the other end is fitted, first with a plate of common glass, and at the distance of about ⅛th of an inch, with a plain piece of slightly ground glass, parallel to the former; in the intermediate place or cell are placed the objects to form the images. These consist of coloured pieces of glass, glass beads, or any other coloured diaphanous bodies, sufficiently small to move freely in the cell, and to assume new positions when the tube is shaken or turned round. A tube so prepared presents an infinite number

of changing and symmetrical pictures, no one of which can be exactly reproduced. This toy is so easily constructed, is so very inexpensive, and at the same time so capable of affording an almost inexhaustible fund of amusement to the young, that we advise our juvenile friends to try their hands at its construction. Any common tube of tin or pasteboard may be used, and strips of glass smoked on one side will answer for mirrors.

KA'LI. The name formerly applied to a species of *Salsola* employed for making BARILLA. It is sometimes used as a designation for the crude alkalies, and is the Germon synonym for 'potassa.'

Acid'ulated Kali. *Syn.* LEMON AND KALI, LEMONIATED K. A common preparation of the shops for making a pleasant effervescing draught. It is sometimes incorrectly styled 'citrate of potash.' *Prep.* 1. Carbonate of soda and tartaric acid, of each, 5 oz.; lump sugar, 1 lb.; all in the state of fine powder, and separately dried by a very gentle heat, after which they are mixed together, flavoured with essence of lemon, 1 dr., rubbed through a gauze sieve in a warm dry situation, put into bottles, and corked down immediately.

2. Finely powdered white sugar, 16 lbs.; tartaric acid, 4¼ lb.; carbonate of soda, 4 lbs.; essence of lemon, 1 oz.; as the last. Keeps well. A dessert-spoonful of either thrown into a glassful of water makes a pleasant effervescing draught.

KA'LIUM. [L.] Potassium.

KAL'YDOR. A cosmetic lotion; it resembles 'GOWLAND'S LOTION,' but is got up in a rather more pleasing style. See LOTION.

KA'OLIN. *Syn.* CHINA CLAY, PORCELAIN C. A fine white clay, derived from the decomposition of the felspar of granitic rocks. The potteries and porcelain works of this country are chiefly supplied with this substance from extensive tracts of it which occur near St. Austle, Cornwall. See CLAY.

KAP'NOMOR. *Syn.* CAPNOMOR. A colourless oil obtained from crude kreasote by distillation with potassa. It boils at 360° Fahr., has a peculiar odour, and is insoluble in water, but readily soluble in an alkaline solution of kreasote.

KATAL'YSIS. *Syn.* CATALYSIS, CONTACT ACTION. Terms applied to a class of chemical actions in which the decompositions, and the recombination of the elements of compound bodies, is apparently excited by the mere presence of, or contact with, other bodies, which do not themselves suffer such a change.

KELP. The alkaline ashes obtained by burning various species of sea-weed, formerly much used for the preparation of carbonate of soda. The weeds most valued for the purpose are the *Fucus vesiculosus, nodosus,* and *serratus,* and the *Laminari abulbosa* and *digitata.*

Of late years, the manufacture of kelp, like that of barilla, has been almost abandoned, except as a source of iodine. Mr. E. C. C. Stanford, by carefully collecting and compressing the weed, and afterwards submitting it to dry distillation, doubles the yield of iodine and bromine, and obtains in addition various valuable hydrocarbons. See BARILLA IODINE, SODA, &c.

KER'MES. *Syn.* KERMES-GRAINS, ALKERMES; GRANUM TINCTORIUM, L. The dried bodies of the female *Coccus Ilicis* of Linnæus, a small insect of the order *Hemiptera,* which flourishes on the Ilex oak. It has been used as a red and scarlet dye-stuff ever since the time of Moses; but is now superseded in this country by cochineal, which gives colours of much greater brilliancy.

KER'MES MIN'ERAL. *Syn.* KERMES MINERALE, K. MINERALIS, L. An amorphous tersulphide of antimony, containing a small admixture of teroxide of animony and sulphuride of potassium. *Prep.* 1. IN THE HUMID WAY.—*a.* (P. Cod.) Carbonate of soda (cryst.), 128 parts (say, 21 parts), is dissolved in water, 1280 parts (say 210 parts), contained in a cast-iron pan; tersulphide of antimony (in fine powder), 6 parts (say 1 part), is next added, and the whole boiled for an hour, with constant agitation with a wooden spatula; the boiling liquid is then filtered into a heated earthen pan containing a small quantity of very hot water, and the solution is allowed to cool as slowly as possible; the red powder which is deposited is collected on a cloth, on which it is well washed with cold water, and the superfluous water being removed by pressure, the powder is dried by a gentle heat, and is, lastly, passed through a fine silk-gauze sieve, and preserved from light and air.

b. (Wholesale.) From black sulphuride of antimony, 4 lb.; carbonate of potassia, 1 lb.; boil in water, 2 galls., for half an hour, filter, &c., as before. The undissolved portion of sesquisulphuret of antimony may be boiled again several times with fresh potassa and water, until the whole is dissolved. Inferior to the last.

c. (CLUZELL'S KERMES.) From tersulphide of antimony, 4 parts; crystallized carbonate of soda, 90 parts; water, 1000 parts; boil, &c., as in 1, *a,* and dry the powder, folded up in paper, at a heat not exceeding 90° Fahr.

2. IN THE DRY WAY.—*a.* (P. Cod.) Carbonate of potassa, 100 parts; tersulphide of antimony, 50 parts; sulphur, 3 parts; mix, fuse in a Hessian crucible, pour the melted mass into an iron mortar, and when cold reduce it to powder; next boil it in water, 1000 parts, contained in an iron vessel, filter the solution, and otherwise proceed as before. *Product:* large, but of inferior quality.

b. (Fownes.) From tersulphide of antimony, 5 parts; carbonate of soda (dry), 3 parts; water, 80 parts; fuse, &c., as before. Nearly equal to 1, *a.*

c. (Berzelius.) Carbonate of potassa (pure), 3 parts; tersulphide of antimony, 8 parts; water, q. s. Resembles the last.

Prop., &c. An odourless, tasteless powder, insoluble in both water and alcohol, and, when pure and carefully prepared, entirely soluble in hydrosulphate of ammonia. As prepared by the formulæ 1, *a*, and 1, *c*, it is a very dark crimson powder, of a velvety smoothness; but that from the other formulæ has a brownish-red colour, more or less deep. The secret of preparing this compound of a fine and velvety quality, like that imported from the Continent, consists simply in filtering the solution whilst boiling hot, and allowing it to cool very slowly, by placing the vessel in an appropriate situation for that purpose. Another important point, according to Rose, is to employ sufficient alkali to keep the whole of the teroxide of antimony in solution as the liquid cools, instead of allowing a part of it to be deposited with the kermes. This is the reason of the superior quality and mildness of that prepared according to the directions of the French Codex. The liquor decanted from the 'kermes mineral' yields the golden sulphide of antimony on the addition of an acid, for which purpose the acetic is generally employed.

Dose. ¼ gr. to 3 or 4 grs., as a diaphoretic, cathartic, or emetic. It occupies in foreign practice the place of our James's Powder.

KETCHUP. *Syn.* CATCHUP, CATSUP, KATCHUP. The juice of certain vegetables strongly salted and spiced, so as to be used as sauce; or a simple sauce made without the natural juice as a substitute for the true ketchup. The following are the principal varieties :—

Camp Ketchup. *Prep.* Take of good old beer, 2 quarts; white wine, 1 quart; anchovies, 4 oz.; mix, heat it to the boiling-point, remove it from the fire, and add of peeled shalots, 3 oz.; mace, nutmegs, ginger, and black pepper, of each, bruised, ½ oz.; macerate for 14 days, with frequent agitation, then allow it to settle, and decant and bottle the clear portion.

Cu'cumber Ketchup. *Prep.* From ripe cucumbers, in the same way as mushroom ketchup. Very luscious. Mixed with cream, or melted butter, it forms an excellent white sauce for fowls, &c.

Marine' Ketchup. *Prep.* Take of strong old beer, 1 gall.; anchovies, 1½ lb.; peeled shalots (crushed), 1 lb.; bruised mace, mustard seed, and cloves, of each, ½ oz.; bruised pepper and ginger, of each, ¼ oz.; mushroom ketchup and vinegar, of each, 1 quart; heat the mixture to the boiling-point, put it into a bottle, and macerate for 14 days, frequently shaking; then strain through flannel, and bottle it for use. Excellent with anything; like the last, it makes good white sauce, and keeps well.

Mush'room Ketchup. *Prep.* 1. Sprinkle mushroom flaps, gathered in September, with common salt, stir them occasionally for 2 or 3 days, then lightly squeeze out the juice, and add to each gallon, cloves and mustard seed, of each, bruised, ½ oz.; allspice, black pepper, and ginger, of each, bruised, 1 oz.; gently heat to the boiling-point in a covered vessel, macerate for 14 days, and decant or strain. Should it exhibit any indications of change in a few weeks, bring it again to the boiling-point, with a little more spice, and a table-spoonful more salt.

2. Take of mushroom juice, 2 galls.; pimento, 2 oz.; cloves, black pepper, mustard seed, and ginger, of each, bruised, 1 oz.; salt, 1 lb., (or to taste); shalots, 3 oz.; gently simmer for 1 hour in a covered vessel, cool, strain, and bottle.

3. Take of mushroom juice, 100 galls.; black pepper, 9 lb.; allspice, 7 lb.; ginger, 5 lb.; cloves, 1 lb. (all bruised); salt, q. s.; gently simmer in a covered tin boiler for 1 hour.

Oys'ter Ketchup. *Prep.* Pulp the oysters, and to each pint add, of sherry wine, or very strong old ale, 1 pint; salt, 1 oz.; mace, ½ oz.; black pepper, 1 dr.; simmer very gently for 10 minutes, strain, cool, bottle, and to each bottle add a spoonful or two of brandy, and keep them in a cool situation. COCKLE KETCHUP and MUSSEL KETCHUP are made in the same way. *Used* to flavour sauces when the fish are out of season; excellent with rump steak, &c.

Pon'tac Ketchup. *Prep.* Take of the juice of elderberries and strong vinegar, of each, 1 pint; anchovies, ½ lb.; shalots and spice, q. s. to flavour; boil for 5 minutes, cool, strain, and bottle. *Used* to make fish sauces.

Toma'to Ketchup. *Prep.* Prepared from tomatoes or love apples, like mushroom ketchup, except that a little very strong Chili vinegar is commonly added. An admirable relish for 'high' or rich flavoured viands.

Wal'nut Ketchup. *Prep.* 1. Take of the expressed juice of young walnuts, when tender, 1 gal.; boil 10 minutes, skim, add of anchovies, 2 lbs.; shalots, 1 lb.; cloves and mace, of each, 1 oz.; 1 clove of garlic, sliced; simmer in a covered vessel for 15 minutes, strain, cool, and bottle, adding a little fresh spice to each bottle, and salt, q. s. Will keep good in a cool place for 20 years.

2. Take of green walnut shells, 16 galls.; salt, 5 lbs.; mix and beat together for a week, press out the liquor, and to every gallon add, of allspice, 4 oz.; ginger, 3 oz.; pepper and cloves, of each, 2 oz.; all bruised; simmer for half an hour, and set aside in a closed vessel and in a cool situation until sufficiently clear.

3. Take of walnut juice, 1 gal.; vinegar, 1 quart; British anchovies (sprats), 3 or 4 lbs.; pimento, 3 oz.; ginger, ½ oz.; long pepper, ½ oz.; cloves, 1 oz.; shalots, 2 oz.; boil and bottle, as before.

4. From the juice of walnut shells, 30 galls.; salt, 1 bushel; allspice and shalots, of each, 6 lbs.; ginger, garlic, and horse-radish, of each, 3 lbs.; essence of anchovies, 3 galls.; as before.

Wine Ketchup. *Prep.* Take of mushroom or walnut ketchup, 1 quart; chopped anchovies, ½ lb.; 20 shalots; scraped horse-radish,

2 oz.; spice, q. s.; simmer for 15 minutes, cool, and add of white and red wine, of each, 1 pint; macerate for 1 week, strain, and bottle.

General remarks. In preparing the above articles, vessels of glazed earthenware, or stoneware, or well-tinned copper pans, should alone be used to contain them whilst being boiled or heated, as salt and vegetable juices rapidly corrode copper, and render the ketchup poisonous. Nothing in the shape of copper, lead or pewter, should be allowed to touch them Even a plated copper spoon left in a bottle of ketchup for some time will render its contents poisonous. Unpleasant and even dangerous fits of vomiting, colic, and diarrhœa, have resulted from the neglect of this precaution. See SAUCE, &c.

KIBES. The vulgar name for ulcerated chilblains.

KID'NEYS. *Syn.* RENES, L. (In *anatomy.*) The kidneys, as almost every one knows, are abdominal viscera which secrete the urine, and form the great channels by which the effete nitrogenous matter is removed from the blood. They are subject to various affections, both functional and organic, chronic and acute, of which some are imperfectly understood, and others only admit of alleviation, but not of being cured. See URINE and URINARY AFFECTIONS.

Kidneys. (In *cookery.*) Soyer recommends kidneys to be dressed by gently broiling them, having previously split them, "so as nearly to divide them, leaving the fat in the middle," and "run a skewer through them, that they may remain open." After being rubbed with a little butter, and seasoned with salt and pepper, "they may be served on toast, or with any sauce." "You may also egg and bread-crumb them." "Five minutes suffice for a sheep or lamb's kidney of common size." (Soyer.) One or two lamb's kidneys, plainly broiled and served up with the gravy in them, eaten along with a little dry-toasted bread, form a most excellent and appropriate luncheon or dinner for a dyspeptic or convalescent.

KING'S CUP. *Prep.* Yellow peel of 1 lemon; lump sugar, 1½ oz.; cold water, 1 pint; infuse 8 or 10 hours, and strain. The addition of a teaspoonful of orange-flower water is a great improvement. *Used* as a diluent in cases where acid liquors are inadmissible. See LEMONADE.

KING'S EVIL. See SCROFULA.

KING'S YELLOW. See YELLOW PIGMENTS.

KI'NIC ACID. $HC_7H_{11}O_6$. *Syn.* QUINIC ACID, CINCHONIC ACID. A peculiar dibasic acid occurring in the cinchona barks, in which it exists associated with the alkaloids. *Prep.* It is readily obtained from kinate of lime, by the action of dilute sulphuric acid; the filtered solution evaporated to the consistence of a syrup, gradually deposits large crystals resembling those of tartaric acid.

Prop., &c. It is soluble in 2 parts of water, and in alcohol; and forms salts called kinates. Kinate of lime is obtained from an acidulated infusion of cinchona bark, by adding an excess of lime, filtering, evaporating to a syrup, and setting the liquid aside to crystallise. These crystals are purified by redissolving them, treating the solution with a little animal charcoal, and crystallising the salt as before. The liquid from which the bark-alkaloids have been precipitated by hydrate of lime affords an almost inexhaustible supply of this salt. See KINONE.

KI'NO. *Syn.* GUM KINO; KINO (B. P., Ph. L. E. & D.) The juice flowing from the incised bark of the *Pterocarpus Marsupium* or Indian, hardened in the sun.—*Dose.* 10 to 30 grs., in powder; as an astringent in chronic diarrhœa, &c.

Factitious Kino, met with in the shops, is made as follows:—Logwood, 48 lbs.; tormentil root, 16 lbs.; madder root, 12 lbs.; exhaust by coction with water, q. s.; to the liquor add of catechu, 16 lbs.; dissolve, strain, and evaporate to dryness. *Prod.* 24 lbs. Extract of mahogany is also commonly sold for kino.

KIRSCH'WASSER (-väs ser) [Ger.]. *Syn.* KIRSCHENWASSER. A spirituous liquor distilled in Germany and Switzerland from bruised cherries. From the rude manner in which it is obtained, and from the distillation of the cherry-stones (which contain prussic acid) with the liquor, it has frequently a nauseous taste, and is frequently poisonous. When properly made and sweetened, it resembles noyau.

KISH. An artificial graphite occasionally produced in iron-smelting furnaces. It occurs in brilliant scales, and is said to possess peculiar efficacy in certain forms of anæmia and chlorosis.

KITCH'EN. The late Alexis Soyer set down as one of the crying faults of our countrymen, the employment of an apartment for the kitchen which is either too small or inconveniently situated, and which, in general, is not sufficiently provided with 'kitchen requisites.' "As a workman cannot work properly without the requisite tools, or the painter produce the proper shade without the necessary colours, in like manner does every person wishing to economise his food, and to cook it properly, require the proper furniture wherewith to do it." The neglect of these matters, which is so general, is, undoubtedly, a mischievous and deceptive economy.

KNOX'S POW'DER. *Prep.* From common salt, 8 parts; chloride of lime, 3 parts; mixed together. An ounce of it dissolved in a tumblerful of water furnishes a solution which is similar to Labarraque's disinfecting fluid.

KŒCHLIN'S LIQUID. *Prep.* From copper filings, 96 grs.; liquor of ammonia, 2 fl. oz.; digested together until it turns of a full blue colour, and then mixed with hydrochloric acid,

5 fl. drs.; distilled water, 5 lbs.—*Dose.* 1 to 2 teaspoonfuls daily; in scrofula. It is poisonous in large doses.

KOOCH'LA NUT. See NUX VOMICA.

KOU'MISS. A liquor prepared by the Calmucs, by fermenting mare's milk, previously kept until sour, and then skimmed. By distillation, it yields a spirit called rack, racky, or araka. 21 lbs. of fermented milk yield about ¾ pint of low wines, and this, by rectification, gives fully ¼ pint of strong alcohol.

KOUS'SO. *Syn.* CUSSO, KOSSO. This substance is the dried flowers of the *Brayera anthelmintica*, an Abyssinian tree which grows to the height of about 20 feet, and belongs to the natural order *Rosaceæ*. It is one of the most effective remedies known for both varieties of tape-worm. The dose, for an adult, is 3 to 5 drs., in powder, mixed with about half a pint of warm water, and allowed to macerate for 15 or 20 minutes. The method prescribed for its successful administration is as follows:—The patient is to be prepared by a purgative or a lavement, and the use of a very slight diet the day before. The next morning, fasting, a little lemon juice is to be swallowed, or a portion of a lemon sucked, followed by the dose of kousso (both liquid and powder), at 3 or 4 draughts, at short intervals of each other, each of which is to be washed down with cold water acidulated with lemon juice. The action of the medicine is subsequently promoted by drinking weak tea without either milk or sugar, or water flavoured with lemon juice or toasted bread; and if it does not operate in the course of 3 or 4 hours, a dose of castor oil or a saline purgative is taken.

The flavour of kousso is rather disagreeable and nauseating. Its operation is speedy and effectual; but at the same time it is apt to produce, in large doses, great prostration of strength, and other severe symptoms, which unfit it for administration to the delicate of both sexes, or during pregnancy or affections of the lower viscera. Care should be taken not to purchase it in powder, as, owing to its high price, it is uniformly adulterated. The powdered kousso of the shops is, in general, nothing more than the root-bark of pomegranate, coloured and scented.

KRE'ASOTE. *Syn.* CREASOTE, CREOSOTE, KREOSOTE; CREASOTUM (B. P., Ph. L. & D.), CREAZOTUM (Ph. E.), L. A peculiar substance, discovered by Reichenbach, and so named on account of its powerful antiseptic property. It is a product of the dry distillation of organic bodies, and is the preservative principle of wood smoke and pyroligneous acid.

Prep. Kreasote is manufactured from wood-tar, in which it is sometimes contained to the amount of 20% to 35%, and from crude pyroligneous acid and pyroxilic oil.

1. (P. Cod.) Wood-tar is distilled in a wrought-iron retort until white vapours of paraffin appear; the heavy oily matter which forms the lower layer of the product is collected, washed with water slightly acidulated with sulphuric acid, and then distilled in a glass retort, rejecting the first portions, which are chiefly eupion; the distillate is treated with a solution of potassa (sp. gr. 1·12), the mixed, liquids being shaken strongly together; after it is settled, the layer of eupion which forms is removed from the surface, and the potash-solution of kreasote exposed to the air until it becomes black; it is then saturated with dilute sulphuric acid, the watery liquid rejected, and the remainder (consisting of crude kreasote) submitted to distillation in glass; the treatment by exposure, potassa, sulphuric acid, and distillation, is repeated three times or oftener, until the combination of kreasote and potassa ceases to become coloured by the action of the air; it is, lastly, saturated with concentrated phosphoric acid, and again distilled, rejecting the first portion that comes over.

2. (M, Simon.) A copper still, capable of containing 80 Berlin quarts, is filled to one third with the oil of wood-tar, and heat is applied; first, the more volatile matters pass over; these do not contain kreasote, and are, therefore, rejected; but when, by gradually increasing the temperature, there passes over a very acid liquid, which becomes turbid, and at the same time an oil separates from it when mixed with water, the product is collected, and the distillation continued until the operator notices a squirting in the still, when this part of the process is complete; the distilled product is then nearly saturated with potassa, and returned to the still, which, in the mean time, has been well cleaned out, and about half filled with water, and the distillation is recommenced; at first an oil comes over, which floats on water, and which consists chiefly of eupion, and is, therefore, rejected; as soon, however, as the oil begins to sink in the water which comes over with it, it is charged with kreasote, and is carefully collected; the distilling aqueous fluid being reintroduced, from time to time, into the still, and the distillation continued so long as any oil continues to come over with it; the heavy oily distillate is now agitated with liquor of potassa, sp. gr. 1·120; the portion which remains undissolved is eupion, and is skimmed off; the potassa-solution of kreasote still, however, contains a considerable quatity of eupion, the greater portion of which may be separated by dilution and distillation with an equal quantity, or with at least ⅛ths of its volume of water, fresh water being added from time to time, as long as any eupion comes over with the distilled liquor; when this has ceased to pass over, sulphuric acid is poured into the still in quantity exactly sufficient to saturate ⅓rd only of the potassa formerly employed, and the distillation is again renewed; kreasote now distils over, the first portions of which, however, still contain eupion, after which pure kreasote follows; that is to say, "a kreasote which, when mixed with 6 or 8 times its quantity of a solution of pure

potassa, furnishes a mixture which, by the addition of any further quantity whatever of water, does not become turbid." The combination of kreasote remaining in the still is now mixed with sulphuric acid in slight excess, and the distillation renewed, the water coming over with it being from time to time returned into the still; and when no further oil passes over with the water, the process is complete. The kreasote thus obtained is redistilled with the water which has passed over with it, whilst the distilled water, as before, is allowed from time to time to run back into the still. The kreasote thus obtained is then colourless; but it contains a considerable quantity of water in solution, which is separated by distillation in a glass retort. The water distils first, and then kreasote, which, after cleaning the neck of the retort from the water, must be received in another dry receiver. If the kreasote assumes a red colour after being exposed for some time to the air, it must be re-distilled, and then it keeps very well. Korne found that tar prepared from turf furnishes much more kreasote than that f fir-wood, &c.

3, (Ure.) In ...erating upon pyroligneous acid, if we dissolve effloresced sulphate of soda in it to saturation, at the temperature of 267° Fahr., the kreasote separates, and floats upon the surface; it is then decanted, and left in repose for some days, during which it deposits a fresh portion of salt and vinegar; it is next saturated whilst hot with carbonate of potassa, and distilled along with water; a pale yellow oily liquid passes over, which is rectified with phosphoric acid, &c., like the crude product of kreasote from tar.

Prop. Kreasote is a colourless, transparent liquid, heavier than water, of a peculiar unpleasant, penetrating odour, resembling that of smoked meat, and a very pungent and caustic taste; its vapour irritates the eyes; it boils at 400 Fahr., and is still fluid at — 16·6° Fahr.; it produces on white filter paper greasy spots, which disappear if exposed to a heat of 212° Fahr.; dissolves in 80 parts of water, and mixes in all proportions with spirit of wine, the essential and fatty oils, acetic acid, naphtha, disulphide of carbon, ammonia, and potass; it dissolves iodine, phosphorus, sulphur, resins, the alkaloids, indigo blue, several salts (especially the acetates and the chlorides of calcium and tin); reduces the nitrate and acetate of silver; is resinified by chlorine, and decomposed by the stronger acids. The aqueous solution is neutral, and precipitates solutions of gum and the white of eggs. It kindles with difficulty, and burns with a smoky flame. When quite pure, it is unaltered by exposure to the air. Sp. gr. 1·071, at 68° Fahr. A slip of deal dipped into it, and afterwards in hydrochloric acid, and then allowed to dry in the air, acquires a greenish-blue colour. It turns a ray of polarised light to the right, whereas carbolic acid does not affect polarisation.

Pur. The fluid commonly sold in the shops for kreasote, is a mixture of kreasote, picamar, and light oil of tar; in many cases it is little else than impure carbolic acid, with scarcely a trace of kreasote. Pure kreasote is perfectly soluble in both acetic acid and liquor of potassa; shaken with an equal volume of water in a narrow test-tube, not more than the 1-80th part disappears; otherwise it contains water, of which kreasote is able to assume 1-10th without becoming turbid.—If it can be dissolved completely in 80 parts by weight of water, at a medium temperature, it then forms a perfectly neutral liquid.—An oily residue floating on the surface betrays the presence of other foreign products (EUPION, KAPNOMOR, PICAMAR), which are obtained at the same time with the kreasote during the dry distillation of organic substances.

Kreasote is "devoid of colour, has a peculiar odour, and is soluble in acetic acid. When it is dropped on bibulous paper, and a boiling heat is applied for a short time, it entirely escapes, leaving no transparent stain." (Ph. L.) "Entirely and easily soluble in its own weight of acetic acid." (Ph. E.) Sp. gr. 1·046 (Ph. L.), 1·066 (Ph. E. & D.). The density and boiling-point of absolutely pure kreasote is given above. When prescribed in pills with oxide of silver, the mass will take fire unless the oxide be first mixed with liquorice or other powder. (Squire.)

Uses. Kreasote has been recommended in several diseases of the organs of digestion and respiration, in rheumatism, gout, torpid nervous fever, spasms, diabetes, tape-worm, &c.; but its use has not, in general, been attended with satisfactory results. It is given in the form of pills, emulsion, or an ethereal or spirituous solution. *Externally*, it has been employed in various chronic diseases of the skin, sores of different kinds, mortifications, scalds, burns, wounds (as a styptic), caries of the teeth, &c.; mostly in the form of an aqueous solution (1 to 80); or mixed with lard (5 drops to 1 dr.), as an ointment; dissolved in rectified spirit, it forms a useful and a popular remedy for toothache arising from decay or rottenness. In the *arts*, kreasote is extensively employed to preserve animal substances, either by washing it over them, or by immersing them in its aqueous solution. A few drops in a saucer, or on a piece of spongy paper, if placed in a larder, will effectually drive away insects, and make the meat keep several days longer than it otherwise would. A small quantity added to brine or vinegar is commonly employed to impart a smoky flavour to meat and fish, and its solution in acetic acid is used to give the flavour of whiskey to malt spirit. See CARBOLIC ACID.

KRE'ATINE. $C_4H_9N_3O_2$·Aq. *Syn.* CREATINE. A crystallisable substance obtained from the juice of the muscular fibre of animals. It was first observed by Chevreul, but has recently been carefully studied by Liebig.

Prep. (Liebig.) Lean flesh is reduced to shreds, and then exhausted with successive portions of cold water, employing pressure; the mixed liquid is heated to coagulate the albumen and colouring matter of the blood, and is then strained through a cloth; pure baryta water is next added as long as a precipitate forms, the liquid is filtered, and the filtrate is gently evaporated to the consistence of a syrup; after repose for some days in a warm situation, crystals of kreatine are deposited; these are purified by redissolving them in water, agitating the solution with animal charcoal, and evaporating, &c., so that crystals may form.

Prop., &c. Brilliant, colourless, prismatic crystals; readily soluble in boiling water, sparingly so in cold water and in alcohol; the aqueous solution is neutral, bitter tasted, and soon putrefies.

KREAT'ININE. $C_4H_7N_3O$. This substance exists in small quantities, both in the juice of flesh and in conjunction with kreatine in urine. It is also produced by the action of the stronger acids on kreatine. It forms colourless prismatic crystals, which are soluble in water, and the solution has a strongly alkaline reaction. It is a powerful organic base, and produces crystallisable salts with the acids.

KRE'NIC ACID. See CRENIC ACID.

KRYSTAL'LINE. The name originally applied by Unverdorben to ANILINE.

KUSTITIEN'S METAL. *Prep.* Take of malleable iron, 3 parts; beat it to whiteness, and add of antimony, 1 part; Molucca tin, 72 parts; mix under charcoal, and cool. *Used* to coat iron and other metals with a surface of tin; it polishes without a blue tint, is hard, and has the advantage of being free from lead and arsenic.

KYANI'ZING. A method of preserving wood and cordage from decay, long known and practised, but patented by Mr. Kyan, a few years since. It consists in immersing the bodies in a solution of corrosive sublimate, 1 part, and water, 50 or 60 parts, either under strong pressure or the contrary, as the urgency of the case or the dimensions of the bodies operated on may require. See DRY ROT.

KY'ANOL. A substance obtained from coal-tar oil, and at first thought to be an independent principle, but since shown to be identical with ANILINE.

LABARRAQUE'S FLUID. See SOLUTION OF CHLORIDE OF SODA.

LAB'DANUM. *Syn.* LADANUM. An odorous, resinous substance found on the leaves and twigs of the *Cystus creticus*, a plant growing in the island of Candia and in Syria. It was formerly much used for making stimulating plasters. The following compound is often vended for it:—

Labdanum, Facti''tious. *Prep.* From gum anime, resin, Venetian turpentine, and sand, of each 6 parts; Spanish juice and gum arabic, of each (dissolved in a little water), 3 parts; Canada balsam, 2 parts; ivory black, 1 part; balsam of Peru, q. s. to give a faint odour.

LA'BELS capable of resisting the action of OILS, SPIRITS, WATER, SYRUPS, and DILUTE ACIDS, may be obtained as follows:—Lay a coat of strained white of egg over the label (an ordinary paper one), and immediately put the vessel into the upper portion of a common steam-pan, or othewise expose it to a gentle heat till the albumen coagulates and turns opaque, then take it out and dry it before the fire, or in an oven, at a white heat of about 212° Fahr.; the opaque white film will then become hard and transparent. The labels on bottles containing STRONG ACIDS or ALKALINE SOLUTIONS should be either etched upon the glass by means of hydrofluoric acid, or be written with incorrodible ink. See ETCHING and INK.

LAB'ORATORY. *Syn.* LABORATORIUM, L. A place fitted up for the performance of experimental or manufacturing operations in chemistry, pharmacy, and pyrotechny. For full information respecting the best mode of fitting up a chemical laboratory, the reader is referred to works specially devoted to chemical manipulation.[1] Almost any well-lighted spare room may be fitted up as a small laboratory at very little expense. The gas-furnaces and improved lamps introduced of later years have to a certain extent rendered chemists independent of brick furnaces. A strong working bench, fitted with drawers and cupboards, and having gas-pipes at intervals for attaching different kinds of jets, is an indispensable fixture. A close cupboard or closet, which is connected by a pipe with the chimney or the external air, is required to receive vessels emitting corrosive or evil-smelling vapours; the door of this closet should be of glass. A sink, with a copious supply of water, must be at hand, for washing apparatus. A glass, a stoneware barrel, with a tap of the same material, is required for holding distilled water. Shelves, supports for apparatus, and drawers, should be provided in abundance. The fine balances and other delicate instruments should be kept in a separate apartment. With regard to apparatus, we may state that the articles most frequently required in a laboratory are the gas or alcohol lamps; iron pans for sand bath and water bath; evaporating dishes; precipitating jars, funnels, and wash-bottles; retorts, flasks, and test-tubes; mortars and pestles; retort- and filtering-stands; rat-tail and triangular files, and glass rod and tubing.

The principal philosophical-instrument-makers sell chests or cabinets filled with apparatus and chemicals, under the name of 'PORTABLE LABORATORIES.' Those sold by Mr. J. J. Griffin and by Messrs. Jackson and

[1] The latest and best work is the "*Handbook of Chemical Manipulation*," by Greville Williams. Faraday's famous work on the same subject has long been out of print.

Townson are, perhaps, the most complete. They are well adapted for illustrating all the more valuable facts of chemical science, and performing all the ordinary operations of qualitative analysis.

LAC. *Syn.* LACCA, L. A resinous substance combined with much colouring matter, produced by the puncture of the female of a small insect, called the *Coccus lacca* or *ficus*, upon the young branches of several tropical trees, especially the *Ficus Indica, Ficus religiosa*, and *Croton lacciferum*. The crude resinous exudation constitutes the STICK-LAC of commerce. SHELL-LAC or SHELLAC is prepared by spreading the resin into thin plates after being melted and strained. SEED-LAC is the residue obtained after dissolving out most of the colouring matter contained in the resin.

Shell-lac is the kind most commonly employed in the arts. The palest is the best, and is known as 'orange lac.' The darker varieties —'liver-coloured,' 'ruby,' 'garnet,' &c.—respectively diminish in value in proportion to the depth of their colour.

Uses, &c. Lac was formerly much used in medicine; its action, if any, is probably that of a very mild diuretic. It is now chiefly used in DENTIFRICES, VARNISHES, LACQUERS, and SEALING-WAX.

Bleached Lac. *Syn.* WHITE LAC; LACCA ALBA, L. By dissolving lac in a boiling lye of pearlash or caustic potassa, filtering and passing chlorine through the solution until all the lac is precipitated; this is collected, well washed and pulled in hot water, and, finally, twisted into sticks, and thrown into cold water to harden. *Used* to make pale varnishes and the more delicate coloured sealing-wax.

LAC DYE. *Syn.* LAC, LAC-LAKE, INDIAN COCHINEAL. A colouring substance used to dye scarlet, imported from India.

Prep. By dissolving out the colour of ground stick-lac by means of a weak alkaline solution, and then precipitating it along with alumina by adding a solution of alum.

Obs. To prepare the lac for dyeing, it is ground and mixed with diluted 'lac spirit,' and the whole allowed to stand for about a week. The 'cloth' is first mordanted with a mixture of tartar and 'lac spirit,' and afterwards kept near the boil for three quarters of an hour, in a bath formed by adding a proportion of the prepared lac dye to the mixture used for mordanting. Lac dye is only applicable to woollen and silk. The colours it yields are similar to those obtained from cochineal, but less brilliant.

LAC SPIRIT. See TIN MORDANTS.

LAC'QUER. A solution of shell-lac in alcohol, tinged with saffron, annotta, aloes, or other colouring substances. It is applied to wood and metals to impart a golden colour. See VARNISH.

LACTALBU'MEN. See CASEIN.

LAC'TATE, *Syn.* LACTAS, L. A salt of lactic acid. The lactates are characterised by yielding an enormous quantity of perfectly pure carbonic oxide gas when heated with 5 or 6 parts of oil of vitriol. Most of these salts may be directly formed by dissolving the hydrate or carbonate of the metal in the dilute acid.

LACTA'TION. See INFANCY, NURSING, &c.

LACTIC ACID. $H_2C_6H_{10}O_6$. *Syn.* ACID OF MILK; ACIDUM LACTICUM, L. A sour, syrupy liquid, discovered by Scheele in whey. It is also found in some other animal fluids, and in several vegetable juices, especially in that of beet-root.

Prep. 1. Dissolve lactate of barium in water, precipitate the barium with dilute sulphuric acid, carefully avoiding excess, and gently evaporate to the consistence of a syrup, or until it acquires the density 1·215. Lactate of calcium may be used instead of lactate of barium, in which case a solution of oxalic acid must be employed as the precipitant. Pure. (See No. 5.)

2. Milk (skimmed or stale), 1 gal.; bicarbonate of sodium, ½ lb.; dissolve, and expose the liquid to the air for some days, until it becomes sour, then saturate the excess of acid with some more bicarbonate of sodium, and again expose it to the air; repeat this as often as the liquid becomes sour; next heat the liquid to the boiling-point, filter, evaporate to dryness (or nearly), and exhaust the residuum with rectified spirit; filter the alcoholic solution, which contains lactate of sodium, add sulphuric acid as long as it causes a precipitate to form, again filter, and concentrate the clear liquid by evaporation.

3. (Boutron and Fremy.) Milk, 3 or 4 quarts; sugar of milk, 200 to 300 grs.; mix, and expose for 2 or 3 days in an open vessel at 70° to 80° Fahr., then saturate with bicarbonate of sodium, again expose at a moderate temperature, saturate with more bicarbonate of sodium, and repeat the process until the whole of the sugar of milk is decomposed; then coagulate the casein by heat, filter, evaporate, extract the acid lactate of sodium by alcohol of sp. gr. ·810, and decompose it by the cautious addition of dilute sulphuric acid; again filter, distil off the alcohol, and evaporate as before.

4. (Scheele.) Evaporate sour whey to ⅓th of its bulk, saturate with slaked lime, filter, add 3 or 4 times the quantity of water, cautiously precipitate the lime with a solution of oxalic acid, filter, and gently evaporate to dryness in a warm bath; digest the residuum in strong rectified spirit, and again filter and evaporate.

5. (Wackenroder.) Sugar of lead, 25 parts; finely powdered chalk, 20 parts; skimmed milk, 100 parts; water, 200 parts; digested together at about 75° Fahr. In six weeks the chalk will be dissolved; the whole is then heated, but not to boiling; the cheese is strained off, pressed, and the decanted liquid is

clarified by albumen and evaporated, to let the lactate of calcium crystallise; the salt is re-crystallised and decomposed, either by sulphuric acid or by the exact quantity of oxalic acid. This is, perhaps, the most effective mode of preparing lactic acid.

6. (Wholesale.)—*a.* Good raw cane-sugar, 7 lbs., is dissolved in milk (skimmed or stale), 2 galls., and cheese (in a moist or putrescent state), ½ lb., and chalk, 4 lbs., previously rubbed to a cream with water, 1½ gal., is then added; the mixture is next exposed in a loosely covered jar, at a temperature of 80° to 86° Fahr., with occasional stirring, for 2 or 3 weeks, or until the whole is converted into a semi-solid mass of crystals of lactate of calcium; this is purified either by draining off and expressing the liquid portion, dissolving the residue in water, and evaporating the solution for crystals; or the whole is put into a stoneware vessel and heated to the boiling-point, by which the casein is coagulated, and the lactate of calcium is dissolved; the solution, filtered whilst hot, furnishes the salt in crystals on cooling; these crystals are subsequently dissolved in water, and the filtered solution decomposed by oxalic acid, as before.

b. From cane-sugar, 4 parts; moist cheese, 1 part; chalk, 3 parts; water, 20 parts; as the last.

Obs. Lactic acid prepared by any of the usual formulæ may be rendered quite pure by dilution with water, saturation with baryta, evaporation, crystallisation, re-solution in water, and the careful addition of dilute sulphuric acid, as in No. 1; the liquid is, lastly, again filtered and evaporated. Another plan is to convert the acid into lactate of zinc, by the addition of commercial zinc-white, and to redissolve the new salt in water, and then decompose the solution with a stream of sulphuretted hydrogen. In all cases the evaporation should be conducted at a very gentle heat, and, when possible, finished over sulphuric acid, or *in vacuo*. For particular purposes, this last product may be dissolved in ether, filtered, and the ether removed by a very gentle heat. Care must also be taken to remove the solid lactate of calcium at the proper period from the fermenting liquid, as otherwise it will gradually redissolve and disappear, and on examination the liquid will be found to consist chiefly of a solution of butyrate of calcium.

Prop. The product of the above formulæ is a solution of lactic acid. It may be concentrated *in vacuo* over a surface of oil of vitriol until it appears as a syrupy liquid of sp. gr. 1·215; soluble in water, alcohol, and ether; exhibiting the usual acid properties, and forming salts with the metals, called LACTATES. Heated in a retort to 266° Fahr., a small portion distils over, and the residuum on cooling concretes into a yellowish, solid, fusible mass, very bitter, and nearly insoluble in water. This is lactic acid, which has lost half (1 equiv.) of its basic water. By long boiling in water, this substance is reconverted into lactic acid. Heated to 480° Fahr., it suffers decomposition, lactide (the anhydrous, concrete, or sublimed lactic acid of former writers) and other products being formed. This new substance may be purified by pressure between bibulous paper and solution in boiling alcohol from which it separates in dazzling white crystals on cooling. By solution in hot water and evaporation to a syrup, it furnishes common lactic acid.

Uses. Lactic acid has been given in dyspepsia, gout, phosphatic urinary deposits, &c. From its being one of the natural constituents of the gastric juice, and from its power of dissolving a considerable quantity of phosphate of calcium, it appears very probable that it may prove beneficial in the above complaints. *Dose.* 1 to 5 grs.; in the form of lozenges, or solution in sweetened water.

LAC'TIC FERMENTA'TION. The peculiar change by which saccharine matter is converted into lactic acid. Nitrogenous substances which in an advanced state of putrefactive change act as alcohol-ferments often possess, at certain periods of their decay, the property of inducing an acid fermentation in sugar, by which that substance is changed into lactic acid. Thus, the nitrogenized matter of malt, when suffered to putrefy in water for a few days only, acquires the power of acidifying the sugar which accompanies it; whilst in a more advanced state of decomposition it converts, under similar circumstances, the sugar into alcohol. The gluten of grain behaves in the same manner. Wheat flour, made into a paste with water, and left for four or five days in a warm situation, becomes a true lactic acid ferment; but if left a day or two longer, it changes its character, and then acts like common yeast, occasioning the ordinary panary or vinous fermentation. Moist animal membranes, in a slightly decaying condition, often act energetically in developing lactic acid. The rennet employed in the manufacture of cheese furnishes a well-known example of this class of substances.

In preparing lactid acid from milk, the acid formed, after a time, coagulates and renders insoluble the casein, and the production of the acid ceases. By carefully neutralizing the free acid by carbonate of sodium, the casein becomes soluble, and, resuming its activity, changes a fresh quantity of sugar into lactic acid, which may be also neutralized, and by a sufficient number of repetitions of this process all the sugar of milk present may, in time, be acidified. This is the rationale of the common process by which lactic acid is obtained. Cane-sugar (probably by previously becoming grape-sugar) and the sugar of milk both yield lactic acid; the latter, however, most readily, the grape-sugar having a strong tendency towards the alcoholic fermentation. If the lactic fermentation be allowed to pro-

ceed too far, the second stage of the process of transmutation commences, hydrogen gas and carbonic acid gas are evolved, and the butyric fermentation, by which oily acids are formed, is established.

LAC'TIDE. See LACTIC ACID.

LAC'TIN. See SUGAR OF MILK.

LAC'TOMETER. *Syn.* GALACTOMETER. An instrument for ascertaining the quality of milk. The best way of testing milk is to place it in a long graduated tube or lactometer, and to allow it to remain until all the cream has separated, then to decant off the clear whey, and to take its specific gravity; the result of the two operations, when compared with the known quantity of cream and the density of the whey of an average sample of milk, gives the value of the sample tested.

A little instrument called a 'milk tester' is sold in London at a low price. It is essentially a hydrometer which sinks to a given mark on the stem in pure water, and floats at another mark at the opposite end of the scale in pure milk. The intermediate space indicates the quantity of water (if any) employed to adulterate the article. As the sp. gr. of pure milk varies, the indications of the 'tester' cannot be depended on.

LAC'TUCA. (B.P.) *Syn.* LETTUCE. The leaves and flowering tops of the wild indigenous plant *Lactuca Virosa*. They are sedative, narcotic, and powefully diuretic; also mildly laxative and diaphoretic. Given in dropsy and visceral obstructions. See LETTUCE, EXTRACT OF.

LAC'TOSE. See SUGAR OF MILK.

LACTUCA''RIUM. *Syn.* LETTUCE OPIUM, THRIDACE; LACTUCARIUM (Ph. E. & D.). The inspissated milky juice of the *Lactuca sativa* (common garden lettuce), or the *Lactuca virosa* (strong scented wild lettuce), obtained, by incision, from the flowering stems, and dried in the air. The latter species yields by far the greater quantity. M. Arnaud, of Nancy, adopts the following method of procuring this substance, which appears to be the most productive and simple of any yet published:—Before the development of the lateral branches, the stems of twelve plants are cut, one after another, a little below the commencement of these branches; returning to the first one, a milky exudation is found on the cut portion, and on that which remains fixed in the earth; this milky exudation is adroitly collected with the end of the finger (or with a bone knife), which is afterwards scraped on the edge of a small glass; the same operation is performed on twelve other heads, and so on; on the third day it is repeated on every portion of the plant remaining in the ground, a thin slice being first cut off the top; this is done every day until the root is reached. As soon as the lactucarium is collected, it coagulates; the harvest of each day is divided into small pieces, which are placed on plates, very near each other, but without touching, and allowed to dry for two days, after which they are set aside in a bottle. In this way 15 or 20 times the ordinary product is obtained.

Prop., &c. Lactucarium is anodyne, hypnotic, antispasmodic, and sedative, allaying pain and diminishing the force of the circulation. It has been recommended in cases in which opium is inadmissible, and has been administered with advantage in chronic rheumatism, cholic, diarrhœa, asthma, and troublesome cough of phthisis, the irritability and watchfulness in febrile disorders, &c.—*Dose.* 2 to 5 grs.; made into pills, lozenges, or tincture.

LACTU'CIN. *Syn.* LACTUCINUM, L. This is the active principle of lactucarium, and is found in the juice of several species of lettuce.

Prep. Exhaust lactucarium with hot rectified spirit, agitate the tincture with a little animal charcoal, filter, add a little milk of lime, and evaporate to dryness; digest the residuum in hot rectified spirit, filter, and evaporate by a gentle heat, so that crystals may form.

Prop., &c. A nearly colourless, odourless, fusible, neutral, bitter substance; sparingly soluble in cold water and in ether; but freely soluble in alcohol. It possesses feeble basic properties. Good lactucarium contains fully 20% of this substance.

LAD'ANUM. See LABDANUM.

LAENNEC'S CONTRA-STIMULANT. See DRAUGHT.

LAKE. *Syn.* LACCA, L. Animal or vegetable colouring matter, precipitated in combination with oxide of tin or alumina; usually the latter. The term was formerly restricted to red preparations of this kind, but is now indiscriminately applied to all compounds of alumina and colouring matter. The term 'LAKE,' when unqualified by an adjective, is, however, understood to apply exclusively to that prepared from cochineal.

Prep. Lakes are made—1. By adding a solution of alum, either alone or partly saturated with carbonate of potassa, to a filtered infusion or decoction of the colouring substance, and after agitation precipitating the mixture with a solution of carbonate of potash.—2. By precipitating a decoction or infusion of the colouring substance made with a weak alkaline lye, by adding a solution of alum.—3. By agitating recently precipitated alumina with a solution of the colouring matter, prepared as before, until the liquid in nearly decoloured, or the alumina acquires a sufficiently dark tint. The first method is usually employed for acidulous solutions of colouring matter, or for those whose tint is injured by alkalies; the second, for those that are brightened, or at least uninjured, by alkalies; the third, for those colouring matters that have a great affinity for gelatinous alumina, and readily combine with it by mere agitation. By attention to these general rules, lakes may be prepared from almost all animal and vegetable colouring substances that yield their colour to

water, many of which will be found to possess great beauty and permanence. The precise process adapted to each particular substance may be easily ascertained by taking a few drops of its infusion or decoction, and observing the effects of alkalies and acids on the colour. The quantity of alum or of alumina employed should be nearly sufficient to decolour the dye liquor; and the quantity of carbonate of potassa should be so proportioned to the alum as to exactly precipitate the alumina without leaving free or carbonated alkali in the liquid. The first portion of the precipitate has the deepest colour, and the shade gradually becomes paler as the operation proceeds. A beautiful 'tone' of violet, red, and even purple, may be communicated to the colouring matter of cochineal by the addition of perchloride of tin; the addition of arseniate of potassa (neutral arsenical salt) in like manner gives shades which may be sought for in vain with alum or alumina. After the lake is precipitated, it must be carefully collected, washed with cold distilled water, or the purest rain water, until it ceases to give out colour, and then carefully dried in the shade. In this state it forms a soft velvety powder. That of the shops is generally made up into conical or pyramidal drops (drop lake), which is done by dropping the moist lake through a small funnel on a clean board or slab, and drying it by a gentle heat as before. A very little clear gum water is commonly added to the paste, to give the drops consistence when dry.

Blue Lake. *Syn.* LACCA CŒRULEA, L. Prepared from some of the blue-coloured flowers; fugitive. The name is also applied to lump archil (lacca cœrulea), to moist alumina coloured with indigo, and to mixed solutions of pearlash and prussiate of potash, precipitated with another solution of sulphate of iron and alum. These are permanent and beautiful, but are seldom used, in consequence of indigo and Prussian blue supplying all that is wanted in this class of colours.

Brazil-wood Lake. *Syn.* DROP LAKE; LACCA IN GLOBULIS, L. *Prep.* 1. Take of ground Brazil-wood, 1 lb.; water, 4 galls.; digest for 24 hours, then boil for 30 or 40 minutes, and add of alum 1½ lb.; dissolved in a little water; mix, decant, strain, and add of solution of tin, ½ lb.; again mix well and filter; to the clear liquid add, cautiously, a solution of salt of tartar or carbonate of soda, as long as a deep-coloured precipitate forms, carefully avoiding excess; collect, wash, dry, &c., as directed above.

Obs. The product is deep red. By collecting the precipitate in separate portions, lakes varying in richness and depth of colour may be obtained. The first portion of the precipitated lake has the brightest colour. An excess of alkali turns it on the violet, and the addition of cream of tartar, on the brownish-red. The tint turns more on the violet red when the solution of tin is omitted. Some persons use less, others more, alum.

2. Add washed and recently precipitated alumina to a strong and filtered decoction of Brazil wood. Inferior to the last.

Carmina'ted Lake. *Syn.* COCHINEAL LAKE, FLORENCE L., FLORENTINE L., PARIS L., VIENNA L.; LACCA FLORENTINA, L. *Prep.* 1. The residuum of the cochineal left in making carmine is boiled with repeated portions of water, until it is exhausted of colour; the resulting liquor is mixed with that decanted off the carmine, and at once filtered; some recently precipitated alumina is then added, and the whole gently heated, and well agitated for a short time; as soon as the alumina has absorbed sufficient colour, the mixture is allowed to settle, after which the clear portion is decanted, the lake collected on a filter, washed, and dried, as before. The decanted liquor, if still coloured, is now treated with fresh alumina until exhausted, and thus a lake of a second quality is obtained. Very fine.

2. To the coloured liquor obtained from the carmine and cochineal as above, a solution of alum is added, the filtered liquor precipitated with a solution of carbonate of potassa, and the lake collected and treated as before. Scarcely so good as the last.

Obs. Some makers mix a little solution of tin with the coloured liquor before adding the alum or alumina; this brightens the colour. The above lake is a good glazing colour with oil, but has little body. It may be made directly from a decoction of cochineal. (See *below*.)

Lake, Coch'ineal. *Prep.* 1. Cochineal (in coarse powder), 1 oz.; water and rectified spirit, of each, 2½ oz.; digest for a week, filter, and precipitate the tincture with a few drops of solution of tin, added every two hours, until the whole of the colouring matter is thrown down; lastly, wash the precipitate in distilled water, and dry it. Very fine.

2. Digest powdered cochineal in ammonia water for a week, dilute the solution with a little water, and add the liquid to a solution of alum, as long as a precipitate falls, which is the lake. Equal to the last.

3. Coarsely powdered cochineal, 1 lb.; water, 2 galls.; boil 1 hour, decant, strain, add a solution of salt of tartar, 1 lb., and precipitate with a solution of alum. By adding the alum first, and precipitating the lake with the alkali, the colour will be slightly varied. All the above are sold as CARMINATED or FLORENCE LAKE, to which they are often superior.

Lake, Green. Made by mixing blue and yellow lake together. Seldom kept in the shops, being generally prepared extemporaneously by the artist on his palette.

Lake, Lac. *Prep.* Boil fresh stick-lac in a solution of carbonate of soda, filter the solution, precipitate with a solution of alum, and proceed as before. A fine red.

Lake, Li'chen. See ORCEIN.

Lake, Mad'der. *Syn.* LACCA RUBIÆ, L. CO-

LUMBINA, L. *Prep.* 1. (Sir H. C. Inglefield.) Take of Dutch grappe or crop madder, 2 oz.; tie it in a cloth, beat it well in a pint of water in a stone mortar, and repeat the process with fresh water (about 5 pints) until it ceases to yield colour; next boil the mixed liquor in an earthen vessel, pour it into a large basin, and add of alum 1 oz., previously dissolved in boiling water, 1 pint; stir well, and while stirring, pour in gradually of a strong solution of carbonate of potassa ('oil of tartar'), 1½ oz.; let the whole stand until cold, then pour off the supernatant yellow liquor, drain, agitate the residue with boiling water, 1 quart (in separate portions), decant, drain, and dry. *Product.* ½ oz. The Society of Arts voted their gold medal to the author of the above formula.

2. Add a little solution of acetate of lead to a decoction of madder, to throw down the brown colouring matter, filter, add a solution of tin or alum, precipitate with a solution of carbonate of soda or of potassa, and otherwise proceed as before.

3. (Ure.) Ground madder, 2 lbs.; water, 1 gal.; macerate with agitation for 10 minutes, strain off the water, and press the remainder quite dry; repeat the process a second and a third time; then add to the mixed liquors, alum, ½ lb., dissolved in water, 3 quarts; and heat in a water bath for 3 or 4 hours, adding water as it evaporates; next filter, first through flannel, and, when sufficiently cold, through paper; then add a solution of carbonate of potassa as long as a precipitate falls, which must be washed until the water comes off colourless, and, lastly, dried. If the alkali be added in 3 successive doses, 3 different lakes will be obtained, successively diminishing in beauty. See MADDER, MADDER RED, &c.

Or'ange Lac. *Prep.* Take of the best Spanish annotta, 4 oz.; pearlash, ¾ lb.; water, 1 gall.; boil for half an hour, strain, precipitate with alum, 1 lb., dissolved in water, 1 gall., observing not to add the latter solution when it ceases to produce an effervescence or a precipitate; strain, and dry the sediment in small squares, lozenges, or drops. The addition of some solution of tin turns this lake on the LEMON YELLOW; acids redden it. See YELLOW LAKE.

Lake, Red. *Prep.* Take of pearlash, 1 lb.; clean shreds of scarlet cloth, 3½ lbs.; water, 5 galls.; boil till the cloth is decoloured, filter the decoction, and precipitate with a solution of alum, as before. See the LAKES noticed above (Brazil-wood, Carminated, Cochineal, and Madder).

Lake, Yellow. *Prep.* 1. Boil French berries, quercitron bark, or turmeric, 1 lb., and salt of tartar, 1 oz., in water, 1 gal., until reduced to one half, then strain the decoction, and precipitate with a solution of alum.

2. Boil 1 lb. of the dye-stuff with alum, ½ lb.; water, 1 gal., as before, and precipitate the decoction with a solution of carbonate of potash. See LAKE, ORANGE (*above*).

LAMB in its general qualities closely resembles mutton, of which, indeed, it is merely a younger and more delicate kind. It is well adapted as an occasional article of food for the convalescent and dyspeptic; but it is unequal for frequent use, more especially for the healthy and robust, to the flesh of the adult animal.

LAMBS, DISEASE OF. Among other diseases, these animals are particularly prone to one affecting the lungs in consequence of the existence of parasites (*Strongylus bronchialis*) in the air-passages. See PARASITES.

LAMP. A contrivance for producing artificial light or heat by the combustion of inflammable liquids. The term 'lamp' is also applied to a portable gas-burner (GAS-LAMP), and to a tubular candle-holder, which, by the aid of a simple mechanical device, keeps the flame at one height (CANDLE-LAMP).

OIL LAMPS were employed for illumination among the nations of antiquity, at the earliest period of which any record exists. The Assyrian, Greek, and Roman lamps preserved in our museums are generally noble specimens of art-workmanship. Though elegant in form, and rich in external embellishment, the ancient lamp was simply a vessel to contain the oil, with a short depression or spout on the one side, in which the wick is laid. Lamps of this rude construction are still in common use in many countries.

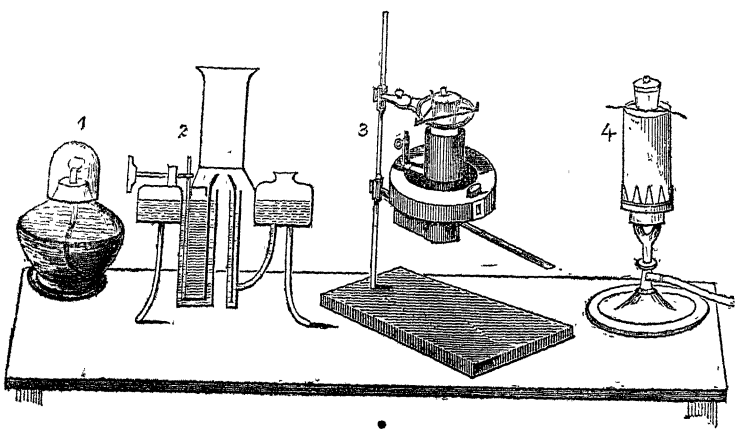
No important improvement in the principle and construction of lamps as a source of light occurred until a comparatively recent date; the smoke, dirt, and disagreeable odour of the common lamp having previously led to its disuse among the superior classes in favour of candles. At length, in 1789, M. Argand made a revolution in illumination by the invention and introduction of the well-known lamp which bears his name. In the ARGAND LAMP a hollow tubular wick of woven cotton replaces the solid bundle of fibres, and is so arranged that air passes through it into the interior of the flame. Over the burner is placed a cylindrical glass chimney, open at the bottom, and surrounding the flame at a short distance from it, by which another current of air is made to act on the exterior portion of the flame. In this way a due supply of oxygen is secured, and sufficient heat generated for the perfect combustion of the gaseous products of the oil, and the smoke and soot which escape from the ordinary lamp are converted into a brilliant and smokeless flame.

The earliest table-lamps constructed on Argand's principle had one serious defect—the oil vessels had to be placed almost on a level with the burners, in a position which caused them to cast objectionable shadows. This defect was almost entirely removed by making the oil vessel in the form of a flattish ring, connected by slender tubes with the

burner. The more elegant contrivances, known as the MODERATOR LAMP and CARCEL LAMP, which are now so much used for burning colza and similar oils, cast no shadow. In these the oil, instead of being sucked up by the wick, or descending to it by the force of gravity, is driven up by mechanical means from the oil-reservoir contained in the foot or pedestal. A spiral spring, acting upon a piston, elevates the oil in the 'moderator,' while a little pump worked by clockwork does the same duty in the 'Carcel.' The burner and wick in each are formed on Argand's principle.

For burning the hydrocarbon oils distilled from coal and petroleum, lamps of very simple construction are used. These oils, in consequence of their diffusive character, rise to a considerable height up a wick, and therefore do not require mechanical lamps. The wicks of HYDRO-CARBON LAMPS are usually flat, but sometimes circular. To cause perfect combustion, a strong draught of air is created by placing over the flame a tall glass chimney, usually much contracted above the flame. A metallic cap, with an orifice the shape of the flame, is placed over the burner, its use being to deflect the currents of air upon the flame. The reservoirs of hydro-carbon lamps ought always to be constructed of some bad conductor of heat, as glass or porcelain.

For chemical operations, many forms of lamp are used. The ordinary glass SPIRIT-LAMP, fitted with a ground-glass cap, is quite indispensable for minor experiments. (See *engr.* 1.)



Stoneware wick-holders are preferable to those of brass, which become greatly heated, and endanger the splitting of the glass. "An effective spirit-lamp may at any time be constructed out of a vial having a glass tube passing through the cork, a cover being formed from a test-tube inverted over the wick, and fitting with moderate tightness on the superior extremity of the cork," (Greville Williams.) Alcohol or wood spirit is the fuel used.

The ARGAND LAMP, when intended as a source of heat for chemical purposes, is so modified as to adapt it to burn either oil, spirit of wine, or wood-spirit, and the combustion is greatly aided by the chimney, which in this case is made of copper. (See *engr.* 2 and 3.) The lamp itself is also made of metal, and furnished with ground caps to the wick-holder and aperture by which the spirit is introduced, in order to prevent loss of spirit by evaporation when the lamp is not in use. When in use this aperture must always be left open, otherwise an accident is sure to happen, as the heat expands the air in the lamp, and the spirit is forcibly expelled.

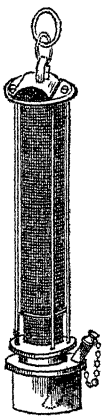
In those situations in which coal-gas is cheap, it may be used with great economy and advantage as a course of heat in most chemical operations. Retorts, flasks, capsules, and other vessels, can be thus exposed to an easily regulated and constant temperature for many successive hours. Small platinum crucibles may be ignited to redness by placing them over the flame on a little wire triangle. Of the various gas-lamps now used in the laboratory, the first and most simple consists of a common Argand gas-burner fixed on a heavy and low foot, and connected with a flexible gas-tube of caoutchouc or other material. (See *engr.* 4.) With this arrangement it is possible to obtain any degree of heat, from that of the smallest blue flame, to that which is sufficient to raise a moderately large platinum crucible to dull redness. When gas mixed with a certain proportion of air is burnt, a pale blue flame, free from smoke, and possessing great heating power, is obtained. A lamp for burning the mixture may easily be made by fitting a close cover of fine wire gauze over the top of the chimney of the last-mentioned contrivance. The gas is turned on, and after a few minutes ignited above the wire gauze. The ingenious and useful burners of

Bunsen and Griffin are so constructed that gas and air mixed in any proportions, or gas alone, may be burnt at pleasure. See ILLUMINATION, FUEL, FURNACE, GAS, LABORATORY, &c.

Flame'less Lamp. *Syn.* GLOW LAMP. A coil of fine platinum wire is slipped over the wick of a spirit lamp, the greater part being raised above the cotton; the lamp is supplied with ether or alcohol, lighted for a moment, and then blown out. The coil continues to glow in the mixed atmosphere of air and combustible vapour, until the liquid in the lamp is exhausted.

Monochromat'ic Lamp. A lamp fed with a mixture of a solution of common salt and spirit of wine. It gives a yellow light, and makes every object illuminated by it appear either yellow or black. The human features are changed in a remarkable degree; the countenance appearing truly ghastly and unearthly.

Safe'ty Lamp. *Syn.* MINER'S LAMP, DAVY, GEORDY. The safety lamp of Sir H. Davy and George Stephenson are similar in principle, and were independently invented about the same time. That of Sir H. Davy consists of a common oil lamp, surmounted with a cylinder of wire gauze, the apertures of which are not greater than the $\frac{1}{20}$th of an inch square, and the wire of which it is made of the $\frac{1}{40}$th to the $\frac{1}{30}$th of an inch in diameter. (See *engr.*) The fire-damp (carbonetted hydrogen) along with air passes through the meshes into the interior of the gauze cylinder. Here it ignites, but the flame which is produced by its combustion cannot explode a mixture of fire-damp and air by which the lamp may be surrounded. The flame is prevented from passing to the exterior of the gauze by the cooling action of the metal of which it is constructed. When this lamp is taken in to an explosive atmosphere, although the fire-damp may burn within the cage with such energy as sometimes to heat the metallic tissue to dull redness, the flame is not communicated to the mixture on the outside. These appearances are so remarkable, that the lamp becomes an admirable indicator of the state of the air in different parts of the mine, and if its admonitions are attended to, gives the miner time to withdraw before an explosion takes place.



Telescope Lamp. This ingenious contrivance, invented by Messrs. Murray and Heath, is intended for microscopic illumination. It consists of three brass tubes sliding one within the other, the oil vessel being contained in the inner tube. The height of the lamp is regulated to the greatest nicety by simply turning one tube in the other, interior spiral guides preventing all chance of slipping. The great advantages of this arrangement is absence of the stand and bar usually employed for raising and lowering the lamp, which enables it to be used on all sides, and to be brought much closer to the microscope than other lamps. See *Engr.*, p. 680.

LAMP BLACK. See BLACK PIGMENTS.

LAMP'REY. *Syn.* GREAT LAMPREY, SEAL. This fish is the *Petromyzon marinus* of Linnæus. It generally quits the sea in the spring, for the purpose of spawning, and remains in our rivers for a few months. Its flesh is soft and glutinous, and though esteemed a delicacy, is extremely difficult of digestion, if not otherwise unwholesome. Potted lampreys are usually so highly seasoned, as to become a dangerous article of food. Henry I is said to have lost his life from the effects of a surfeit of lampreys.

LANTHA'NIUM. La. A rare metal, discovered by Mosander, associated with oxide of cerium. Oxide of lanthanium is a pale salmon-coloured powder, unaffected by ignition in open vessels. See CERIUM.

LA'PIS. [L.] A stone. The term was much employed by the old chemists, and is still commonly applied to several preparations used in medicine.

Lapis Caus'ticus. See POTASSA.

Lapis Divi'nus. *Syn.* DIVINE STONE; LAPIS OPHTHALMICUS, L.; PIERRE DIVINE, Fr. *Prep.* 1. (Beer.) Verdigris, nitre, and alum, equal parts, melted together.

2. (P. Cod.) Alum, nitre, and blue vitriol, of each 3 oz.; camphor, 1 dr.; as last.

3. (Woolfuss.) Blue vitriol, nitre, alum, and camphor, equal parts, melted together, adding the camphor last. Astringent and detergent. 1 oz., dissolved in water, 1 pint, formed a once celebrated lotion. 1 dr. in water, 1 pint, is still used as a collyrium.

Lapis Inferna'lis. See NITRATE OF SILVER.

Lapis Lazu'li. See ULTRAMARINE.

Lapis Lydius. *Syn.* LYDIAN STONE. A siliceous slate, used as a touchstone by jewellers.

Lapis Medicamento'sus. *Syn.* MEDICINAL STONE; LAPIS MIRABILIS, L. *Prep.* (Ph. L. 1746.) Alum, litharge, and Armenian bole, of each, 6 oz.; colcothar of green vitriol, 3 oz.; vinegar, 4 fl. oz.; mix. and evaporate to dryness. Formerly used to make an astringent and detergent lotion:—1 oz. to water, 1 pint. Once a popular application to ulcers, and in other cases; now disused.

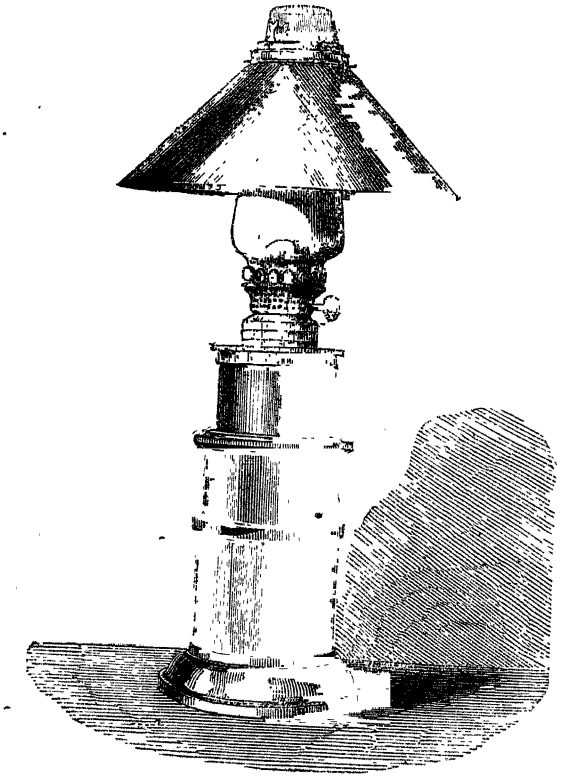
Lapis Vulnerar'ius. Very similar to LAPIS DIVINUS.

LARD. *Syn.* HOG'S LARD, AXUNGE; ADEPS (Ph. L.), AXUNGIA (Ph. E.), A. SUILLUS (Ph. D.), A. PORCI, A. PRÆPARATUS, (B.P.), L. The fat of the pig (*Sus scrofa*—Linn.) melted by a gentle heat, and strained through flannel or a hair sieve. The fat about the loins yields the whitest and hardest lard. "That which has been cured with chloride of sodium is not to be employed." (Ph. L.) "It is not to be used without being first carefully washed with

water." (Ph. L. 1866.) *Used*, chiefly, to make ointments, and in cookery. See ADEPS.

LARD'ING. By many this is regarded as belonging to the higher style of cookery only, and too troublesome and extravagant to be adapted to the kitchens of the middle classes and the poor. This, we are assured, is not the case. "On the contrary, "it is an economical process, and will make lean meat go much farther than without it." The process of larding is a follows:—"Get what is called a larding needle, that is, a piece of steel from 6 to 9 inches long, pointed at one end, and having four slits at the other to hold a small strip of bacon when put between them. It will, perhaps, cost tenpence. Cut the bacon into pieces 2 or 3 inches long, and ¼ to ½ an inch square; put each one after the other in the pin, insert it in the meat, and leave only about half an inch out; using 8 pieces to each pound." (Soyer.)

LARK. The *Alauda arvensis* (SKYLARK) and the *Alauda cristata* (FIELD-LARK), with several other species of the same genus, form a light and nutritious article of food, by many esteemed a delicacy. The last, according to



Galen and Dioscorides, eaten either roasted or boiled, 'helps the colic.' The heart, applied to the thigh, was also regarded to possess the same virtue.

LAUDA'NUM. This name is now understood to denote, exclusively, the common tincture of opium of the Pharmacopœia; but formerly the term was applied to several preparations of opium differing greatly from each other, both in their strength and mode of preparation. (See *below*.)

Laudanum, Dutchman's. From the flowers of bull's hoof or Dutchman's laudanum (*Passiflora mucuja*—Linn.) infused in rum. Narcotic. *Used* as a substitute for tincture of opium in the West Indies.

Laudanum, Ford's. This is merely the common tincture of opium aromatized with a little cloves and cinnamon.

Laudanum, Houlton's. *Prep.* From opium 2½ oz.; distilled vinegar, 1½ pint; digested together for a week, the filtered tincture gently evaporated nearly to dryness, and then redissolved in weak spirit (1 of rectified spirit to 7 of water), 1 quart.—*Dose* 10 to 60 drops.

Laudanum, Neumann's. A fermented infusion of opium evaporated to the consistence of honey.

Laudanum, Quince. *Syn.* EXTRACTUM OPII CYDONIATUM, LAUDANUM CYDONIATUM, L. *Prep.* 1. Extract of opium made with quince juice; a few drops of the oils of cinnamon, cloves, and mace, being added before the mass cools. Now seldom used.

2. LAUDANUM LIQUID-QUINCE; LAUDANUM LIQUIDUM CYDONIATUM, L. L. C. PARATUM FERMENTATIONE, L.) A fermented infusion of opium prepared with quince juice, aromatized with cloves, cinnamon, aloes wood, and yellow sandal wood, and evaporated so as to possess about twice the strength of the ordinary tincture. Now obsolete.

Laudanum, Rousseau's. Wine of opium prepared by fermentation. See WINE.

Laudanum, Smith's Concentrated. Resembles Battley's LIQUOR OPII SEDATIVUS, but possesses about 6 times its strength.

Laudanum, Swediaur's. *Prep.* From extract of opium, 2 parts, dissolved in a mixture of alcohol, 1 part, distilled water, 8 parts. Every 5 drops contain 1 gr. of opium.

Laudanum, Sydenham's Liquid. *Syn.* LAUDANUM LIQUIDUM SYDENHAMI, L. Similar to WINE OF OPIUM—Ph. L., but rather stronger, and aromatized with a little cloves and cinnamon. Wine of opium is now always sold for it.

Laudanum, Tartarized. *Syn.* LAUDANUM LIQUIDUM TARTARIZATUM, L. A tincture of opium prepared with spirit alkalized with salt of tartar, and flavoured with aromatics. Obsolete.

LAUGH'ING GAS. See NITROUS OXIDE.

LAUR'EL. See CHERRY LAUREL, SWEET BAY, OIL, &c.

LA'VA. The matter thrown out by volcanoes, The beautiful ornamental vases, jugs, and other objects sold under the name, are a superior sort of unglazed coloured porcelain.

LAVE'MENT. See ENEMA.

LAV'ENDER. The flowers or flowering tops of *Lavandula vera* or common garden lavender. An essential oil, spirit, and tincture, prepared from it, are officinal in the Pharmacopœias.

Lavender, Red. See TINCTURE.

Lavender, Smith's British. *Prep.* From English oil of lavender, 2 oz.; essence of ambergris, 1 oz.; ean de Cologne, 1 pint; rectified spirit, 1 quart. Very fragrant. See WATER (Lavender.)

LAX'ATIVES. *Syn.* LENITIVES; LAXATIVA, LAXANTIA, LENITIVA, L. Mild purgatives or cathartics. The principal of these are—almond oil, cassia pulp, castor oil, confection of senna, cream of tartar, figs, grapes, honey, phosphate of soda, prunes, salad oil, tamarinds, &c..

LAY'ERS. Among gardeners, a mode of propagating plants, by laying down the shoots of young twigs, and covering a portion of them with the soil, without detaching them from the parent plant. To facilitate the rooting of such layers, the part beneath the soil is fractured by twisting or bruising it, or it is partly cut through with a sharp knife, immediately under a bud. When the layer has taken root, it is divided from the parent stem, and transplanted or potted. In this way with a little care, nearly all plants may be multiplied.

LEAD. Pb. Eq. 207. *Syn.* PLUMBUM. This metal, like gold, silver, and iron, appears to have been known in the most remote ages of antiquity. The ore from which it is almost exclusively extracted, as being the only one found in abundance, is the native sulphide or sulphuret of lead, called by mineralogists galena.

Prep. On the large scale lead is obtained by roasting galena in a reverberatory furnace, and smelting the residue along with coal and lime. The lead thus obtained generally contains small quantities of both silver and gold, which it often pays to extract, by a method termed 'Pattinson's process.' This process is founded on the circumstance that when melted, lead containing silver is allowed to cool. The lead crystallises out first, leaving an alloy of lead and silver still fused. By removing the crystals of lead, as formed, until about four fifths are removed; the residue is an alloy of lead and silver much richer than the original. Repeated several times, this yields a rich alloy of silver and lead that is expelled and the silver obtained.

Pure lead for chemical purposes may be obtained as follows, although the lead of commerce is nearly pure:

By reducing nitrate of lead with charcoal.

By heating the oxide left by igniting pure acetate of lead with black flux.

Prop., &c. The general properties of lead are too well known to require notice here. The sp. gr. of that of commerce is about 11·35; but in a state of absolute purity its greatest density is 11·45. It melts at about 600° Fahr., and when very slowly cooled, crystallises in octahedrons. At a white heat it boils, and is volatilised. When exposed to moist air, it soon becomes covered with a gray film. It is scarcely acted on by hydrochloric or sulphuric acids, although, after some time, both coat it with a film of chloride or sulphate. It is rapidly acted on by nitric acid, with formation of the nitrate. Pure water, put into a leaden vessel, and exposed to the air, soon corrodes it, and dissolves the newly formed oxide; but river and spring water have little action upon lead, provided there is no free carbonic acid present, the carbonates and sulphates in such waters destroying their solvent powers. It has been found that a very small amount of phosphate of sodium or of iodide of potassium, dissolved in distilled water prevents its corrosive action on this metal. The lead in contact with such water gradually becomes covered with a superficial film of an insoluble salt of lead, which adheres tenaciously, and prevents further change. From this it appears that ordinary water ('hard water'), which abounds in mineral salts, may be more or less safely kept in leaden cisterns; but distilled water and rain water, and all other varieties that contain scarcely any saline matter, speedily

corrode, and dissolve a portion of lead, when kept in vessels of that metal. When, however, leaden cisterns have iron or zinc fastenings or braces, a galvanic action is set up, the preservative power of saline matter ceases, and the water speedily becomes contaminated with lead, and unfit for consumption as a beverage. Water containing carbonic anhydride also acts on lead; and this is the reason why the water of some springs (although loaded with saline matter), when kept in leaden cisterns, or raised by leaden pumps, possesses unwholesome properties.

Free carbonic acid is evolved during the fermentation or decay of vegetable matter, and hence the absolute necessity of preventing the leaves of trees falling into water-cisterns formed of lead. The 'eau de rose' and the 'eau d'orange' of commerce, which are pure distilled water holding in solution small quantities of essential oil, and are imported in leaden canisters, always contain a small quantity of lead, and deposit a sediment, which is not the case when they are kept in glass or incorrodible vessels.

Lead and all its preparations are highly poisonous; and whether imbibed in almost infinitesimal quantities with our daily beverages and food, or swallowed in larger and appreciable doses, is productive of the most disastrous consequences, the real cause being unfortunately seldom suspected.

With the acids lead or its oxides form salts, usually white in colour, and in the majority nearly insoluble in water, but readily soluble in acids.

Tests. The oxides and salts of lead, mixed with a little carbonate of soda, and exposed on a charcoal support to the reducing flame of the blowpipe, readily yield a soft and ductile globule of metallic lead, and the charcoal, at the same time, becomes covered with a yellowish incrustation of oxide of lead. Both metallic lead and its oxides are soluble in nitric acid, furnishing a solution which may be examined with ease.

Selection of lead salts may be recognised by the following reactions:—Sulphuretted hydrogen, hydrosulphide of ammonium, and the alkaline sulphides, give black precipitates, insoluble in the cold dilute acids, alkalies, alkaline sulphides, and cyanide of potassium. Potassium and sodium hydrates give a white precipitate, soluble in excess. Ammonia (except with the acetate) gives a white precipitate, insoluble in excess. The carbonates of potassium, sodium, and ammonium, give a white precipitate, insoluble in excess. Dilute sulphuric acid (in excess), and solutions of the sulphates give a white precipitate, sparingly soluble in dilute acids, but soluble in a hot boiling solution of potassium carbonate. Chromate and bichromate of potassium give yellow precipitates insoluble in dilute nitric acid, and soluble in solution of potassium hydrate. Iodide of potassium gives a yellow precipitate, soluble in great excess by heat, and separating in small, brilliant, golden-yellow scales, as the liquid cools. A piece of polished zinc precipitates metallic lead in an arborescent form, hence called the lead tree. To prepare for these tests, a solid supposed to contain lead should be digested in nitric acid, when the solution, evaporated to dryness and redissolved in water, may be tested as above.

Estim. This has been already referred to under previous heads. The ores of lead (galena) may be digested in nitric acid, when the solution may be treated with sulphuric acid, and the lead estimated from the weight of the precipitated sulphate. This is called an assay in the wet way. The method adopted by practical mineralogists is an assay in the dry way, and is conducted as follows:—A small but powerful air-furnace, charged with coke, is brought to as high a temperature as possible, and a conical wrought-iron crucible plunged into the midst of it; as soon as the crucible has attained a dull-red heat, 1000 grs. of the galena, reduced to powder, are thrown into it, and stirred gently with a long piece of stiff iron wire flattened at the one end, in order to expose as large a surface of the powdered ore to the air as possible, observing now and then to withdraw the wire, to prevent it becoming red-hot, in which case some of the ore would permanently adhere to it, and be reduced before the intended time; the roasting is completed in 3 or 4 minutes, and any portion of the ore adhering to the stirrer being detached by a knife, and returned into the crucible, the latter is covered up, and allowed to attain a full cherry-red heat, when about 2 or 3 spoonfuls of reducing flux are added, and the whole brought to a full white heat; in 12 to 15 minutes, the portion of metal and scoria adhering to the sides of the crucible are scraped down into the melted mass with a small stick of moist green wood, after which the crucible is again covered, and the heat urged for 2 or 3 minutes longer, so as to keep the mass in a perfectly liquid state during the whole time; the crucible is then removed from the fire with the crucible-tongs, and adroitly tilted so as to discharge its contents into a small ingot-mould of brass, observing to rake the scoria from the surface to the sides of the crucible, so as to allow the molten lead to be poured out without it; the scoria is then reheated in the crucible with about ½ spoonful of flux, and after being cleansed with a piece of green wood, as before, is at once poured into a second mould, which is instantly inverted; the little button of lead thus obtained is added to the lead in the other mould, and the whole is accurately weighed. The weight, divided by 10, gives the percentage of lead (including silver, if present) in the ore examined.

One half of the lead thus obtained is put into a dry cupel of bone ash, and placed in the cupelling furnace, and treated as described in

the article on assaying; the metallic button left on the cupel is then detached and weighed. The weight, divided by 5, gives the per-centage of pure silver.

Obs. The flux commonly employed in the above assay is composed of red argol, 6 parts; nitre, 4 parts; borax, 2 parts; fluor spar, 1 part; well pulverised and thoroughly mixed together. When the ore is very refractory, about a spoonful of carbonate of potassium should be added for each 1000 grains of ore, in which case the roasting may be dispensed with. The quantity of silver in argentiferous galena varies from $\frac{3}{1000}$ to $\frac{1}{3}$ part of the whole. Whenever this ore contains above 2 parts of silver in the 1000, it is found to be profitable to extract the latter. Indeed, by Pattison's process it is found that as small a proportion as 1 in 8000 can be extracted with profit.

Uses. The uses of lead in the arts are well known. It enters into the composition of many important alloys (pewter, type-metal, shot-metal, solder, &c.), it furnishes us with several valuable pigments (chrome yellow, &c.), and it is extensively used in dyeing. Some of its preparations are employed in medicine.

Ant., &c. Administer an emetic of sulphate of zinc or sulphate of copper, and, if necessary, tickle the fauces with the finger or a feather, to induce vomiting. Should this not succeed, the stomach-pump may be had recourse to. Epsom or Glauber's salts, or alum, dissolved in water, or water acidulated with sulphuric acid, followed by tea, water gruel, or barley water, are the proper antidotes, and should be taken as soon after the poison has been swallowed as possible. In poisoning by white lead, Dr. Alfred Taylor recommends the administration of a mixture of sulphate of magnesium and vinegar, as preferable to the sulphate alone. When the symptoms are those of painter's colic, the treatment recommended under that head should be adopted. In paralysis arising from lead, small doses of strychnine, brucine, and their preparations, may be cautiously administered. A symptom of poisoning by lead is the formation of a narrow leaden blue line, from $\frac{1}{20}$th to $\frac{1}{8}$th of an inch wide, bordering the edges of the gums, attached to the neck of two or more teeth of either jaw. (Dr. Burton.) This decoloration may often be detected or rendered more conspicuous by rinsing the mouth out with water holding a little sulphuretted hydrogen or hydrosulphide of ammonium in solution. Chevallier and Rayer recommend the use of sulphurous or hepatic mineral waters, or of artificial solutions of sulphuretted hydrogen or alkaline sulphides in water, both in cases of acute and chronic poisoning by lead; but the practical success of this plan does not appear to have been in proportion to theoretical anticipations. The hydrated sulphides of iron are said by their advocates to be infallible, if taken sufficiently early.

Lead, Acetate of. $Pb(C_2H_3O_2)_2$. *Syn.* PLUMBIC ACETATE, SUGAR OF LEAD, [PLUMBI ACETAS. (B. P.) *Prep.* Lithage (in fine powder) 24; acetic acid, 40; distilled water, 20; mix the acetic acid and the water, add the litharge, and dissolve with the aid of a gentle heat, filter, evaporate until a pellicle forms and crystallise. Drain and dry the crystal.

Acetic acid (sp. gr. 1·0843), 23 parts, is gently heated in a copper boiler rendered electro-negative by means of a large flat piece of lead soldered within it, and litharge (pure, and in fine powder), 13 parts, is sprinkled in; the heat is then continued, with constant stirring, until the acid is saturated, when the mother-waters of a former process, if any, are added, and the whole is heated to the boiling-point, and allowed to settle until cold; the clear portion is now decanted, and evaporated in a similar vessel until the liquor has the sp. gr. 1·266 or 1·267, when it is run into salt-glazed stoneware vessels (the edges of which have been well smeared with candle grease), and allowed to crystallise. The product is 38 to 38½ parts of crystallised sugar of lead. It is found to be advantageous to preserve a very slight excess of acid during the boiling and crystallisation, to prevent the formation of any basic acetate, the presence of which impedes the formation of regular crystals.

From litharge, 112 lb.; acetic acid (sp. gr. 1·057), 128 lb. *Prop.* 180 to 184 lb.

Prop. Pure acetate of lead forms colourless, transparent, prismatic crystals, slightly efflorescent in dry air; it is soluble in 8 parts of alcohol and in 1¼ part of cold water; the aqueous solution has a sweet astringent taste, and feebly reddens litmus, but turns turmeric and the juice of violets green; when gently heated, it melts in its water of crystallisation; by continuing the heat, the whole of the water is expelled, and the dry acetate obtained; at a higher temperature the salt suffers decomposition, and acetic acid, acetone, &c., is given off. Commercial acetate of lead is in general a confused crystalline mass, somewhat resembling broken lump-sugar. It is powerfully astringent and poisonous.

When pure it is completely soluble in distilled water acidulated with acetic acid forming a transparent colourless solution, "38 grains dissolved in water require for complete precipitation, 200 grains measures of the volumetric solution of oxalic acid." (B. P.)

Uses, &c. Acetate of lead is extensively employed in dyeing and calico-printing. In *medicine*, it is used as an astringent, styptic, and hæmostatic; in pulmonary, uterine, and intestinal hæmorrhage, colliquative diarrhœa, phthisical sweats, &c. It is usually combined with morphia or opium, and with acetic acid to prevent it passing into the state of the poisonous carbonate in the stomach.—*Dose.* ½ gr. to 2 grs. (Collier); 1 to 2 grs. to 8 or 10 grs., twice or thrice a day (Pereira); 3 grs. to 10 grs., every 6 or 8 hours (A. T. Thomson). *Externally*, as a collyrium, 10 grs. to water, 8 fl. oz. (A. T. Thomson); as a lotion, 20 grs. (A. T.

Thomson), 1 dr. (Collier), to water, 8 or 10 fl. oz.; as an injection, 40 grs. to rose water, ½ pint. The lotion is cooling and sedative, and is commonly used in excoriations, local inflammations, &c.

Basic Acetates. There are several of these salts, but only one is of any importance.

Tribasic Lead Acetate, or Double Plumbic Acetate, and Dioxide. $Pb(C_2H_3O_2)_2\ 2\ Pb\ O$. *Syn.* SUBACETATE OF LEAD; BASIC LEAD CITRATE; GOULARD'S ACETATE OF LEAD; PLUMBI SUBACETAS (B. P.) *Prep.* Litharge, 7; acetate of lead, 10; and distilled water, 40; are boiled half-an-hour, and evaporated down, and allowed to crystallise out of contact with air.

Used under the form of "Plumbi subacetas liquor" v. (B. P.)

Lead, Arse"niate of. $Pb_3(AsO_4)_2$. *Syn.* ARSENATE OF L.; PLUMBI ARSENIAS, L. *Prep.* Gradually add a solution of acetate of lead to another of arseniate of sodium. A white, insoluble powder. Proposed as an external application in certain forms of cancer.

Lead, Bro'mide of. $PbBr_2$. *Syn.* PLUMBI BROMIDUM, L. *Prep.* By precipitating a solution of neutral acetate or nitrate of lead with a solution of bromide of potassium. A white, crystalline powder, sparingly soluble in water. It fuses by heat into a red liquid, which turns yellow when cold. It has been used in the same cases as iodide of lead.

Lead, Car'bonate of. $PbCO_3$. *Syn.* PLUMBI CARBONAS, L. *Prep.* by precipitating a cold solution of either acetate or nitrate of lead with a solution of an alkaline carbonate, observing to well wash the precipitate and dry it in the shade. This preparation is seldom employed, the commercial carbonate (WHITE LEAD) being substituted for it. See WHITE PIGMENTS.

Lead, Chloride of. $PbCl_2$. *Syn.* CHLORIDE LEAD; PLUMBI CHLORIDUM (Ph. L. 1836). *Prep.* (Ph. L. 1836.) Dissolve acetate of lead, 19 oz., in boiling water, 3 pints; next dissolve chloride of sodium, 6 oz., in boiling water, 1 pint; mix the two solutions, and when cold, wash and dry the precipitate. A white, crystalline powder.

Dissolve finely powdered litharge in boiling dilute hydrochloric acid, and set aside the filtered solution to cool. Brilliant colourless needles.

Prop. Soluble in 135 parts of cold and in 22 parts of boiling water; it melts when heated, and solidifies on cooling, forming a horn-like substance (horn lead; plumbi corneum).

Uses, &c. In the Ph. L. 1836 chloride of lead was ordered to be employed in the preparation of 'hydrochlorate of morphia.' Mr. Tuson highly recommends it in cancerous affections, to allay pain and restrain morbid action, either in the form of a lotion or ointment.

Various mixtures of lead chlorides and oxide are employed as a white pigment under the name of 'Pattison's white.' It is prepared by rapidly mixing a boiling solution of lead chloride with an equal volume of lime water. Another similar compound is called 'patent yellow' or 'Turner's yellow.'

Lead, Chromate of. $PbCrO_4$. *Syn.* LEMON YELLOW, LEIPZIG YELLOW, PARIS YELLOW *Prep.* By adding a filtered solution of acetate or nitrate of lead to a like solution of chromate of potassium, as long as a precipitate forms, which is collected, washed with water, and dried. For information respecting the manufacture of this substance on the large scale, as a colouring substance (chrome yellow), see YELLOW PIGMENTS.

Lead, Dichromate of. *Syn.* CHROME ORANGE, CHROME RED. $PbCrO_4 . PbO$. *Prep.* By adding to a solution of nitrate or acetate of lead a solution of chromate of potassium, to which an equivalent of potassa has been added. This compound, is of a splendid scarlet colour. See RED PIGMENTS.

Lead, Cy'anide of. $PbCy_2$. *Syn.* PLUMBI CYANIDUM, L. *Prep.* By adding hydrocyanic acid to a solution of acetate of lead, as long as a precipitate forms, which, after being washed with distilled water, is dried by a very gentle heat, and preserved from the light and air. Sometimes used as a source of medicinal hydrocyanic acid.

Lead, Iodide of. PbI_2. *Syn.* LEAD IODIDE; PLUMBI IODIDUM, (B. P., Pho. L. E. D.) *Prep.* (B. P.) Nitrate of lead, 4; iodide of potassium, 4; distilled water, a sufficiency. Dissolve with the aid of heat the nitrate of lead in 30 of water, and the iodide of potassium in 10 of water, mix, collect the precipitate, wash, and dry at a gentle heat.

Prop., &c. A rich yellow-coloured powder, soluble in acetic acid, alcohol, and boiling water; when heated, it fuses and volatilizes in yellow vapour, but with a higher degree of heat, violet vapours of iodine are evolved, leaving a residuum (lead) which is wholly soluble in nitric acid.—*Dose.* ¼ gr. to 4 grs. or more, made into a pill; as a deobstruent and resolvent, in enlargements of the cervical, axillary, and mesenteric glands, and in scrofulous affections and schirrous tumours.

Lead. Nitrate of. $Pb(NO_3)_2$. *Syn.* PLUMBI NITRAS, L. (B. P., Ph. E. D.)

Prep. (Ph. D.) Litharge (in fine powder), 1 oz.; pure nitric acid, 2 fl. oz., diluted with water, ½ pint; mix, apply a sand-heat, and evaporate to dryness, occasionally stirring; boil the residuum in water, 2½ pints; filter, acidulate with a few drops of nitric acid, evaporate to a pellicle, and set the liquid aside to cool; lastly, dry the deposited crystals on bibulous paper, and preserve them in a well-closed bottle.

(Commercial). By dissolving while lead in dilute nitric acid, and crystallising.

Uses, &c. This salt is extensively used in calico printing, and in the preparation of the iodide and other salts of lead. It was formerly much esteemed in asthmas, hæmorrhages, and epilepsy. It is now often used in an external application in cancer, ulcers, wounds, and various cutaneous affections. It is the basis of Liebert's celebrated 'cosmé-

tique infallible,' and of Ledoyen's 'disinfecting fluid.' A very weak solution is an excellent application to chapped nipples, lips, hands, &c.—*Dose.* ½ to 1 gr.; in the form of pill or solution, washed down with a table-spoonful of water very slightly acidulated with nitric acid.

Lead, Nitro-sac'charate of. *Syn.* PLUMBI NITROSACCHARAS, L. *Prep.* (Dr. S. E. Hoskins.) Nitric acid, 1 part; water, 19 parts; mix; in this dilute acid saccharate of lead (in fine powder) is to be dissolved, and set aside that crystals may form, which are to be dried by pressure between the folds of bibulous paper. A weak solution of the salt, acidulated with saccharic acid, has been employed by Dr. Hoskins as a solvent for phosphatic calculi, with apparent success.

Lead, Oxide of. PbO. *Syn.* MONOXIDE OF LEAD, PROTOXIDE OF LEAD, YELLOW OXIDE OF LEAD, PLUMBI OXYDUM (B. P.) *Prep.* This substance is obtained perfectly pure by expelling the acid from nitrate of lead, by exposing it to heat in a platinum crucible; or, still better, by adding ammonia to a cold solution of nitrate of lead until the liquid becomes faintly alkaline, washing the precipitate with cold water, drying it, and heating it to moderate redness for 1 hour.

Prep., &c. Pure protoxide of lead has a lemon-yellow colour, and is the best of all the salts of lead. It is very heavy, slightly soluble in water, and freely so in acids, particularly when in the hydrated state; the aqueous solution has an alkaline reaction; at a red heat it melts, and assumes a semi-crystalline form on cooling; in the melted state it rapidly attacks and dissolves siliceous matter, with which it unites to form glass (flint glass); when heated along with organic substances of any kind, it is easily reduced to the metallic state.

On the commercial scale, this oxide is prepared by heating the gray film or dross that forms on the surface of melted lead when freely exposed to the air. When the process is arrested, as soon as the oxide acquires a uniform yellow colour, it is called massicot; when the heat is still further increased, until it fuses or partially vitrifies, it forms litharge of which there are several varieties. See LITHARGE, MASSICOT.

Lead, Red Oxide of. *Syn.* RED LEAD, MINIUM. *Prep.* This is prepared by exposing unfused protoxide of lead to the air for a long time, at a dull red heat. It is a very heavy powder, of a fine red colour, decomposed by a strong heat into protoxide of lead, and oxygen gas, which is evolved. Somewhat uncertain in its composition, but is generally of the composition Pb_3O_4 or $PbO_2 2PbO$. See RED PIGMENT.

Lead, Dioxide. PbO_2. *Syn.* BINIODIDE OF LEAD, PEROXIDE OF LEAD, PUCE OXIDE OF LEAD. *Prep.* By digesting red oxide of lead in dilute nitric acid; or by infusing a mixture of protoxide of lead and chlorate of potassium at a heat a little below redness, and washing the powdered mass in water; or by transmitting a current of chlorine gas through a solution of neutral acetate of lead. This oxide gives up half its oxygen at a red heat; acids also decompose it. Its chief use is in chemical analysis, to separate sulphurous acid from certain gaseous mixtures, which it converts into sulphuric acid, which it at the same time absorbs, forming sulphate of lead. It has recently been employed as an oxidizing agent in the manufacture of the ANILINE DYES.

Lead, Pyrolig'nite of. Sugar of lead made with rough pyroligneous acid. Used in dyeing, chiefly for the preparation of acetate of alumina.

Lead, Sac'charate of. *Syn.* PLUMBI SACCHARAS, L. *Prep.* (Dr. S. E. Hoskins.) Nitric acid, 2 parts; water, 10 parts; mix in a porcelain capsule, add of sugar, 1 part; and apply heat until reaction ceases; then dilute the liquid with distilled water, neutralize it with powdered chalk, filter, and add to the filtrate a solution of acetate of lead, as long as a precipitate (saccharate of lead) forms; lastly, collect the precipitate on a filter, wash and dry it. Used to make nitro-saccharate of lead, and as a source of saccharic acid.

Lead, Sul'phate of. $PbSO_4$. *Syn.* PLUMBI SULPHAS, L. This salt occurs native in transparent octahedra (lead vitriol), and is obtained in large quantities as a by-product in the preparation of acetate of aluminum for dyeing.

Prep. By adding dilute sulphuric acid to a solution of a soluble salt of lead. It is very sparingly soluble in water and in dilute sulphuric acid, soluble in strong hydrochloric acid and bitartrate of ammonium.

Lead, Sul'phide of. PbS. *Syn.* PLUMBI SULPHIDE. This occurs abundantly in nature in the form of GALENA.

Prep. By fusing metallic lead with sulphur or by passing sulphuretted hydrogen through a solution of a salt of lead.

Lead, Tan'nate of. *Syn.* PLUMBI TANNAS, L. *Prep.* Precipitate a solution of acetate of lead with an infusion of galls, and wash and dry the precipitate. Astringent, sedative, and hæmostatic.—*Dose.* 1 gr. and upwards, made into a pill. It has been highly recommended in the form of ointment and cataplasms, in bed-sores, chronic ulcers of the feet, white swellings, &c.

Lead, Tar'trate of. *Syn.* PLUMBI TARTRAS, L. *Prep.* By precipitating acetate of lead, by tartrate of ammonium, washing and drying.

LEAD, GRANULATED. *Prep.* By melting new lead, and pouring it in a small stream, from an iron ladle with a hole drilled in its bottom, into a pail of water. Used to make solutions and alloys.

LEAD, RED. See RED PIGMENTS.

LEAD, WHITE. See WHITE PIGMENT.

LEAD DUST. *Syn.* PULVIS PLUMBI, PLUMBUM DIVISUM, L. *Prep.* By melting new lead, adding bruised charcoal, mixing by violent agitation, which must be continued until the

metal "sets," and then pounding and washing away the charcoal. Used by potters.

LEAD PYROPH'ORUS. See PYROPHORUS.

LEATH'ER. *Syn.* CORIUM, CORIUS, L. Leather is the skin of animals which has been prepared by one or other of several processes adopted for the purpose, having the common object of preventing its spontaneous destruction by putrefaction, besides other objects, which are more or less peculiar to each variety of this useful substance.

Leather is only prepared on the large scale, and primarily either by the process of 'TANNING' or 'TAWING,' in the manner briefly described under these heads.

CURRIED LEATHER is leather which has been tanned, and sold to the currier, who, after soaking it in water, and rubbing it to soften it, pares it even with a broad, sharp knife, rubs it with a piece of polished stone or wood, and, whilst still wet, besmears it with oil or grease (DUBBING), which gradually penetrates the leather as the moisture evaporates. It next undergoes the operation of 'waxing,' which consists of first rubbing it on the flesh side with a mixture of oil and lamp black; it is then 'black-sized' with a brush or sponge, and, when dry, is lastly 'tallowed' with a proper cloth, and 'slicked' upon the flesh side with a broad and polished lump of glass. Leather curried on the hair or grain side, termed 'black on the grain,' is blackened by wetting it with iron liquor, and rubbing it with an iron 'slicker' before applying the oil or grease. The grain is finally raised by the 'pommel' or 'graining board' passed over it in various directions.

Leather is dyed or stained by the application, with an ordinary brush, of any of the strong liquid dyes, in the cold or only gently heated, to the surface of the skin previously stretched on a board. The surface, when dry, is commonly finished off with white of egg and the pommel or smoothing stick. Bookbinders generally employ copperas water as a black stain or sprinkle; a solution of indigo as a blue one; and a solution of salt of tartar or common soda, as a brown one.

Leather, before being japanned or varnished, as in the preparation of what is called 'ENAMELLED' and 'PATENT LEATHER,' is carefully freed from grease by the application of absorbent substances or hard pressure between rollers, and the surface is nicely shaved, smoothed, and polished by appropriate tools, the varnish is then applied to the grain side for the former, and the flesh side of the skin for the latter, which is previously stretched out tight on a board to receive it. The whole is, lastly, submitted to a gentle stove-heat to harden the varnish; and the process is repeated, if necessary.

Uses, &c. These are well known, and are all but universal. The leather manufacture of Great Britain is equal in importance and utility to any other department of our industry, and inferior in point of value and extent only to those of cotton, wool, and iron. "If we look abroad on the instruments of husbandry, on the implements used in most of the mechanic trades, on the structure of a multitude of engines and machines; or if we contemplate at home the necessary parts of our clothing—breeches, shoes, boots, gloves—or the furniture of our houses, the books on our shelves, the harness of our horses, or even the substance of our carriages; what do we see but instances of human industry exerted upon leather? What an aptitude has this single material in a variety of circumstances for the relief of our necessities, and supplying conveniences in every state and stage of life? Without it, or even without it in the plenty we have it, to what difficulties should we be exposed?" (Dr. Campbell.) Leather is a kind of natural felt, but of much closer and firmer texture than that of artificial origin. "The thinner and softer kinds of leather are sometimes used as body-clothing; but its special and proper purpose is the manufacture of coverings for the feet, to protect them from cold and water." (Eras. Wilson.) See JAPANNING, VARNISH, &c.

LEAV'EN. Dough which has become sour or run into a state of incipient putrefaction. When a small quantity of it is added to recent dough, it excites fermentation, but is apt to produce a disagreeable taste and odour in the bread. It is now superseded by yeast. Both these substances are used in the same way.

LEAVES (Medicated). *Syn.* FOLIA MEDICATA, L. On the Continent several preparations of this kind are in use. In many cases the leaves of tobacco deprived of nicotine, by soaking them in water, are dried, and then moistened or steeped in a tincture or infusion of the medicinal substance. In this way belladonna, camphor, and henbane, are often administered. Cruveillier recommends opiated belladonna leaves for smoking in troublesome coughs, phthisis, spasmodic asthmas, &c., to be prepared as follows:—Belladonna leaves, 1 oz., are steeped in an infusion of opium, 10 grs., in water, 1 fl. oz. (or less), and are then carefully dried in the shade. "MUSTARD LEAVES (Riggollot's) consist of mustard moistened with water, spread on paper, and dried." (Squire.) See CIGARS (in *pharmacy*), and VEGETABLE SUBSTANCES.

LECANOR'IC ACID. See ORSELLINIC ACID.

LEECH. *Syn.* HIRUDO (B. P., Ph. L. & D.), L. The officinal leech of the Pharmacopœias is the *Sanguisuga medicinalis* (*Hirudo medicinalis*—Cuv.), familiarly known as the 'old English' or 'speckled leech.' It is also occasionally called the 'Hamburg gray' or 'Russian leech,' from being imported from those parts. Its characteristics are—Back, greenish or olive-green, sometimes almost black or intense brown, with 6 rusty-red or yellowish longitudinal stripes, which are mostly spotted with black.—Belly, dirty yellow or

light olive-green, spotted more or less with black. The spots are very variable in size and number; in some cases few, in others so numerous as to form the prevailing tint of the belly. This variety, which is the most valuable of the commercial leeches, is chiefly imported from Hamburg.

Another variety of leech, the *Sanguisuga officinalis*, familiarly known as the 'Hamburg' or 'French green leech,' are imported from Bordeaux, Lisbon, and Hamburg. Its characteristics are—Back, brownish olive-green, with 6 reddish or rusty-yellow longitudinal bands.—Belly, light dirty pea-green, or yellowish-green, free from spots, but exhibiting two lateral stripes. This leech is vastly inferior to the preceding variety, and some of those imported from France and Portugal are absolutely useless, from their indisposition to bite, arising from the fraud practised by the collectors and dealers, of gorging them with blood to improve their appearance before sending them to market. The above are the species of leech commonly employed in medicine in this country, but many others are noticed by writers on the subject.

Leeches are best preserved in water obtained from a pond, and occasionally changed; when kept in spring water, they soon die. The introduction of a hand to which an ill-flavoured medicine or odour adheres into the water in which they are kept, is often sufficient to poison them. The application of saline matter to the skin of leeches, even in very small quantities, immediately occasions the expulsion of the contents of the stomach; hence a few grains of common salt are frequently sprinkled over them, to make them disgorge the blood which they have swallowed. The frequent changing of the water in which leeches are kept is injudicious. Once a month in winter, and once a week in summer, is deemed sufficiently often by the large dealers, unless the water becomes discoloured or bloody, when it should be changed every day, or every other day. When clean pond water cannot be obtained, clean rain water that has been well exposed to the air should alone be employed. Mr. J. R. Kenworthy recommends placing in the water a few balls of irregular lumps of pure clay, about 2½ inches in diameter; a method which we can recommend as both simple and successful. The plan adopted by M. Fée is as follows:—Place 7 inches of a mixture of moss, turf, and charcoal, in a marble or stone trough, over which sprinkle some small pebbles. At one end of the trough, and about half way up, place a thin shelf of stone or marble, pierced with small holes, on which put first some moss, or portions of marsh horse-tail (*Equisetum palustre*), and on this a layer of pebbles to keep it down; then pour in water sufficiently high just to moisten the moss and pebbles, put in the leeches, and tie over the mouth of the trough with a cloth. Another plan consists in keeping the leeches in a glass tank, or aquarium, provided with a pebbly bottom and a few healthy aquatic plants.

Propag. According to Dr. Wagner, an annual feast on living blood is necessary to render leeches able to grow and propagate. These conditions can only be fulfilled by restoring to the breeding cisterns those which have been already employed. All artificial methods of feeding them, by bladders or sponges of blood, have been found to fail. He recommends the employment of two tanks, with the bottom formed of loam, clay, or turf, surrounded by an inner border of a similar substance, and an outer one of sand—the one for leeches fit for medical use—and the other for breeding, or for such leeches as have been applied. No leeches are to be taken from the breeding tank until a year has elapsed after their having been applied and fed with human blood; and their removal to the first tank should take place in September or October, as by this time the breeding season is over. By this plan all leeches that have been applied are to be carefully restored to the breeding tank, without making them disgorge the blood they have swallowed.

LEECH'ING. This consists in the application of leeches to any vascular part of the body, for the purpose of withdrawing blood from it, and thus allaying local inflammation, distension of vessels, &c. Leeches are most conveniently applied by means of a common pill-box or a wine-glass. The part should be previously washed perfectly clean, and if covered with hair should be closely shaved. Sometimes leeches are indisposed to bite; in such cases, allowing them to crawl over a piece of dry linen or calico, rolling them in porter, moistening the part with a little milk or sweetened milk, or drawing a little blood by a slight puncture or scratch, will usually make them bite freely. To stop the bleeding from leech-bites, various plans are adopted, among which the application of nitrate of silver or creasote, or gentle pressure for some hours with the finger, are the most successful. Of late years a piece of matico leaf or soldier's herb, applied in the same manner as a piece of lint, has been commonly adopted to stop the bleeding of leech-bites.

LEEK. *Syn.* PORRUM, L. The *Allium porrum* (Linn.). Its general properties are intermediate between those of the onion and garlic. The juice is said to be powerfully diuretic, and capable of dissolving phosphatic calculi.

LEGU'MIN. Vegetable casein. It is found most abundantly in the seeds of leguminous (podded) plants, *e. g.*, beans, peas, &c.

LEM'ON. *Syn.* LIMO, L. The fruit of the *Citrus limonum* or lemon tree. The juice, peel, and essential oil, are officinal. See Oil, and *below*.

LEM'ON ACID. See CITRIC ACID.

LEM'ON FLA'VOUR. See ESSENCE OF LEMON.

LEM'ON JUICE. *Syn.* LIMONIS SUCCUS

than an ordinary pea, and is of the shape of a double convex lens. Several varieties are cultivated on the Continent of Europe and in many parts of Asia, where they are largely consumed as human food. Lentils are more nourishing than any other description of pulse, but are reputed difficult of digestion, apt to disorder the bowels, and injurious to the eyes. Several alimentary preparations, sold at high prices as cures for dyspepsia, constipation, &c., contain lentil flour as the principal ingredient. See ERVALENTA and REVALENTA.

LETH'ARGY. *Syn.* LETHARGUS, L. A heavy, unnatural sleep, sometimes bordering upon apoplexy, with scarcely any intervals of waking, from which the patient is with difficulty aroused, and into which he again sinks as soon as the excitement is withdrawn. It frequently arises from plethora, in which case depletion is indicated; or from the suppression of some usual discharge or secretion, which it should then be our business to re-establish. It also often arises from over mental fatigue and nervous debility, when relaxation from business, the use of a liberal diet, and ammoniacal stimulants and antispasmodics, are found useful. When depending on a determination of blood to the head, cupping may be had recourse to, and all sources of excitement avoided. In all cases the bowels should be moved as soon as possible by means of mild purgatives.

LET'TUCE. *Syn.* LACTUCA, L. The early leaves or head of the *Lactuca sativa*, or garden lettuce, forms a common and wholesome salad. They are reputed as slightly anodyne, laxative, hypnotic, and antaphrodisaic, and have been recommended to be eaten at supper by those troubled by watchfulness, and in whom there exists no tendency to apoplexy. The leaves and flowering tops of *L. virosa* are officinal in the L. P., the "flowering herb" (LACTUCA) in the Ph. L.; the "inspissated juice," in the Ph. E.; and the "inspissated juice and leaves," in the Ph. D. The "inspissated juice" of *Lactuca virosa*, or strong-scented wild lettuce, is also officinal in the Ph. E.; and both the "leaves and inspissated juice" of the same variety are ordered in the Ph. D. The last species is more powerful than the cultivated lettuce. See EXTRACT and LACTUCARIUM.

LEUCORRHŒ'A. *Syn.* WHITES; CATARRHUS VAGINÆ, FLUOR ALBUS, L. The symptoms of this disease are well known to most adult females. The common causes are debility, a poor diet, excessive use of hot tea, profuse menstruation or purgation, late hours, immoderate indulgence of the passions, frequent miscarriages, protracted or difficult labours, or local relaxation. Occasionally it is symptomatic of other affections. The treatment must be directed to the restoration of the general health, and imparting tonicity to the parts affected. Tepid or sea bathing, or shower baths; bark, chalybeates, and other tonics; with local affusions of cold water, and mild astringent injections, as those of black tea or oak bark, are generally found successful in ordinary cases.

LEVANT' NUT. See COCCULUS INDICUS.

LEVIGA'TION. *Syn.* LEVIGATIO, L. The process of reducing substances to fine powder, by making them into a paste with water, and grinding the mass upon a hard smooth stone or slab, with a conical piece of stone having a flat, smooth, under surface, called a 'muller.' Levigation is resorted to in the preparation of paints on the small scale, and in the elutriation of powders. The term is also, sometimes, incorrectly applied to the lengthened trituration of a substance in a marble or wedgwood-ware mortar.

LEVORACE'MIC ACID. See RACEMIC ACID.

LEY'DEN JAR. *Syn.* LEYDEN PHIAL, ELECTRICAL JAR. An instrument for the accumulation of the electric fluid. Its simplest form is that of a wide-mouthed jar of rather thin glass, coated on both sides with tin-foil, except on the upper portion, which is left uncoated, and having a cover of baked wood, through which passes a brass wire, terminating in a metallic knob, and communicating with the inner coating. To charge the jar, the outer coating is connected with the earth, and the knob put in contact with the conductor of an electrical machine. The inner and outer surfaces of the glass thus become respectively positive and negative, and the particles of the glass become strongly polarised. On making connection between the two coatings with a conducting substance, discharge takes place by a bright spark and a loud snap; and if any part of the body be interposed in the circuit, a shock is felt.

*** LIBAVIUS'S LIQUOR.** See TIN (Bichloride).

LI'CHEN. In pathology, a dry papulous or pimply eruption of the skin, terminating in scurfy exfoliations. "Lichen exhibits great variety in its outward characters in different individuals; in one, the pimples are brightly red; in another, of debilitated constitution, they are bluish and livid; in a third, they are developed around the base of hairs; in a fourth, they appear as circular groups, and increase by their circumference, while they fade in the centre, forming so many rings of various size; in a fifth, a modification of the preceding, they have the appearance of flexuous bands; while in a sixth, they are remarkable for producing intensity of suffering, or unusual disorganization of the skin. They are all occasioned by constitutional disturbance, sometimes referable to the digestive, and sometimes to the nervous system. In some instances, however, they depend upon a local cause. I have had a crop of lichenous pimples on the backs of my hands from rowing in hot weather; and in hot climates that annoying disorder called prickly heat is a lichen." (Eras. Wilson.) The treatment of this affection is noticed under ERUPTIONS (Papular).

LI'CHENS. *Syn.* LICHENES—Juss., LICHENALES—Lind., L. In botany, these are cryptogamous plants, which appear under the form of thin, flat crusts, covering rocks and the barks of trees. Some of them, like Iceland moss (*Cetraria Islandica*), are esculent and medicinal, and employed either as medicine or food; and others, when exposed in a moistened state to the action of ammonia, yield purple or blue colouring principles, which, like indigo, do not pre-exist in the plant. Thus, the *Rocella tinctoria*, the *Variolaria orcina*, the *Lecanora tartarea*, &c., when ground to a paste with water, mixed with putrid urine or solution of carbonate of ammonia, and left for some time freely exposed to the air, furnish the archil, litmus, and cudbear of commerce, very similar substances, differing chiefly in the details of their preparation. From these the colouring matter is easily extracted by water or very dilute solution of ammonia. See ARCHIL, CUDBEAR, and LITMUS.

LIG'ATURE. In *surgery*, a small waxed piece of cord or string formed of silk or thread, employed for the purpose of tying arteries, veins, and other parts, to prevent hæmorrhage, or to cause their extirpation. To be safe and useful, they should be round, smooth, and sufficiently strong to permit of being tied with security without incurring the danger of breaking or slipping. There are many cases recorded in which emigrants, soldiers, and travellers, have lost their lives, from the simple inability of those around them to apply a ligature.

LIGHT. *Syn.* LUMEN, LUX, L. Light acts as a vivifying or vital stimulus on organised beings; just as privation of light, or darkness, disposes to inactivity and sleep. "In maladies characterised by imperfect nutrition and sanguinification, as scrofula, rickets, and anæmia, and in weakly subjects with œdematous (dropsical) limbs, &c., free exposure to solar light is sometimes attended with very happy results. Open and elevated situations probably owe part of their healthy qualities to their position with regard to it." On the contrary, "in diseases of the eye, attended with local vascular or nervous excitement, in inflammatory conditions of the brain, in fever, and in mental irritation, whether attended or not with vascular excitement, the stimulus of light proves injurious, and, in such cases, darkness of the chamber should be enjoined. After parturition, severe wounds, and surgical operations, and in all inflammatory conditions, exclusion of strong light contributes to the well-doing of the patient." (Pereira.)

LIG'NIN. $C_6H_{10}O_5$. *Syn.* CELLULOSE. This is woody fibre deprived of all foreign matter. It forms about 95% of baked wood, and constitutes the woody portion of all vegetable substances. Fine linen and cotton are almost entirely composed of lignin, the associated vegetable principles having been removed by the treatment the fibres have been subjected to during the process of their manufacture.

Pure lignin is tasteless, inodorous, insoluble in water and alcohol, and absolutely innutritious; dilute acids and alkaline solutions scarcely affect it, even when hot; oil of vitriol converts it into dextrin or grape sugar, according to the mode of treatment. When concentrated sulphuric acid is added very gradually to about half its weight of lint, linen rag, or any similar substance shredded small, and contained in a glass vessel, with constant trituration, the fibres gradually swell up and disappear, without the disengagement of any gas, and a tenacious mucilage is formed, which is entirely soluble in water. If, after a few hours, the mixture be diluted with water, the acid neutralized by the addition of chalk, and, after filtration, any excess of lime thrown down by the cautious addition of a solution of oxalic acid, the liquid yields, after a second filtration, and the addition of alcohol in considerable excess, a gummy mass, which possesses all the characters of pure dextrin. If, instead of at once saturating the diluted acid solution with chalk, we boil it for 4 or 5 hours, the dextrin is entirely converted into grape sugar, which, by the addition of chalk and filtration, as before, and evaporation by a gentle heat to the consistence of a syrup, will, after repose for a few days, furnish a concrete mass of crystallised sugar. By strong pressure between folds of porous paper or linen, redissolving it in water, agitation with animal charcoal, and recrystallisation, brilliant colourless crystals of grape sugar may be obtained. Hemp, linen, or cotton, thus treated, yield fully their own weight of gum, and 1½ of their weight of grape sugar. During the above transformation, the sulphuric acid is converted into sulpholignic acid, and may be procured in a separate state. A solution of oxide of copper in ammonia, or solution of basic carbonate of copper in strong ammonia, dissolves cotton, which may then be precipitated by acids in colourless flakes.

LIG'NITE. *Syn.* BROWN COAL. Wood and other matter more or less mineralised and converted into coal. The lignites are generally dark brown, and of obvious woody structure. They are distinguished from true coals by burning with little flame and much smoke. Those of Germany are largely used as a source of paraffin and burning oils.

LIG'NUM VI'TÆ. See GUAIACUM WOOD.

LIME. CaO. *Syn.* OXIDE OF CALCIUM; CHAUX, Fr.; KALK, Ger. Lime, when pure, and as a chemical and medical reagent, will be found treated of under CALCIUM (Oxide of). It is prepared on the large scale for commerce by calcining chalk, marble or limestone, in kilns, and is called quicklime, caustic lime, burnt lime, stone lime, &c. The lime kilns are usually of the form of an inverted cone, and are packed with alternate layers of limestone and fuel, and the burnt lime raked out from the bottom.

The lime thus obtained is a pale yellow powder, combining eagerly with water, and crumbling to a light white powder, "slaked lime," with the evolution of much heat. Lime which slakes well is termed "fat lime," while if it slakes badly is termed "poor lime."

Lime, Salts of. See under CALCIUM.

Lime, Pyrolignite of. An impure acetate of calcium used for making mordants in dyeing and calico printing, as a substitute for the more expensive acetate of lead.

Lime, Chloride of. *Syn.* BLEACHING POWDER, CHLORINATED LIME, HYPOCHLORIDE OF CALCIUM.

A compound of hypochloride, chloride, and hydrate of lime in varying proportions, and most extensively used for bleaching, thousands of tons being made near Newcastle alone every year.

Prep. Hydrate of calcium is thinly spread out in a proper vessel and exposed to an atmosphere of chlorine gas until it is saturated. Now included in the Materia Medica.

Hydrate of calcium, or slaked lime (fresh), 20 parts, common salt, 1 part, are mixed together, and the powder placed in long earthenware vessels into which chlorine is passed until the mixture begins to grow damp, or until one part of it, dissolved in 130 parts of water, is capable of decolouring 4½ parts of sulphate of indigo, when the whole is transferred to dry bottles.

(Wholesale.) The chlorine is generated from the usual materials mixed in leaden vessels, heated by steam, and the gas, after passing through water, is conveyed by a leaden tube into an apartment built of siliceous sandstone, and arranged with shelves or trays, containing dry fresh slaked lime, placed one above another, about an inch asunder. The process, to produce a first-class article, is continued for 4 or 5 days. During this time the lime is occasionally agitated by means of iron rakes, the handles of which pass through boxes of lime placed in the walls of the chamber, which thus act as valves.

Prop., &c. Chloride of lime is a pale yellowish, white powder, generally more or less damp, and evolving a chlorine-like odour of hypochloric acid. Soluble in about 20 parts of water, and decomposed by acids with the evolution of chlorine and a little oxygen. Good chloride of lime should contain from 32% to 36% of chlorine, of which, however, but 25% to 30% can be easily liberated by an acid.

Estim. See CHLOROMETRY.

Uses. Chloride of lime is employed in medicine as an antiseptic and disinfectant. An ointment of chloride of lime has been used in 'scrofula,' and a lotion or bath, moderately dilute, is one of the cleanest and readiest ways of removing the 'itch,' and several other skin diseases. It is also in great use as a disinfectant, and may be used either in substance or solution. A small quantity of the powder spread on a flat dish or plate, and placed on the chimney-piece, and a like quantity in an opposite part of the room, will continue to evolve sufficient chlorine or hypochlorous acid to disinfect the air of an apartment for several days. The evolution of chlorine is promoted by occasionally renewing the exposed surface, by stirring it with a piece of stick, and, after it becomes scentless, by the addition of a little acid, as strong vinegar, or hydrochloric acid, or oil of vitriol, largely diluted with water. Of late, however, it has been partly superseded by the antiseptics, carbolic acid, &c. The most extensive consumption of chloride of lime is, however, for bleaching textile fabrics. When employed for this purpose, the goods are first immersed in a dilute solution of this compound, and then transferred to a vat containing dilute sulphuric acid. The chlorine thus disengaged in contact with the cloth, causes the destruction of the colouring matter. This process is generally repeated several times, it being unsafe to use strong solutions. White patterns may thus be imprinted upon coloured cloth; the figures being stamped with tartaric acid thickened with gum water, the stuff is immersed in the chloride bath, when the parts to which the acid has been applied remain unaltered, while the printed portions are bleached white.

Concluding remarks.—Chloride of lime is now scarcely ever made on the small scale, as it can be purchased of the large manufacturer of better quality and cheaper than it could possibly be made by the druggist. The only secret in the manufacture of good bleaching powder is maintaining the temperature of the ingredients rather low.

LIME. The fruit of *Citrus limetta.* It resembles the lemon, but is smaller and has a smoother skin. It is imported into Great Britain in a preserved state for use as a dessert. Its juice is also largely imported for the preparation of CITRIC ACID, and for the prevention of scurvy on board ship (see *below*).

LIME JUICE. *Syn.* LEMON JUICE. The juice of the fruits of various species of *Citrus*, principally LIMES, is known in commerce under these names. It is very variable as to quality, which depends upon the method of extraction, the quality of the fruit, and the honesty of the shipper.

We have examined the juice expressed from limes sent from the West Indies, from Jamaica, and from South Africa, with the following results:

	W. Indies.	Jamaica.	S Africa.
Specific gravity of juice . .	1041·30	1044·18	1044·90
Per cent. of citric acid .	7·96	8·66	8·50
Per cent. of ash	0·321	0·401	0·364

The yield from limes is very small, and the freshly expressed juice contains a large amount of pulp. This, however, on standing a few weeks, separates, and a clear sherry-coloured liquid is obtained.

A concentrated lime or lemon juice is used by calico printers. It is a "dark, treakly looking fluid, marking from 48° to 54° Twaddell," and contains about 30 per cent. of pure citric acid.

Adult. See LEMON JUICE.

Estim. Lime juice is only valuable on account of the citric acid it contains. If of good quality, 100 grs. will neutralise from 70 to 76 grs. of pure crystallised carbonate of soda. "For commercial purposes, each grain of carbonate of soda neutralised may represent a half grain of crystallised citric acid (equal to ·38 gr. of dry acid), and the value of the lime juice be calculated in proportion." (O'Neill.) As commercial lime juice contains variable proportions of vegetable extractive matter, the indications of the hydrometer cannot be depended upon. See ACIDIMETRY, CITRIC ACID, &c.

LIME'STONE. A general term applied to a great variety of rocks in which carbonate of lime is the principal constituent.

Estim. The value of chalk, limestone, marble, &c., for hydraulic mortars and cements, may be determined as follows:

A given weight (say 100 grs.) of the sample is reduced to powder and digested in hydrochloric acid diluted with about an equal weight of water, with frequent agitation for an hour or longer; the mixture is then diluted with thrice its volume of water, thrown upon a filter, and the undissolved portion washed, dried, ignited, and weighed. This weight indicates the per-centage of clay and silica or sand; and the loss that of the lime or calcium oxide, magnesium oxide, and ferric oxide, present in the substance examined. In most cases these results will be sufficient to show the quality of the limestone for the purpose of making mortar or cement.

The filtrate and the washings are mixed together, and ammonia is added in excess; the bulky, reddish-brown precipitate is collected, washed, dried, ignited, and weighed. This gives the per-centage of ferric oxide.

The filtrate, &c., from last is then treated with oxalate of ammonium, and the quantity of lime determined in the manner described under the head of CALCIUM.

The liquid filtered from the precipitate in last is boiled for some time with carbonate of potassium until ammoniacal fumes are no longer evolved; the precipitate is then collected on a filter, washed with hot water, dried, and strongly ignited for 3 or 4 hours, and, lastly, weighed. This gives the per-centage of magnesium.

LINC'TUS. [L., Eng.] *Syn.* LOCH, LOHOCH, LINCTURE, LAMBATIVE; LOOCH, Fr. A medicine of the consistence of honey, intended to be licked off a spoon. This form of medicine is well adapted to females and children, but is not much used in England at the present time. Those employed in modern pharmacy and prescribing are included under the heads CONFECTION, CONSERVE, or ELECTUARY. —The *dose*, when it is not otherwise stated, is a teaspoonful occasionally.

Linctus, Caca'o. *Syn.* LINCTUS CACAO, L.; CREME DE TRONCHIN, Fr. *Prep.* From cocoa-butter, 2 oz.; white sugar (in powder), syrup of capillaire, and syrup of tolu, of each, 1 oz.; mix. Demulcent and pectoral; in coughs, sore throats, hoarseness, &c.

Linctus, Common. *Prep.* From oil of almonds and syrup of tolu, of each, 1 oz.; powdered white sugar, 2 drs. As the last.

Linctus, Cough. *Syn.* PECTORAL LINCTUS; LINCTUS PECTORALIS, L. *Prep.* 1. (Dr. Latham.) Compound ipecacuanha powder (Dover's powder), ½ dr.; compound tragacanth powder, 2 drs.; syrup of tolu, confection of hips, and simple oxymel, of each, 1 oz.—*Dose.* 1 teaspoonful, 3 or 4 times a day. "This linctus has been extensively used, as a remedy for coughs, in the West-end of London, having been found to be a safe and generally efficacious remedy." (Redwood.) The preceding as well as the following are also useful preparations.

Linctus, Demul'cent. *Syn.* LINCTUS DEMULCENS, L.; LOOCH DE TRONCHIN, Fr. *Prep.* From oil of almonds, syrup of capillaire, manna, and cassia pulp, of each, 2 oz.; powdered gum tragacanth, 20 grs.; orange-flower water, 2 fl. oz. As the last. The above is the quantity for two days, which is as long as it will keep.

Linctus, Emol'lient. *Syn.* OILY EMULSION; LOHOCH OLEOSUM, EMULSIO OLEOSA, L.; LOOCH HUILEUX, Fr. *Prep.* (P. Cod.) Oil of almonds, powdered gum, and orange-flower water, of each, 4 drs.; syrup of marshmallow, 1 oz.; water, 3 fl. oz. or q. s.; for an emulsion. In troublesome coughs.

Linctus, Expec'torant. *Syn.* LINCTUS EXPECTORANS, LOHOCH E., L. *Prep.* 1. Oxymel of squills, confection of hips, syrup of marshmallow, and mucilage of gum arabic (thick), equal parts. Demulcent and expectorant.

2. (Dr. Copland.) Oil of almonds and syrup of lemons, of each, 1 fl. oz.; powdered ipecacuanha, 6 grs.; confection of hips, 1 oz.; compound powder of tragacanth, 3 drs.

3. (Zanetti.) Kermes mineral, 4 grs.; manna, 6 oz.; oil of almonds, syrup of squills, and syrup of senega, of each, 2 drs. Laxative, demulcent, and expectorant. The above are useful in hoarseness, tickling coughs, sore throats, &c.

Linctus, Pectoral. *Syn.* FOX LUNGS; LINCTUS PECTORALIS, LOHOCH È PULMONE VULPIUM, L. *Prep.* From spermaceti and Spanish juice, of each, 8 oz.; water, q. s. to soften the liquorice; make a thin electuary, and add of honey, 3 lbs.; oil of aniseed, 1 oz.; mix well. A popular and excellent demulcent in coughs. It formerly contained the herb 'fox lungs,' but spermaceti is now substituted for that article.

Linctus, Turpentine. *Syn.* LINCTUS STIMULANS, L. TEREBINTHINÆ, LOHOCH ANTHEL-

MINTICUM, L. *Prep.* (Recamier.) Oil of turpentine, 2 drs.; honey of roses, 3 oz.; mix. — *Dose.* A teaspoonful, night and morning, followed by a draught of any weak liquid; in worms, more especially tape-worm.

Linctus, White. *Syn.* LINCTUS ALBUS, MISTURA ALBA, LOHOCH ALBUM, L.; LOOCH BLANC, Fr. *Prep.* (P. Cod.) Jordan almonds, 4½ drs.; bitter almonds, ½ dr.; blanch them by steeping them in hot water and removing the skins; add of white sugar, ½ oz.; gum tragacanth, 20 grs.; beat to a smooth paste, and further add, of oil of almonds and orange-flower water, of each, 4 drs.; pure water 4 fl. oz. A pleasant demulcent in tickling coughs.

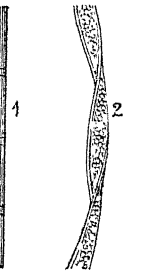
LIN'EN. *Syn.* LINTEUM, L. Linen is a textile fabric made of the liber-fibres of the *Linum usitatissimum*, or common flax, a plant which from time immemorial has been cultivated for this purpose. It is remarkable for the smoothness and softness of its texture, and is hence highly esteemed in temperate climates as an elegant and agreeable article of clothing to be worn next the skin. Its fibres are better conductors of heat, more porous, and more attractive of moisture, than those of cotton, which render it less adapted for body linen in cold weather, as well as in hot weather and hot climates, than calico. The latter, however, lacks the luxurious softness and freshness of linen, whilst the peculiar twisted and jagged character of its fibres render it apt to excite irritation in extremely delicate skins. The common prejudice in favour of old linen and flax lint for dressing wounds is thus shown to have reason on its side, and, like many other vulgar prejudices, to be supported by the investigations of science.

Identif. Linen fabrics are commonly sophisticated with cotton, which is a much less costly and a more easily wrought material. Various plans have been proposed to detect this fraud, many of which are too complicated and difficult for practical purposes. The following commend themselves for their simplicity and ease of application:—

1. A small strip (a square inch, for instance) of the suspected cloth is immersed for 2 or 3 minutes in a boiling mixture of about equal parts of hydrate of potassium and water, contained in a vessel of silver, porcelain, or hard glass; after which it is taken out and pressed between the folds of white blotting paper or porous calico. By separating 8 or 10 threads in each direction, their colour may be readily seen. The deep yellow threads are LINEN, the white or pale yellow ones are COTTON.

2. A small strip of the cloth, after having been repeatedly washed with rain water, boiled in the water, and dried, is immersed for 1 to 2 minutes in sulphuric acid; it is then withdrawn, carefully pressed under water with the fingers, washed, immersed for a few seconds in ammonia, solution of carbonate of potassium, or solution of carbonate of sodium, again washed with water, and dried between filtering paper. By this treatment the cotton fibres are dissolved, while the linen fibres are merely rendered thinner and more translucent, according to the duration of the experiment; after a short immersion, the cotton fibres appear transparent, while the linen fibres remain white and opaque.

3. (By the MICROSCOPE.) The indications afforded by both the previous tests, although quite visible to the naked eye, are rendered still more palpable by the use of a magnifying glass of small power, as the common pocket lens. Under a good microscope the presence of cotton in a linen tissue is very perceptible. The fibres of cotton present a distinctly flat and shrivelled appearance, not unlike that of a narrow, twisted ribbon, with only occasional joints; whilst those of flax are round, straight, and jointed. The fibres of cotton, after being exposed to the action of strong alkaline lyes, untwist themselves, contract in length, and assume a rounded form, but still continue distinct in appearance from the fibres of linen. The engraving represents a fibre of linen (1) and a fibre of cotton (2), as they appear when magnified 155 diameters. The difference between the two may be perceived, although less distinctly, through a good Stanhope or Coddington lens, provided the object be well illuminated.



Dyeing. Linen and cotton, from the similarity of their behaviour with dye-stuffs, are treated in nearly the same manner. The affinity of their fibres for colouring matter is very much weaker than that of the fibres of silk and woollen. On this account they are dyed with greater difficulty than those substances, and the colours so imparted are, in general, less brilliant and permanent under similar conditions. Linen shows less disposition to take dyes than cotton. The yarn or cloth, after being scoured and bleached in the usual manner, requires to have an additional tendency given to it, by chemical means, to condense and retain the materials of the dye-bath in its pores. This is effected by steeping the goods in solutions (mordants) which have at once an affinity for both the fibres of the cloth and the colouring matter. A similar process is employed in dyeing most other substances; but with cotton and linen, attention to this point is essential to the permanency of the dye. These matters are more fully explained under the heads DYEING and MORDANT.

The domestic management of linen may here receive a few moments' attention. Fruit stains, iron-moulds, and other spots on linen,

may, in general, be removed by applying to the part, previously washed clean, a weak solution of chlorine, chloride of lime, spirits of salts, oxalic acid, or salts of lemons, in warm water, and frequently by merely using a little lemon juice. When the stain is removed, the part should be thoroughly rinsed in clear warm water (without soap) and dried. Recent iron-moulds or ink spots on starched linen, as the front of a shirt, may be conveniently removed by allowing a drop or two of melted tallow from a common candle to fall upon them before sending the articles to the laundress. The oxide of iron combines with the grease, and the two are washed out together. If the spot is not entirely removed the first time, the process should be repeated. Linen that has acquired a yellow or bad colour by careless washing, may be restored to its former whiteness by working it well in water to which some strained solution of chloride of lime has been added, observing to well rinse it in clean water, both before and after the immersion in the bleaching liquor. The attempt to bleach unwashed linen should be avoided, as also using the liquor too strong, as in that case the linen will be rendered rotten.

LING. The *Gadus molua* (Linn.), an inferior species of the cod-fish tribe, common in the Northern seas, and used as a coarse article of food by the poor.

LIN'IMENT. *Syn.* LINIMENTUM, L. A semifluid ointment, or soapy application to painful joints, swellings, burns, &c. The term is also occasionally extended to various spirituous and stimulating external applications. A medicine of a thinner consistence, but similarly employed, is called an 'EMBROCATION.' These terms are, however, frequently confounded together, and misapplied. Liniments are generally administered by friction with the hand or fingers, or with some substance (as a piece of flannel) capable of producing a certain amount of irritation of the skin. Sometimes a piece of linen rag dipped in them is simply laid on the part. In most cases in which liniments are found beneficial, the advantage obtained from them is attributable rather to the friction or local irritation than to any medicinal power in the preparation itself. The greater number of cerates and ointments may be converted into liniments by simply reducing their consistence with almond or olive oil, or oil of turpentine.

Liniment, Ac'id. *Syn.* LINIMENTUM ACIDUM, L. ACIDI SULPHURICI, L. *Prep.* 1. (Sir B. Brodie.) Salad oil, 3 oz.; oil of vitriol, 1 dr.; mix, then add of oil of turpentine, 1 oz., and agitate the whole well together. As a counter-irritant, in rheumatism, stiff joints, &c. It closely resembles the 'GUESTONIAN EMBROCATION.'

2. (Hosp. F.) Olive oil, 3 oz.; oil of turpentine, 2 oz.; sulphuric acid, 1 fl. dr. An excellent alterative, stimulant, discutient, and counter-irritant, in chronic rheumatism, stiff joints, indolent tumours, and various chronic diseases of the skin.

Linimentum Aconitii. (B. P.) Aconite root, in powder, 20; camphor, 1; rectified spirit, to percolate, 30. Moisten the root for 3 days, then pack in a percolator, and pour sufficient rectified spirit upon it to produce with the camphor 20.

Strength, 1 in 1. Applied with a camel-hair pencil, alone or mixed in equal proportions, with a soap liniment or compound camphor liniment, and rubbed on the part. 7 parts of this, and 1 part of chloroformum belladonna, and sprinkled thinly on impermeable piline, is the best application for neuralgia or lumbago.

Liniment of Am'ber-oil. *Syn.* LINIMENTUM SUCCINI, L. *Prep.* 1. From olive oil, 3 parts; oils of amber and cloves, of each, 1 part. Resembles 'ROCHE'S EMBROCATION.'

2. (Opiated; LINIMENTUM SUCCINI OPIATUM, L.) From rectified oil of amber and tincture of opium, of each, 2 fl. oz.; lard, 1 oz. Anodyne, antispasmodic, and stimulant. A once popular remedy in cramp, stiff joints, &c.

Liniment of Ammo"nia. *Syn.* AMMONIACAL LINIMENT, VOLATILE L., OIL AND HARTSHORN; LINIMENTUM AMMONIÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Solution of ammonia, 1; olive oil, 3; mix.

2. (Ph. L. & E.) Liquor of ammonia (sp. gr. ·960), 1 fl. oz.; olive oil, 2 fl. oz.; shake them together until they are mixed.

3. (Ph. D.) To the last add of olive oil, 1 fl. oz. Stimulant and rubefacient. *Used* in rheumatism, lumbago, neuralgia, sore throat, spasms, bruises, &c. When the skin is irritable, more oil should be added, or it should be diluted with a little water.

4. (Camphorated; LINIMENTUM AMMONIÆ CAMPHORATUM, EMBROCATIO AMM. CAMPHORATA, L.)—*a.* (Hosp. F.) Olive oil, 3 oz.; camphor, ½ oz.; dissolve by a gentle heat, and when cold, add of liquor of ammonia, 1 fl. oz.

b. Soap liniment, 2 oz.; olive oil and liquor of ammonia, of each, 2 drs. As the last; more especially for sprains, bruises, chilblains, &c.

5. (Compound; DR. GRANVILLE'S COUNTER-IRRITANT OR ANTIDYNOUS LOTION; LINIMENTUM AMMONIÆ COMPOSITUM, L.—Ph. E.)—*a.* (STRONGER.) From liquor of ammonia (sp. gr. ·880), 5 fl. oz.; tincture of camphor, 2 fl. oz.; spirit of rosemary, 1 fl. oz.; mix. It should be kept in a well-stoppered bottle and in a cool situation.

b. (WEAKER.) Solution of ammonia (·880), 5 fl. oz.; tincture of camphor, 3 fl. oz.; spirit of rosemary, 2 fl. oz.

Obs. The above formulæ are nearly identical with the original ones of Dr. Granville; the principal difference being in his ordering liquor of ammonia of the sp. gr. ·872, instead of ·880. They are counter-irritant, rubefacient,

vesicant, and cauterising, according to the mode and length of their application. The milder lotion is sufficiently powerful to produce considerable rubefaction and irritation in from 1 to 5 or 6 minutes; vesication, in 8 or 10 minutes; and cauterisation, in 4 or 5 minutes longer. For the latter purpose, the stronger lotion is generally employed. According to Dr. Granville, these lotions are prompt and powerful remedies in rheumatism, lumbago, cramp, neuralgia, sprains, swollen and painful joints, headache, sore throat, and numerous other affections in which the use of a powerful counter-irritant has been recommended. They are ordered to be applied by means of a piece of linen, 6 or 7 times folded, or a piece of thick, coarse flannel wetted with the lotion, the whole being covered with a thick towel, and firmly pressed against the part with the hand. The stronger lotion is only intended to be employed in apoplexy, and to produce cauterisation. See COUNTER-IRRITANTS.

6. (From SESQUICARBONATE OF AMMONIA;—LINIMENTUM AMMONIÆ SESQUICARBONATIS—Ph. L.) Solution of sesquicarbonate of ammonia, 1 fl. oz.; olive oil, 3 fl. oz.; shake them together until mixed. This preparation resembles ordinary liniment of ammonia in its general properties, but it is much less active, owing to the alkali being carbonated. It is the 'oil and hartshorn' and the 'volatile liniment' of the shops.

Liniment, An'odyne. See LINIMENTS OF BELLADONNA, MORPHIA, OPIUM, SOAP, &c.

Liniment, Antispasmod'ic. *Syn.* LINIMENTUM ANTISPASMODICUM, L. CAJEPUTI COMPOSITUM, L. *Prep.* (Hufeland.) Oils of cajeput and mint, of each, 1 part; tincture of opium, 3 parts; compound camphor liniment, 24 parts. Anodyne, stimulant, and rubefacient.

Liniment, Arceus's. Compound elemi ointment.

Liniment of Belladon'na. *Syn.* LINIMENTUM BELLADONNÆ, B.P.L. *Prep.* 1. (B.P.) Prepared the same as LINIMENTUM ACONITII. A fluid ounce is equal to a solid ounce. Prescribed with equal parts of soap liniment, or compound camphor liniment, and is an excellent topical application for neuralgic pain.

2. Extract of belladonna, 1 dr.; oil of almonds, 2 oz.; lime water, 4 fl. oz.; In eczema, and some other cutaneous affections, to allay irritation, &c.

3. (Cutan. Hosp.) Extract of belladonna, 4 drs.; glycerine, 1 oz.; soap liniment, 6 oz. As the last.

4. (Guy's Hosp.) Extract of belladonna, 1 oz.; soap liniment, 8 fl. oz.

5. (Phœbus.) Extract of belladonna, 40 grs.; rectified ether, 1 dr.; cherry-laurel water, 2 fl. oz. As a friction to the abdomen in lead colic.

Obs. The above are reputed excellent stimulants, anodynes, antispasmodics, and resolvents, in various diseases, as rheumatism, neuralgia, painful affections of the skin and joints, tumours, &c. &c.

Linimentum Calcis. (B. P.) Solution of lime, 1; olive oil, 1; mix. The best liniment for burns and scalds.

Liniment of Caj'eput Oil. *Syn.* LINIMENTUM OLEI CAJEPUTI, L. *Prep.* 1. (Dr. Copland.) Compound camphor liniment and soap liniment, of each, 1½ fl. oz.; oil of cajeput, 1 fl. oz.

2. (Dr. Williams.) Oil of cajeput, ½ fl. dr.; castor oil, 1 fl. dr.; olive oil, 4½ fl. drs. A warm, antispasmodic, diffusible stimulant and rubefacient; in spasmodic asthma, colic, chronic rheumatism, spasms, chest affections, &c. See ANTISPASMODIC L. (*above*).

Liniment of Cam'phor. *Syn.* CAMPHORATED OIL, CAMPHOR EMBROCATION; LINIMENTUM CAMPHORÆ (B. P., Ph. L. E. & D.), OLEUM CAMPHORATUM, L. *Prep.* 1. (B.P.) Camphor, 1; olive oil 4; dissolve.

2. (Ph. L. & E.) Camphor, 1 oz.; olive oil, 4 fl. oz.; gently heat the oil, add the camphor (cut small), and agitate until dissolved. The Dublin College orders only ½ the above camphor. Stimulant, anodyne, and resolvent; in sprains, bruises, rheumatic pains, glandular enlargements, &c.

3. (Compound; LINIMENTUM CAMPHORÆ COMPOSITUM—B. P., Ph. L. & D.)—*a.* (B. P.) Camphor, 5; English oil of lavender, ¼; strong solution of ammonia, 10; rectified spirit, 20. Dissolve the oil and camphor in the spirit and gradually add the ammonia.

b. (Ph. L.) Camphor 2½ oz.; oil of lavender, 1 fl. dr.; rectified spirit, 17 fl. oz.; dissolve, then add of stronger liquor of ammonia, 3 fl. oz., and shake them together until they are mixed.

c. (Ph. L. 1836.) Liquor of ammonia, 7½ fl. oz.; spirit of lavender, 1 pint; distil off 1 pint, and dissolve in it camphor, 2½ oz. The formula of the Ph. D. 1826 was nearly similar.

d. (Wholesale.) Camphor (clean), 21 oz.; English oil of lavender, 3¾ oz.; liquor of ammonia, 2¾ lbs.; rectified spirit, 7 pints; mix, close the vessel, and agitate occasionally, until the camphor is dissolved. Powerfully stimulant and rubefacient. It closely resembles, and is now almost universally sold for, Ward's 'Essence for the Headache.'

Liniment of Canthar'ides. *Syn.* LINIMENT OF SPANISH FLIES; LINIMENTUM LYTTÆ, LIN. CANTHARIDIS (Ph. D. & U. S.), L. *Prep.* 1. (Dr. Collier.) Tincture of cantharides and soap liniment, equal parts.

2. (Ph. D.) Cantharides (in fine powder), 3 oz.; olive oil, 12 fl. oz.; digest for 3 hours over a waterbath, and strain through flannel, with expression.

3. (Ph. U. S.) Spanish flies, 1 oz.; oil of turpentine, 8 fl. oz.; proceed as last. The above are irritant and rubefacient; but should be used cautiously, lest they produce strangury.

Liniment of Chlo''ride of Lime. *Syn.* LI-

NIMENTUM CALCIS CHLORINATÆ, L. *Prep.* 1. Chloride of lime, 1 dr.; water (added gradually), 3 fl. oz.; triturate together in a glass mortar for 10 minutes, pour off the liquid portion, and add of oil of almonds, 2 fl. oz.

2. (Kopp.) Solution of chloride of lime (ordinary), 1 part; olive oil, 2 parts.

3. (Waller.) Chloride of lime (in fine powder), 1 part; soft soap, 2 parts; soft water, q. s. to make a liniment.

Obs. The above are cleanly and excellent applications in itch, scald head, herpes, lepra, foul ulcers, &c.

Liniment of Chlo″roform. *Syn.* LINIMENTUM CHLOROFORMI, B. P. *Prep.* 1. (B. P.) Chloroform, 1; liniment of camphor, 1; mix. The oil in the camphor liniment prevents the evaporation of the chloroform. Stimulating on application to a tender skin.

2. Chloroform 1 fl. dr.; almond oil, 7 fl. drs.; mix in a phial, and agitate it until the two unite.

3. (Tuson.) Chloroform, 1 fl. dr.; soap liniment, 2 fl. oz.; as the last. Used as an application in neuralgic pains, rheumatism, &c.

Liniment of Cod-liver Oil. *Syn.* LINIMENTUM OLEI MORRHUÆ, L. O. JACORIS ASELLI, L. *Prep.* (Dr. Brach.) Cod-liver oil, 2 fl. oz.; liquor of ammonia, 1 fl. oz.; mix. Resolvent, dispersive; applied to glandular tumours, scrofulous enlargements, &c.

Liniment of Cro′ton Oil. *Syn.* LINIMENTUM CROTONIS (B. P., Ph. D.), L. OLEI CROTONIS, L. O. TIGLII, L. *Prep.* 1. (B. P.) Croton oil, 1; oil of cajeput, 3½; rectified spirit, 3½; mix.

2. (Ph. D.) Croton oil, 1 fl. oz.; oil of turpentine, 7 fl. oz.; mix by agitation.

3. (J. Allen.) Croton oil and liquor of potassa, of each, 1 fl. dr.; agitate until mixed, then add of rose water, 2 fl. oz.

4. (Pereira.) Croton oil, 1 part; olive oil, 5 parts.

Obs. The above are used as counter-irritants; in rheumatism, neuralgia, bronchial and pulmonary affections, &c. When rubbed on the skin, redness and a pustular eruption ensue, and in general the bowels are acted on.

Liniment, Diuret′ic. *Syn.* LINIMENTUM DIURETICUM, L. *Prep.* 1. (Dr. Calini.) Squills (in fine powder), 1 dr.; gastric juice of a calf, 2 oz.; mix.

2. (Dr. Christison.) Soap liniment, tincture of foxglove, and tincture of squills, equal parts. In dropsies; rubbed over the abdomen or loins twice or thrice a day.

Liniment, Emoll′ient. *Syn.* LINIMENTUM ALBUM, L. EMOLLIENS, L. *Prep.* From camphor, 1 dr.; Peruvian balsam, ½ dr.; oil of almonds, 1 fl. oz.; dissolve by heat, add of glycerin, ½ fl. oz., agitate well, and, when cold, further add of oil of nutmeg, 15 drops. Excellent for chopped hands, lips, nipples, &c.

Liniment of Gar′lic. *Syn.* LINIMENTUM ALLII, L. *Prep.* From juice of garlic, 2 parts; olive oil, 3 parts; mix. In hooping-cough, infantile convulsions, &c.

Liniment of Gin′ger. *Syn.* LINIMENTUM ZINGIBERIS, L. *Prep.* (Dr. Turnbull.) Ginger, 1 part; rectified spirit, 2 parts; make a tincture or essence. For short-sightedness. A few drops are occasionally rubbed on the forehead for 8 or 10 minutes at a time. How this tincture came to be called a liniment we are at a loss to determine.

Liniment, Hunga″rian. *Syn.* LINIMENTUM HUNGARICUM, L. *Prep.* (Soubeiran.) Powdered cantharides and sliced garlic, of each, 1 dr.; camphor, bruised mustard seed, and black pepper, of each, 4 drs.; strong vinegar, 6 fl. oz.; rectified spirit, 12 fl. oz.; macerate a week, and filter. An excellent rubefacient and counter-irritant.

Liniment of Hydrochlo″ric Acid. *Syn.* LINIMENTUM MURIATICUM, L. ACIDI MURIATICI, L. A. HYDROCHLORICI, L. *Prep.* 1. (Hosp. F.) Olive oil, 2 oz.; white wax, 2 drs.; dissolve by a gentle heat, add of balsam of Peru, 1 dr.; hydrochloric acid, 2 drs.; mix well. An excellent application to chilblains before they break.

2. (W. Cooley.) Olive oil, ¼ pint; white spermaceti (pure) and camphor, of each, ½ oz.; mix with heat, add of hydrochloric acid, ½ fl. oz., and proceed as before. Equal to the last, and cheaper. This was extensively employed among the seamen of the Royal Navy by Mr. Cooley with uniform success.

Liniment of I′odide of Potas′sium. *Syn.* LINIMENTUM IODURETUM GELATINOSUM, L. GELÉE POUR LE GOÎTRE, Fr. *Prep.* (Foy.) Iodide of potassium, 4 drs.; proof spirit, 2 oz.; dissolve, and add the liquid to a solution of curd soap, 6 drs., in proof spirit, 2 oz., both being at the time gently warm; lastly, aromatise with rose or neroli, pour it into wide-mouthed bottles, and keep them closely corked. In goitre, &c.

Linimentum Potassii Iodidi cum Sapone. (B. P.) Hard soap, in powder, 1½; iodide of potassium, 1½; glycerin, 1; oil of lemon, ½: water, 1. Dissolve the soap in 7 of water, by heat of a water bath; dissolve the iodide of potassium in the remainder of the water, and mix by trituration the two solutions, and when cold add the oil of lemon, and mix thoroughly.

Liniment of I′odine. *Syn.* LINIMENTUM IODI (B. P.); IODURETTED LINIMENT; LINIMENTUM IODINII, L. IODURETUM, L. *Prep.* 1. (B. P.) Iodine, 5; iodide of potassium, 2; camphor, 1; rectified spirit, 40; dissolve.

2. (Cutan. Hosp.) Compound tincture of iodine and laudanum, equal parts.

3. (Dr. Copland.) Soap liniment, 1 oz.; iodine, 8 to 10 grs.

4. (Guibourt.) Iodide of potassium, 1 dr.; water, 1 fl. dr.; dissolve, and add it to white soap (in shavings) and oil of almonds, of each, 10 drs., previously melted together. Some perfume may be added. In scrofula, glandular enlargements, rheumatism, &c.

Liniment of Lead. *Syn.* LINIMENTUM PLUMBI, L. *Prep.* (Gaozey.) Acetate of lead, 40 grs.; soft water, 12 fl. oz.; olive oil, 6 oz.; mix, and agitate well. Astringent and refrigerant. Useful in excoriations, especially when accompanied with inflammation.

Liniment of Lime. *Syn.* LINIMENT FOR BURNS, CARRON OIL; LINIMENTUM CALCIS (Ph. L. E. & D.), L. AQUÆ CALCIS, OLEUM LINI CUM CALCE, L. *Prep.* 1. From olive oil (linseed oil—Ph. E.) and lime water, equal parts, shaken together until they are mixed. Very useful in burns and scalds.

2. (Compound; LINIMENTUM CALCIS COMPOSITUM, L.)—*a.* (Camphorated—W. Cooley.) Camphor liniment and lime water, equal parts.

b. (Opiated—W. Cooley.) Lime water and camphor liniment, of each, 1 oz.; extract of opium, 5 grs.; mix. Both are used as anodynes to allay pain and irritation in severe burns, chilblains, &c., for which purpose they are excellent. All the above liniments with lime water should be used as soon as possible after being prepared, as the ingredients separate by keeping.

Liniment of Mercury. *Syn.* MERCURIAL LINIMENT; LINIMENTUM HYDRARGYRI (B. P., Ph. L.), LIN. H. COMPOSITUM (Ph. L. 1836), L. *Prep.* 1. (B. P.) Ointment of mercury, 1; solution of ammonia, 1; liniment of camphor, 1. Melt the ointment in the liniment, add the ammonia, and shake them together.

2. (Ph. L.) Camphor, 1 oz.; spirit of wine, 1 fl. dr.; sprinkle the latter on the former, powder, add of lard and mercurial ointment (stronger), of each, 4 oz.; rub them well together, then gradually add of liquor of ammonia, 4 fl. oz.; and mix well. Stimulant and discutient. It resembles mercurial ointment in its effects; but though milder in its operation, it more quickly produces salivation.

Liniment of Mor'phia. *Syn.* LINIMENTUM MORPHIÆ, L. *Prep.* (W. Cooley.) Pure morphia, 3 grs.; put it into a warm mortar, add very gradually, of oil of almonds (warm), 1 fl. oz., and triturate until the morphia is dissolved, then add of camphor liniment, 1 oz. An excellent topical anodyne and antispasmodic, which often allays pain when other means have failed.

Liniment of Mus'tard. *Syn.* LINIMENTUM SINAPIS, L. *Prep.* 1. Flour of mustard (best), 1 oz.; water, tepid, 2 fl. oz.; mix, and add of glycerin, liquor of ammonia, and olive oil, of each, 1 fl. oz.

2. (Béral.) Carbonate of ammonia (in fine powder), 1 part; camphor (in powder), 2 parts; oil of lavender, 4 parts; tincture of mustard, 6 parts; mix, dissolve by agitation, add of simple liniment (warm), 56 parts, and again agitate until the whole is perfectly incorporated.

3. Black mustard seed (ground in a pepper-mill or otherwise well bruised), ½ lb.; oil of turpentine, 1 pint; digest, express the liquid, filter, and dissolve in it camphor, ½ lb. Stimulant and rubefacient. A popular and useful remedy in rheumatic pains, lumbago, colic, chilblains, &c. The last is a close imitation of Whitehead's 'Essence of Mustard.'[1]

4. (LIN. OLEI VOLATILIS SINAPIS.)—*a.* From volatile oil of black mustard seed, ½ dr.; oil of almonds, 1 fl. oz. As a rubefacient.

b. From volatile oil, 1 part; alcohol (sp. gr. ·815), 1 to 2 parts. As a vesicant.

Liniment of Mustard (Compound). LINIMENTUM SINAPIS COMPOSITUM (B. P.). Oil of mustard, 1 dr.; etherial extract of mezereon, 40 grs.; camphor, 2 drs.; castor oil, 5 drs.; rectified spirit, 32 drs.; dissolve.

Liniment of Ni'trate of Mercury. *Syn.* CITRINE LINIMENT; LINIMENTUM HYDRARGYRI NITRATIS, L. *Prep.* (Sir H. Halford.) Ointment of nitrate of mercury and olive oil, equal parts, triturated together in a glass mortar, or mixed by a gentle heat. This liniment is stimulent, discutient, and alterative, and in its general properties resembles the ointment of the same name. For most purposes the quantity of oil should be at least doubled.

Liniment of Nux Vom'ica. *Syn.* LINIMENTUM NUCIS VOMICÆ, L. *Prep.* (Magendie.) Tincture of nux vomica, 1 fl. oz.; liquor of ammonia, 2 fl. drs.; mix. As a stimulating application to paralysed limbs. The addition of ½ fl. dr. each of glycerin and salad oil renders it an excellent application in chronic rheumatism and neuralgia.

Liniment of O'pium. *Syn.* ANODYNE LINIMENT; LINIMENTUM OPII (B. P., Ph. L. & E.), L. OPII or L. ANODYNUM (Ph. D.), L. SAPONIS CUM OPIO, L. *Prep.* 1. (B. P.) Tincture of opium, 1; liniment of soap, 1; mix.

2. Tincture of opium, 2 fl. oz.; soap liniment, 6 fl. oz.; mix.

3. (Ph. E.) Castile soap, 6 oz.; opium, 1½ oz.; rectified spirit, 1 quart; digest for three days, then filter, add of camphor, 3 oz., oil of rosemary, 6 fl. drs., and agitate briskly.

4. (Ph. D.) Soap liniment and tincture of opium, equal parts.

5. (Wholesale.) Soft soap, 1¼ lb.; powdered opium and camphor, of each ¼ lb.; rectified spirit, 1 gall.; digest a week.

Obs. This preparation is an excellent anodyne in local pains, rheumatism, neuralgia, sprains, &c.

Liniment of Phos'phorus. *Syn.* LINIMENTUM PHOSPHORATUM, L. *Prep.* (Augustin.) Phosphorus, 6 grs.; camphor, 12 grs.; oil of almonds, 1 oz.; dissolve by heat; when cold, decant the clear portion, and add of strongest liquor of ammonia, 10 drops. A useful friction in gout, chronic rheumatism, certain obstinate cutaneous affections, &c.

Sim'ple Liniment. *Syn.* LINIMENTUM SIMPLEX (Ph. E.), L. *Prep.* (Ph. E.) White wax, 1 oz.; olive oil, 4 fl. oz.; melt together, and stir the mixture until it is cold. Emollient; resembles spermaceti ointment in all except its consistence.

[1] See page 462.

Liniment of Soap. *Syn.* OPODELDOC, CAMPHORATED TINCTURE OF SOAP, BALSAM OF S.; LINIMENTUM SAPONIS (B. P., Ph. L. E. & D.), L. SAPONACEUM, TINCTURA SAPONIS CAMPHORATA, BALSAMUM SAPONIS, L. *Prep.* 1. (B. P.) Hard soap (cut small), 2½ oz.; camphor, 1¼ oz.; English oil of rosemary, 3 drs.; rectified spirit, 18 oz.; distilled water, 2 oz.; mix the water and spirit, add the other ingredients, digest at a temperature not exceeding 70° Fahr., agitating occasionally for seven days, and filter.

2. (Ph. L.) Castile soap (cut small), 2½ oz.; camphor (small), 10 drs.; spirit of rosemary, 18 fl. oz.; water, 2 fl. oz.; digest with frequent agitation until the solid substances are dissolved.

3. (Ph. E.) Castile soap, 5 oz.; camphor, 2½ oz.; oil of rosemary, 6 fl. drs.; rectified spirit, 1 quart.

4. (Ph. D.) Castile soap (in powder), 2 oz.; camphor, 1 oz.; proof spirit, 16 fl. oz.

5. (LINIMENT SAVONNEAU—P. Cod.) Tincture of soap (P. Cod.) and rectified spirit (·863 or 41 o. p.), of each, 8 parts; olive oil, 1 part.

Obs. This article, prepared according to the directions of the Pharmacopœia, from 'soap made of olive oil and soda' (Castile soap). is apt to gelatinise in cold weather, and to deposit crystals of elaidate and stearate of lime. This may be avoided, when expense is not an objection, by first well drying the soap, employing a spirit of at least 85%, and keeping the preparation in well-closed bottles. A cheaper and better plan is to substitute the 'soft soap' of the Ph. L. ('soap made with olive oil and potassa') for the Castile soap ordered by the College. The soft soap of commerce imparts to the liniment an unpleasant smell. The following formula, one of those commonly adopted by the wholesale druggists, produces a very good article, though much weaker than that of the Pharmacopœia.

6. (Wholesale.) Camphor (cut small), 1½ lb.; soft soap, 7 lbs.; oil of rosemary, 3 fl. oz.; rectified spirit of wine and water, of each, 3½ galls.; digest with occasional agitation for a week, and filter. This is the 'opodeldoc' or 'soap liniment' of the shops.

Uses. Soap liniment is stimulant, discutient, and lubricating, and is a popular remedy in rheumatism, local pains, swellings, bruises, sprains, &c.

7. (With Opium.) See LINIMENT OF OPIUM.

8. (Sulphuretted; LINIMENTUM SAPONIS SULPHURETUM, L. SULPHURO-SAPONACEUM —Jadelot, L.) Sulphuret of potassium, 3 oz.; soap, 12 oz.; water, q. s.; melt together, and add, of olive oil, 12 oz.; oil of origanum, 1 fl. dr.; mix well. An excellent remedy for the itch, and some allied skin diseases.

Liniment of Sul'phide of Carbon. *Syn.* LINIMENTUM CARBONIS SULPHURETI, L. *Prep.* 1. From bisulphide of carbon, 1 dr.; camphorated oil, 1 oz.; mix.

2. (Lampadius.) Camphor, 2 drs.; bisulphuret of carbon, 4 fl. drs.; dissolve, and add of rectified spirit, 1 fl. oz. In rheumatism, gouty nodes, &c.

Liniment of Sulphu'ric Acid. See ACID LINIMENT.

Liniment, Tripharm'ic. *Syn.* LINIMENTUM TRIPHARMICUM (Ph. L. 1746), L. *Prep.* Take of lead plaster and olive oil, of each, 4 oz.; melt, add of strong vinegar, 1 fl. oz., and stir until cold. Cooling and desiccative; in excoriations, burns, &c.

Liniment of Tur'pentine. *Syn.* KENTISH'S LINIMENT; LINIMENTUM TEREBINTHINÆ (B. P., Ph. L. & D.), L. TEREBINTHINATUM (Ph. E.), L. *Prep.* 1. (B. P.) Oil of turpentine, 16; camphor, 1; soft soap, 2; dissolve the camphor in the turpentine, then add the soap, and rub till thoroughly mixed.

2. (Ph. L.) Soft soap, 2 oz.; camphor, 1 oz.; oil of turpentine, 10 fl. oz.; shake them together until mixed. Stimulant; in lumbago, cholera, colic, &c.

3. (Ph. L. 1824.) Resin cerate, 6 oz.; oil of turpentine, 4 fl. oz.; mix. An excellent application to burns.

4. (Ph. E.) Resin ointment, 4 oz.; camphor, 4 drs.; dissolve by a gentle heat, and stir in oil of turpentine, 5 fl. oz.

5. (Ph. D.) Oil of turpentine, 5 fl. oz.; resin ointment, 8 oz.; mix by a gentle heat. This forms Dr. Kentish's celebrated application to burns and scalds. The parts are first bathed with warm oil of turpentine or brandy, and then covered with pledgets of lint, smeared with the liniment.

6. (Compound—*a.* LINIMENTUM TEREBINTHINÆ ACETICUM.) Oil of turpentine, 1; acetic acid, 1; liniment of camphor, 1; mix.

b. (LINIMENTUM TEREBINTHINÆ COMPOSITUM, L.) (Acetic; ST. JOHN LONG'S LINIMENT; LINIMENTUM TEREBINTHINÆ ACETICUM, L.) Oil of turpentine, 3 oz.; rose water, 2½ fl. oz.; acetic acid, 5 drs.; oil of lemons, 1 dr.; yolk of egg, 1; make an emulsion. As a counter-irritant in phthisis.

c. (Ammoniated—Debreyne.) Lard, 3 oz.; melt, and add, of oil of turpentine and olive oil, of each, 1 oz.; when cold, further add of camphorated spirit, 4 fl. drs.; liquor of ammonia, 1 fl. dr. In sciatica, lumbago, &c.

d. (Opiated—Recamier.) Oil of turpentine, 1 fl. oz.; oil of chamomile, 2 fl. oz.; tincture of opium, 1 fl. dr. In neuralgia, &c.

e. (Sulphuric—Ph. Castr. Ruthena.) Oil of turpentine, 2 oz.; olive oil, 5 oz.; mix, and add of dilute sulphuric acid, 1½ dr. See ACID LINIMENT.

Liniment of Vera'trine. *Syn.* LINIMENTUM VERATRIÆ, L. *Prep.* (Brande.) Veratrine, 8 grs.; alcohol, ½ fl. oz.; dissolve, and add of soap liniment, ½ fl. oz. In neuralgic and rheumatic pains, gout, &c.

Liniment of Ver'digris. *Syn.* OXYMEL OF VERDIGRIS; LINIMENTUM ÆRUGINIS (Ph. L.),

OXYMEL ÆRUGINIS (Ph. L. 1738), OXYMEL CUPRI SUBACETATIS (Ph. D. 1826), L. *Prep.* (Ph. L.) Verdigris (in powder), 1 oz.; vinegar, 7 fl. oz.; dissolve, filter through linen, add of honey, 14 oz., and evaporate to a proper consistence.

Obs. This preparation is wrongly named a 'liniment.' The College, after 'beating about the bush' for nearly a century, found a right name for it in 1788; but, as in many other cases, soon abandoned it for another less appropriate.

Oxymel of verdigris is stimulant, detergent, and escharotic. It is applied to indolent ulcers, especially of the throat, by means of a camel-hair pencil; and, diluted with water, it is used as a gargle. Care must be taken to avoid swallowing it, as it occasions vomiting and excessive purging.

Liniment, Ver'mifuge. *Syn.* LINIMENTUM ANTHELMINTICUM, L. VERMIFUGUM, L. *Prep.* Castor oil, 1 oz.; essential oils of wormwood and tansy, of each, ½ oz.; Dr. Peschier's ethereal tincture of pennyroyal buds, 20 drops; mix. Employed in frictions on the abdomen in cases of worms in children. Its activity may be still further increased by the addition of a little garlic juice. ('Journ. de Méd.') An excellent medicine.

Liniment, Ware's. *Prep.* From camphor liniment, 1 oz.; solution of carbonate of potassa, 1 dr. In amaurosis.

Liniment, White's. The old name for spermaceti ointment.

Liniment, Wilkinson's. *Prep.* (Phœbus.) Prepared chalk, 20 grs.; sulphur, lard, and tar, of each, ½ oz.; mix, and add of Boyle's fuming liquor, 10 or 15 drops. In certain chronic skin diseases, neuralgia, &c.

LIN'SEED. *Syn.* FLAX SEED; LINI SEMINA, L. The seed of *Linum usitatissimum* (Linn.), or common flax. (Ph. L.) Oily, emollient, demulcent, and nutritive. Ground to powder (linseed meal; farina lini), it is used for poultices. The cake left after expressing the oil (linseed cake; lini placenta) is used for feeding cattle. Under the form of tea or infusion, it is used as a diluent, and to allay irritation in bronchial, urinary, and other like affections. See INFUSION, LINEN, &c.

LINT. *Syn.* LINTEUM, L. White linen-cloth, scraped by hand or machinery, so as to render it soft and woolly. The hand-made lint is now little used; it was prepared from pieces of old linen-cloth. The machine-made lint is prepared from a fabric woven on purpose. A lint made from cotton (cotton-lint) is now largely manufactured; it is much inferior to the true lint, being a bad conductor of heat. Lint is used for dressing ulcers, either alone or smeared with some suitable ointment or cerate.

Medica'ted Lint. *Syn.* LINTEUM MEDICATUM, L. NIGRUM, L. INFERNALE, L. *Prep.* 1. Nitrate of silver, 20 to 30 grs.; distilled water, 1 fl. oz.; dissolve, saturate dry lint, ½ oz., with the solution, and expose it in a saucer or capsule to the light and air, until it has become black and dry.

2. From nitrate of silver and nitrate of copper, of each, ½ dr.; lint, 1 oz.; water, 1½ fl. oz.; as the last. Used to dress old and indolent ulcers.

LIP SALVE. See SALVE.

LIQUA'TION. The process of sweating out by heat the more fusible metals of an alloy. Metallurgists avail themselves of this method in assaying and refining the precious metals, and procuring antimony and some other metals from their ores.

LIQUEFA'CIENTS. *Syn.* RESOLVENTS; LIQUEFACIENTIA, RESOLVENTIA, L. In pharmacy, substances or agents which promote secretion and exhalation, soften and loosen textures, and promote the absorption or removal of enlargements, indurations, &c. To this class belong the alkalies, antimony, bromine, chlorine, iodine, mercury, sulphur, &c., and their preparations.

LIQUEFACTION. The assumption of the liquid form. It is usually applied to the conversion of a solid into the liquid state, which may arise from increase of temperature (fusion), absorption of water from the atmosphere (deliquescence), or the action of a body already fluid (solution).

Liquefaction of Gases. Under the combined influence of pressure and cold, nearly all the gases may be liquefied. The first experiments in this direction were made by Faraday, who succeeded in reducing to the liquid condition 8 bodies which had hitherto been regarded as permanent gases, namely, ammonia, carbonic anhydride, chlorine, cyanogen, hydrochloric acid, nitrous oxide, sulphuretted hydrogen, and sulphurous anhydride. His method of proceeding was very simple; the materials were sealed up in a strong, narrow, glass tube, bent so as to form an obtuse angle, together with a little 'pressure gauge,' consisting of a slender tube closed at one end, and having within it, near the open extremity, a globule of mercury. The gas, being disengaged by the application of heat or otherwise, accumulated in the tube, and by its own pressure brought about liquefaction. The force required for this purpose was judged of by the diminution of volume of the air in the pressure gauge. By employing powerful condensing syringes, and an extremely low temperature, Faraday has since succeeded in liquefying olefiant gas, hydriodic and hydrobromic acids, phosphuretted hydrogen, and the gaseous fluorides of silicon and boron. Oxygen, hydrogen, nitrogen, nitric oxide, carbonic oxide, and coal gas, refused to liquefy at the temperature of —166° Fahr., while subjected to pressures varying in different cases from 27 to 58 atmospheres. Since then an even greater degree of cold has been obtained from liquefied nitric oxide and ether.

CARBONIC ANHYDRIDE is liquefied on the

large scale by condensing it in strong vessels of gun-metal or boiler-plate. It requires a pressure of between 27 and 28 atmospheres at 32° Fahr. (Adams.) The liquefied acid is colourless and limpid, lighter than water, and four times more expansible than air; it mixes in all proportions with ether, alcohol, naphtha, oil of turpentine, and sulphuret of carbon; and is insoluble in water and fat oils. When a jet of liquid carbonic anhydride is allowed to issue into the air from a narrow aperture, such an intense degree of cold is produced by the evaporation of a part, that the remainder freezes to a solid (solid carbonic anhydride), and falls in a shower of snow. This substance, which may be collected, affords a means of producing extreme cold. Mixed with a little ether, and poured upon a mass of mercury, the latter is almost instantly frozen. The temperature of this mixture in the air was found to be —106° Fahr.; when the same mixture was placed beneath the receiver of an air-pump, and exhaustion rapidly performed, the temperature sank to —166°. This degree of cold was employed in Faraday's last experiments on the liquefaction of gases.

LIQUEUR. [Fr.] *Syn.* CORDIAL. A stimulating beverage, formed of weak spirit, aromatised and sweetened. The manufacture of liqueurs constitutes the trade of the 'compounder,' 'rectifier,' or 'liquoriste.'

The materials employed in the preparation of liqueurs or cordials are rain or distilled water, white sugar, clean flavourless spirit, and flavouring ingredients. To these may be added the substances employed as 'finings,' when artificial clarification is had recourse to.

The utensils and apparatus required in the business are those ordinarily found in the wine and spirit cellar; together with a copper still, furnished with a pewter head and a pewter worm or condenser, when the method 'by distillation' is pursued. A barrel, hogshead, or rum puncheon, sawn in two, or simply 'unheaded,' as the case may demand, forms an excellent vessel for the solution of the sugar; and 2 or 3 fluted funnels, with some good white flannel, will occasionally be found useful for filtering the aromatic essences used for flavouring. Great care is taken to ensure the whole of the utensils, &c., being perfectly clean and 'sweet,' and well 'seasoned,' in order that they may neither stain nor flavour the substances placed in contact with them.

In the preparation or compounding of liqueurs, one of the first objects which engages the operator's attention is the production of an alcoholic solution of the aromatic principles which are to give them their peculiar aroma and flavour. This is done, either by simple solution or maceration, as in the manufacture of tinctures and medicated spirits, or by maceration and subsequent distillation. The products, in this country, are called ESSENCES or SPIRITS, and by the French INFUSIONS, and are added to the solution of sugar (SYRUP or CAPILLAIRE) or to the dulcified spirit, in the proportions required. Grain or molasses spirit is the kind usually employed for this purpose in England. As before observed, it should be of the best quality; as, if this is not the case, the raw flavour of the spirit is perceptible in the liquor. Rectified spirit of wine is generally very free from flavour, and when reduced to a proper strength with clear soft water, forms a spirit admirably adapted for the preparation of cordial liquors. Spirit weaker than about 45 o. p., which has been freed from its own essential oil, by careful rectification, is known in trade under the title of 'pure,' 'flavourless,' 'plain,' or 'silent spirit.' Before macerating the ingredients, if they possess the solid form, they are coarsely pounded, bruised, sliced, or ground, as the peculiar character of the substance may indicate. This is not done until shortly before submitting them to the action of the menstruum; as, after they are bruised they rapidly lose their aromatic properties by exposure to the air. When it is intended to keep them for any time in the divided state, they should be preserved in well-corked bottles or jars. The practice of drying the ingredients before pounding them, frequently adopted by ignorant and lazy workmen, for the sake of lessening the labour, is, of course, even more destructive to their most valuable qualities than mere exposure to the air. The length of time the ingredients should be digested in the spirit should never be less than 5 or 6 days, but a longer period is preferable when distillation is not employed. In either case the time may be advantageously extended to 10 days or a fortnight, and frequent agitation should be had recourse to during the whole period. When essential oils are employed to convey the flavour, they are first dissolved in a little of the strongest rectified spirit of wine, in the manner explained under ESSENCE; and when added to the spirit, they are mixed up with the whole mass as rapidly and as perfectly as possible. In managing the still, the fire is proportioned to the ponderosity of the oil or flavouring substance, and the receiver is changed before the faints come over; as these are unfitted to be mixed with the cordial. In many cases the addition of a few pounds of common salt to the liquor in the still facilitates the process and improves the product. Ingredients which are not volatile are, of course, always added after distillation. The stronger spirit is reduced to the desired strength by means of either clear soft water or the clarified syrup used for sweetening. The sugar employed should be of the finest quality, and is prererably made into capillaire or syrup before adding it to the aromatised spirit; and not until this last has been rendered perfectly 'fine' or transparent, by filtration or clarification, as the case may demand. Some spirits or infusions, as those

of aniseed, caraway, &c., more particularly require this treatment, which is best performed by running them through a clean wine bag, made of rather fine cloth, having previously mixed them with a spoonful or two of magnesia; but in all cases clarification by simple repose should be preferred. Under proper management, liqueurs or cordials prepared of good materials will be found perfectly 'clear' or 'bright' as soon as made, or will become so after being allowed a few days for defecation; but in the hands of the inexperienced operator, and when the spirit employed is insufficient in strength or quantity, it often happens that they turn out 'foul' or 'milky.' When this is the case, the liquid may be 'fined down' with the whites of 12 to 20 eggs per hogshead; or a little alum, either alone or followed by a little carbonate of sodium or potassium, both dissolved in water, may be added, in the manner described under FININGS.

An excellent and easy way of manufacturing cordial liquors, especially when it is inconvenient to keep a large stock on hand, is by simply 'aromatising' and 'colouring,' as circumstances or business may demand, spirit 60 or 64 u. p., kept ready sweetened for the purpose. To do this to the best advantage, two descriptions of sweetened spirit should be provided, containing respectively 1 lb. and 3 lbs. of sugar to the gallon. From these, spirit of any intermediate sweetness may be made, which may be flavoured with any essential oil dissolved in alcohol, or any aromatised spirit or 'infusion' (see *below*), prepared either by digestion or distillation. As a general rule, the concentrated essences, made by dissolving 1 oz. of the essential oil in 1 pint of the strongest rectified spirit of wine, will be found admirably adapted for this purpose. These essences, which should be kept in well-corked bottles, are employed by dropping them cautiously into the sweetened spirit until the desired flavour is produced. During this operation, the liquor should be frequently and violently shaken to produce complete admixture. If by any accident the essence is added in too large a quantity, the resulting 'milkiness' or excess of flavour may be removed by the addition of a little more spirit, or by clarification. In this way the majority of the liqueurs in common use may be produced extemporaneously, of nearly equal quality to those prepared by distillation. For those which are coloured, simple digestion of the ingredients is almost universally adopted. The "process by distillation" should, however, be always employed to impart the flavour and aroma of volatile aromatics to the spirit, when expense, labour, and time, are of less importance than the production of a superior article.

The French liquoristes are famed for the preparation of cordials of superior quality, cream-like smoothness, and delicate flavour. Their success chiefly arises from the employment of very pure spirit and sugar (the former in a larger proportion than that adopted by the English compounder), and in the judicious application of the flavouring ingredients. The French liquoristes distinguish their cordials as 'eaux' and 'extraits' (waters, extracts), or liqueurs which, though sweetened, are entirely devoid of viscidity; and 'baumes,' 'crêmes,' and 'huiles' (balms, creams, oils), which contain sufficient sugar to impart to them a syrupy consistence. The greatest possible attention is given to the preparation of the aromatised or flavouring essences, in France called 'infusions.' These are generally made by macerating the aromatic ingredients in spirit at about 2 to 4 u. p. (sp. gr. ·922 to ·925), placed in well-corked glass carboys, or stoneware jars or bottles. The maceration is continued, with occasional agitation, for 3, 4, or even 5 weeks, when the aromatised spirit is either distilled or filtered; generally the former. The outer peel of cedrats, lemons, oranges, limettes, bergamottes, &c., is alone used by our Continental neighbours, and is obtained either by carefully peeling the fruit with a knife, or by 'oleo-saccharum,' by rubbing it off with a lump of hard white sugar. Aromatic seeds and woods are bruised by pounding before being submitted to infusion. The substances employed in France to colour liqueurs are, for—blue, soluble Prussian blue, sulphate of indigo (nearly neutralised with chalk), and the juice of blue flowers and berries;—amber, fawn, and brandy colour, burnt sugar or spirit colouring;—green, spinach or parsley leaves (digested in spirit), and mixtures of blue and yellow;—red, powdered cochineal or brazil wood, either alone or mixed with a little alum;—violet, blue violet petals, litmus, or extract of logwood;—purple, the same as violet, only deeper;—yellow, an aqueous infusion of safflower or French berries, and the tinctures of saffron and turmeric.

A frequent cause of failure in the manfacture of liqueurs and cordials is the addition of too much flavouring matter. Persons unaccustomed to the use of strong aromatic essences and essential oils, seldom sufficiently estimate their power, and, consequently, are very apt to add too much of them, by which the liqueur is rendered not only disagreeably high flavoured, but, from the excess of oil present, also 'milky,' or 'foul,' either at once, or, what is nearly as bad, on the addition of water. This source of annoyance, arising entirely from bad manipulation, frequently discourages the tyro, and cuts short his career as a manufacturer. From the viscidity of cordials, they are less readily 'fined down' than unsweetened liquor, and often give much trouble to clumsy and inexperienced operators. The most certain way to prevent disappointment in this respect is to use too little rather than too much flavouring; for if the quantity proves insufficient, it is readily 'brought up' at any time, but the contrary is not effected without some trouble and delay.

A careful attention to the previous remarks will render this branch of the rectifier's art far more perfect and easy of performance than it is at present, and will, in most cases, produce at once a satisfactory article, 'fine, sweet, and pleasant.'

The cordials of respectable British 'compounders' contain fully 3 lbs. of white lump sugar per gallon, and are of the strength of 60 to 64 u. p. The baumes, crêmes, and huiles imported from the Continent are richer both in spirit and sugar than ours, and to this may be referred much of their superiority. Mere sweetened or cordialised spirits (eaux, of the Fr.) contain only from 1 to 1½ lb. of sugar per gallon.

The purity of liqueurs is determined in the manner noticed under BRANDY, WINE, &c.

The following list embraces nearly all the cordials and liqueurs, both native and imported, met with in trade in this country:—

Absinthe. *Syn.* EXTRAIT D'ABSINTHE DE SUISSE; SWISS EXTRACT OF WORMWOOD. *Prep.* From the tops of *Absinthum majus*, 4 lbs.; tops of *Absinthum minus*, 2 lbs.; angelica root, calamus aromaticus, Chinese aniseed, and leaves of dittany of Crete, of each, 15 grs.; brandy or spirit at 12 u. p., 4 galls.; macerate for 10 days, then add water, 1 gall.; distil 4 galls. by a gentle heat, and dissolve in the distilled spirit, of crushed white sugar, 2 lbs. Tonic and stomachic.

Alker'mes. This liqueur is highly esteemed in some parts of the South of Europe.

Prep. 1. Bay leaves and mace, of each 1 lb.; nutmegs and cinnamon, of each 2 oz.; cloves, 1 oz. (all bruised); cognac brandy, 3½ galls.; macerate for 3 weeks, frequently shaking, then distil over 3 galls., and add, of clarified spirit of kermes, 18 lbs.; orange-flower water, 1 pint; mix well, and bottle. This is the original formula for the 'alkermes de Santa Maria Novella,' which is much valued.

2. Spice, as last; British brandy, 4 galls.; water, 1 gall.; macerate as before, and draw over 4 galls., to which add, of capillaire, 2 galls., and sweet spirit of nitre, ¼ pint. Cassia is often used for cinnamon. Inferior to the last.

An'iseed Cordial. *Prep.* 1. From aniseed, 2 oz. (or essential oil, 1½ dr.), and sugar, 3 lbs. per gallon. It should not be weaker than about 45 u. p., as at lower strengths it is impossible to produce a full-flavoured article without its being milky, or liable to become so.

2. (ANISETTE DE BORDEAUX.)—*a.* (Foreign.) Aniseed, 4 oz.; coriander and sweet fennel seeds, of each, 1 oz. (bruised); rectified spirit, ½ gall.; water, 3 quarts; macerate for 5 or 6 days, then draw over 7 pints, and add of lump sugar, 2½ lbs.

b. (English.) Oil of aniseed, 15 drops; oils of cassia and caraway, of each, 6 drops; rub them with a little sugar, and then dissolve it in spirit (45 u. p.), 3 quarts, by well shaking them together; filter, if necessary, and dissolve in the clear liquor sugar, 1½ lb. See PEPPERMINT (*below*).

Balm of Moluc'ca. *Prep.* From mace, 1 dr.; cloves, ½ oz.; clean spirit (22 u. p.), 1 gall.; infuse for a week in a well-corked carboy or jar, frequently shaking, colour with burnt sugar, q. s., and to the clear tincture add of lump sugar, 4½ lbs., dissolved in pure soft water, ½ gall. On the Continent this takes the place of the 'cloves' of the English retailer.

Bit'ters. These have generally from 1 to 1½ lb. of sugar per gallon.[1]

Car'away Cordial. *Prep.* Generally from the essential oil, with only 2½ lbs. of sugar per gall. 1 fl. dr. of the oil is commonly reckoned equal to ¼ lb. of the seed. The addition of a very little oil of cassia, and about half as much of essence of lemon or of orange, improves it. See BRANDY (Caraway).

Ce'drat Cordial. *Prep.* From essence (oil) of cedrat, ¼ oz.; pure spirit (at proof), 1 gall.; dissolve, add of water, 3 pints, agitate well; distil 3 quarts, and add an equal measure of clarified syrup. A delicious liqueur. See CRÊME and EAU (*below*).

Cin'namon Cordial. *Prep.* This is seldom made with cinnamon, owing to its high price, but with either the essential oil or bark of cassia, with about 2 lbs. of sugar to the gall. It is preferred coloured, and therefore may be very well prepared by simple digestion. The addition of 5 or 6 drops, each, of essence of lemon and orange peel, with about a spoonful of essence of cardamoms per gall., improves it. 1 oz. of oil of cassia is considered equal to 8 lbs. of the buds or bark. 1 fl. dr. of the oil is enough for 2½ galls. It is coloured with burnt sugar.

Cit'ron Cordial. *Prep.* From the oil or peel, with 3 lbs. of sugar per gall., as above. (See *below*.)

Citronelle. *Syn.* EAU DE BARBADES. *Prep.* 1. From fresh orange peel, 2 oz.; fresh lemon peel, 4 oz.; cloves, ½ dr.; corianders and cinnamon, of each, 1 dr.; proof spirit, 4 pints; digest for 10 days, then add of water, 1 quart, and distil ½ gall.; to the distilled essence add of white sugar, 2 lbs., dissolved in water, 1 quart.

2. Essence of orange, ½ dr.; essence of lemon, 1 dr.; oil of cloves, and cassia, of each, 10 drops; oil of coriander, 20 drops; spirit (58 o. p.), 5 pints; agitate until dissolved, then add of distilled or clear soft water, 3 pints; well mix, and filter it through blotting paper, if necessary; lastly, add of sugar (dissolved), q. s.

Clairet. *Syn.* ROSSALIS DES SIX GRAINES. *Prep.* From aniseed, fennel seed, coriander seed, caraway seed, dill seed, and seeds of the candy-carrot (*Athamantia cretensis*—Linn.), of each (bruised), 1 oz.; proof spirit, ½ gall.; digest for 1 week, strain, and add of loaf sugar, 1 lb., dissolved in water, q. s.

[1] See article, BITTERS.

Cloves. *Syn.* CLOVE CORDIAL. *Prep.* From bruised cloves, 1 oz., or essential oil, 1 fl. dr., to every 3 galls. of proof spirit. If distilled, some common salt should be added, and it should be drawn over with a pretty quick fire. It requires fully 3 lbs. of sugar per gall., and is generally coloured with poppy flowers or burnt sugar. The addition of 1 dr. of bruised pimento, or 5 drops of the oil for every oz. of cloves, improves this cordial. See BALM OF MOLUCCA (*above*).

Coriander Cordial. *Prep.* From corianders, as the last. A few sliced oranges improve it.

Crême d'Anis. As ANISEED CORDIAL, only richer.

Crême des Barbades. As CITRONELLE, adding some of the juice of the oranges, and an additional lb. of sugar per gall.

Crême de Cacao. *Prep.* Infuse roasted caracca cacao nuts (cut small), 1 lb., and vanila, ½ oz., in brandy, 1 gall, for 8 days; strain, and add of thick syrup, 3 quarts.

Crême de Cedrat. *Syn.* HUILE DE CEDRAT. *Prep.* From spirit of citron, 1 pint; spirit of cedrat, 1 quart; proof spirit, 3 quarts; white sugar, 16 lbs., dissolved in pure soft water, 2 galls.

Crême de Macarons. *Prep.* 1. From cloves, cinnamon, and mace, of each (bruised), 1 dr.; bitter almonds (blanched and beaten to a paste), 7 oz.; spirit (17 u. p.), 1 gall.; digest a week, filter, and add of white sugar, 6 lbs., dissolved in pure water, 2 quarts.

2. Clean spirit (at 24 u. p., sp. gr. ·945), 2 galls.; bitter almonds, ¾ lb.; cloves, cinnamon, and mace, of each, in coarse powder, 1½ dr.; infuse for 10 days, filter, and add of white sugar, 8 lbs., dissolved in pure water, 1 gall.; lastly, give the liqueur a violet tint with infusion or tincture of litmus and cochineal. An agrecable, nutty-flavoured cordial, but, from containing so much bitter almonds, should be only drank in small quantities at a time. The English use only one half the above quantity of almonds.

Crême de Naphe. *Prep.* From sweetened spirit (60 u. p.) containing 3½ lbs. of sugar per gall., 7 quarts; orange-flower water (foreign), 1 quart. Delicious.

Crême de Noyeau. See NOYEAU.

Crême d'Orange. *Prep.* From oranges (sliced), 3 dozen; rectified spirit, 2 galls.; digest for 14 days; add, of lump sugar, 28 lbs. (previously dissolved in water, 4½ galls.); tincture of saffron, 1½ fl. oz.; and orange-flower water, 2 quarts.

Crême de Portugal. Flavoured with lemon, to which a little oil of bitter almonds is added.

Curaçao. *Prep.* From sweetened spirit (at 56 u. p.), containing 3½ lbs. of sugar per gall., flavoured with a tincture made by digesting the 'oleo-saccharum' prepared from Seville oranges, 9 in number; cinnamon, 1 dr.; and mace, ¾ dr., in rectified spirit, 1 pint. It is coloured by digesting in it for a week or 10 days Brazil-wood (in powder), 1 oz., and afterwards mellowing the colour with burnt sugar, q. s.

Delight of the Mandarins. From spirit (22 u. p.), 1 gall.; pure soft water, ½ gall.; white sugar (crushed small), 4½ lbs.; Chinese aniseed and ambrette or musk seed, of each (bruised), ½ oz.; safflower, ½ oz.; digested together in a carboy or stone bottle capable of holding double, and agitated well every day for a fortnight.

Eau de Cedrat. *Syn.* CEDRAT WATER. As CRÊME DE CEDRAT, but using less sugar.

Eau de Chasseurs. See PEPPERMINT (*below*).

Eau de Vie d'Andaye. *Syn.* EAU DE VIE D'ANIS; ANISEED LIQUEUR BRANDY. *Prep.* From brandy or proof spirit, 1 gall.; sugar, ¾ lb.; dissolved in aniseed water, 1 pint.

Gold Cordial. *Prep.* From angelica root (sliced), 1 lb.; raisins, ½ lb; coriander seeds, 2 oz.; caraway seeds and cassia, of each, 1½ oz.; cloves, ½ oz.; figs and sliced liquorice root, of each, 4 oz.; proof spirit, 3 galls.; water, 1 gall.; digest 2 days, and distil 3 gallons by a gnetle heat; to this add of sugar, 9lb., dissolved in rose water and clean soft water, of each, 1 quart; lastly, colour the liquid by steeping in it of hay saffron, 1¼ oz. This cordial was once held in much esteem. It derives its name from a small quantity of gold leaf being formerly added to it.

Huile d'Anis. See CRÊME D'ANIS (*above*).

Huile de Vanille. Flavoured with essence or tincture of vanilla. It is kept in a decanter, and used to flavour liqueurs, grog, &c.

Huile de Venus. *Prep.* From the flowers of the wild carrot, 2½ oz., and sugar, 3 lbs. to the gal. It is generally coloured by infusing a little powdered cochineal in it.

Jargonelle. *Syn.* JARGONELLE CORDIAL. Flavoured with essence of jargonelle pear (acetate of amyl). Pine-apple cordial and liqueurs from some other fruits are also prepared from the new fruit essences. See ESSENCE.

Lem'on Cordial. *Prep.* Digest fresh and dried lemon peel, of each 2 oz., and fresh orange peel, 1 oz., in proof spirit, 1 gal., for a week; strain with expression, add of clear soft water, q. s. to reduce it to the desired strength, and lump sugar, 3 lbs. to the gallon. The addition of a little orange-flower or rose water improves it.

Liquodilla. Flavoured with oranges and lemons, of each, sliced, 3 in number; with sugar, 2½ lbs. per gal.

Lov'age Cordial. *Prep.* From the fresh roots of lovage, 1 oz. to the gallon. A fourth of this quantity of the fresh roots of celery and sweet fennel are also commonly added. In some parts a little fresh valerian root and oil of savine are added before distillation. It is much valued by the lower classes in some of the provinces for its stomachic and emmenagogue qualities.

Oil of Ce'drat. See CRÊME DE CEDRAT (*above*).

O'range Cordial. Like LEMON CORDIAL or

CREME D'ORANGE, from fresh orange peel, ½ lb. to the gallon.

Parfait Amour. *Syn.* PERFECT LOVE. *Prep.* Flavoured with the yellow rind of 4 lemons, and a teaspoonful of essence of vanilla to the gallon, with sugar, 3 lbs., and powdered cochineal, q. s. to colour.

Pep'permint. *Syn.* PEPPERMINT CORDIAL, SPORTSMAN'S C., X. MINT; EAU DE CHASSEURS, Fr. This well-known compound is in greater demand in every part of the kingdom than all the other cordials put together.

Prep. 1. From peppermint water and gin or plain spirit (22 u. p.), of each, 1 pint; lump sugar, ¾ lb.

2. (Wholesale.) English oil of peppermint, 5 oz., is added to rectified spirit of wine, 3 pints, and the mixture is agitated well together for some time in a corked bottle capable of holding 4 pints or more; it is then emptied into a cask having a capacity of upwards of 100 galls., and perfectly white and flavourless proof spirit, 36 galls., is poured in, and the whole well agitated for 10 minutes; a solution of the best double refined lump sugar, 2¾ cwt., in about 35 galls. of pure filtered rain water, is then added, and the contents of the cask well 'rummaged up,' in the usual manner, for at least 15 minutes; sufficient clear rain water to make up the whole quantity to exactly 100 gallons, and holding in solution alum, 5 oz., is next added, and the whole is again well agitated for at least a quarter of an hour, after which the cask is bunged down, and allowed to repose for a fortnight before it is 'broached' for sale.

Obs. The last formula produces a beautiful article, provided the ingredients are of good quality. Care on this point is particularly necessary in reference to the essential oil, which should only be purchased of some known respectable dealer. The sugar should be sufficiently pure to dissolve in a wine-glassful of clear soft water without injuring its transparency, and the cask should be a fresh-emptied gin pipe, or one properly prepared for gin, as, if it gives colour, it will spoil the cordial. When these particulars are attended to, the product is a bright transparent liquor as soon as made, and does not require fining. Should there be the slightest opacity, the addition of 2 oz. of salt of tartar, dissolved in a quart of hot water, will have the effect of "clearing it down" in the course of a few days. The product is 100 galls. of cordial at 64 u. p.

Pimen'to. *Syn.* PIMENTO CORDIAL, PIMENTO DRAM. Rather strongly flavoured with allspice or pimento. It has obtained a great repute in the West Indies in diarrhœa, cholera, and bowel complaints generally.

Rasp'berry Cordial. *Prep.* From raspberry brandy, capillaire, and water, equal parts. A similar article is prepared by flavouring sweetened spirit with the new 'raspberry essence.'

Rat'ifia. The numerous liqueurs bearing this name are noticed in another part of this volume. See RATIFIA.

Shrub. See the article SHRUB in another part of this work.

Sighs of Love. *Prep.* 1. From proof spirit flavoured with otto of roses and capillaire, equal parts.

2. From sugar, 6 lbs.; pure soft water q. s. to produce a gallon of syrup, to which add, of eau de rose, 1 pint; proof spirit, 7 pints. It is stained of a pale pink by powdered cochineal. A very pleasant cordial. A drop or two (not more) of essence of ambergris or vanilla improves it.

Tears of the Widow of Malabar. *Prep.* As BALM OF MOLUCCA, but employing cloves (bruised), ½ oz., mace (shredded), 1 dr., and a teaspoonful of essence of vanilla for flavouring. Some add of orange-flower water, ¼ pint. It is slightly coloured with burnt sugar.

Tent. From plain spirit (22 u. p.) and port wine, of each, 1 quart; sherry and soft water, of each, 1 pint; orange-flower water and lemon juice, of each, ¼ pint; essence of ambergris, 2 drops (not more); sugar, 2 lbs. See WINE.

Us'quebaugh. See the article USQUEBAUGH in another part of this work.

LIQUEUR DE LA MOTTE. [Fr.] See DROPS (Golden) and TINCTURE.

LIQUEUR DORÉE. [Fr.] *Prep.* Take of cinnamon, bitter orange peel, and Peruvian bark, of each, ½ oz.; hay saffron, ¼ oz.; brandy and Malaga wine, of each 3 quarts; digest for a week, strain, and add of lump sugar, 2 lbs. Tonic, stomachic, and stimulant; chiefly used as an agreeable alcoholic dram.

LIQUEUR DE PRESSAVIN. [Fr.] *Prep.* From oxide of mercury (freshly precipitated) and cream of tartar, of each, 1 oz.; hot water, 1 quart; dissolve and filter. For *use*, 2 spoonfuls of this liquor are added to 1 quart of water.—*Dose.* A wine-glassful 3 or 4 times a day, avoiding the use of common salt. This is simply a solution of potassio-tartrate of mercury, and may be taken in the usual cases in which mercury is administered.

LIQUODIL'LA. See LIQUEUR.

LIQUID-AMBAR. *Syn.* COPALM BALSAM. A fluid balsamic juice obtained from the *Liquid-ambar styraciflua*, an American tree. It closely resembles LIQUID STORAX in its properties, and may be applied to the same purposes. See STYRAX.

LIQ'UOR. *Syn.* LIQUOR, L.; LIQUEUR, Fr. This term is given in the London Pharmacopœia to those aqueous solutions commonly, though improperly, called 'WATERS;' ammoniæ liquor potassæ, &c. It is now more correctly applied to the 'WATERS' of the British Pharmacopœia. See SOLUTION.

The term 'liquor' has also, of late years, been applied to certain concentrated preparations, most of which would be more correctly

termed 'FLUID EXTRACTS,' as they merely differ from good extracts in their consistence, and from ordinary extracts in containing less starchy matter, albumen, and gum. There is also usually a little spirit added to them, to prevent decomposition. Liquors of this kind may be prepared of the finest quality, by the same processes that are required for the preparation of good soluble extracts; observing to stop the evaporation as soon as the consistence of treacle is acquired, and when cold, to add 1-4th or 1-5th part of their weight (after evaporation) in rectified spirit. The addition of 3 or 4 drops of the oils of cloves and mustard seed, dissolved in the spirit, will secure them from any risk of 'moulding' or fermenting; in fact, with this addition many of them will keep well without spirit, provided they are evaporated sufficiently, and kept in a cool place. The liquors, which are merely concentrated infusions or decoctions, and which, in their consistence, do not even approximate to extracts, may be made in the manner directed under those heads.

Much confusion would be prevented if the terms 'concentrated decoction' 'concentrated infusion,' &c., were adopted for those vegetable preparations possessing 8 times the usual strength; 'liquors' for those of a higher strength, but still sufficiently liquid to be treated as such in dispensing, &c.; and 'fluid extracts,' for those possessing considerable consistence, and approaching the common extracts in their degree of concentration and mode of preparation. See DECOCTION, INFUSION, ESSENCE, EXTRACT, SOLUTION, &c.

*** The following formulæ present some illustrations of the preparation of this class of medicines.

Liquor, Anodyne. See SPIRIT OF ETHER.

Liquor, Antinephritic. *Syn.* LIQUOR ANTINEPHRITICUS, L. *Prep.* (Adams.) Poppy heads, 6 oz.; water, 1½ pint; boil to one third, strain with pressure, and add of nitrate of potassa, 1 oz.—*Dose.* 1 to 2 teaspoonfuls night and morning; in gravel and painful affections of the kidneys and bladder.

Liquor, Antipodag'ric (Beguin's). *Syn.* HOFFMANN'S GOUT LIQUID; LIQUOR ANTIPODAGRICUS HOFFMANNII, L. *Prep.* From Boyle's fuming liquor, 1 part; spirit of wine, 3 parts. Sudorific.—*Dose.* 20 to 30 drops; or externally, in gout, and other painful affections, either alone or combined with camphor. See AMMONIA (Perhydrosulphate).

Liquor, Antipsor'ic. *Syn.* LIQUOR ANTIPSORICUS, LOTIO A., L. *Prep.* (Van Mons.) Sulphuret of sodium, 1½ dr.; hydrochlorate of ammonia, 75 grs.; dissolve each separately in water, ½ pint, mix the solutions, and filter. In itch, and other moist skin diseases.

Liquor, Bleaching. See SOLUTION OF CHLORIDE OF LIME.

Liquor, Boyle's Fu''ming. The perhydrosulphate of ammonia.

Liquor of Calum'ba. *Syn.* LIQUOR CALUMBÆ, L. Same as CONCENTRATED INFUSION OF CALUMBA.

Liquor of Cam'phor. See ESSENCE.

Liquor of Chiret'ta. Same as CONCENTRATED INFUSION OF CHIRETTA.

Liquor of Cincho'na. *Syn.* LIQUOR OF BARK, CONCENTRATED INFUSION OF BARK, INSPISSATED I. OF B.; INFUSUM CINCHONÆ SPISSATUM (Ph. L.), L. *Prep.* 1. (Ph. L.) Yellow cinchona bark (bruised), 3 lbs., is macerated in distilled water, 6 pints, at two successive operations, as directed under EXTRACT OF CINCHONA—Ph. L.; the mixed infusions are evaporated by the heat of a water bath to one fourth, and placed aside to settle; the clear portion is decanted, the remainder strained, and the mixed liquid again evaporated until its sp. gr. reaches 1·200; to this, when cold, rectified spirit is dropped in, by degrees, "so that 3 fl. drs. may be added to each fl. oz. of the liquor;" lastly, allow it to repose for 20 days, that the dregs may subside.

Obs. It is not at all clear whether the College means 3 fl. drs. of spirit to be added to each fl. oz. of the liquid before its addition, or that it is to be added so that each fl. oz. of the product shall contain that quantity. We presume the former. 1 fl. dr. of this preparation is said to represent fully 4 fl. oz. of the INFUSION OF CINCHONA—Ph. L.; but it is obvious that it must be liable to great variations in strength. "In a general way, 1 fl. dr. may be considered equal to 3 fl. oz. of the infusion." (Pereira.) As commonly met with, this preparation is nearly destitute of the cinchona alkaloids.

2. Yellow cinchona bark, bruised, 56 lbs., and water holding in solution sulphuric acid, 1½ lb., are macerated together, with occasional agitation, in a covered earthen vessel, for 48 hours, after which the liquid is expressed, and the residuum or marc is treated with fresh water; the mixed strained liquid is then evaporated as rapidly as possible in earthenware, to exactly 6 lbs.; to this, rectified spirit, 1¼ lb., is added, and the whole is set aside for a week or 10 days; the clear portion is, lastly, decanted and preserved in well-closed bottles. The product is very rich in quinine. It is 96 times as strong as the DECOCTION OF CINCHONA—Ph. L., and 12 times as strong as the above preparation of the Ph. L. This preparation resembles the 'LIQUOR CINCHONÆ' sold by certain houses in the trade, at 24s. per lb., wholesale.

3. Exhaust the bark as above, by maceration in 3 successive waters without acid, filter, evaporate the mixed liquors to 7 lbs., and proceed as before. Inferior to the last, and less rich in the cinchona alkaloids. Very thick; scarcely liquid.

4. FROM PALE BARK:—(LIQUOR CINCHONÆ PALLIDÆ; INFUSUM CINCHONÆ SPISSATUM—Ph. L.) From pale bark, as the last. See INFUSION OF CINCHONA.

Disinfect'ing Liquor. See SOLUTION (Chlo-

rides of Lime, Soda, and Zinc), and DISINFECTING COMPOUNDS.

Liquor of Er'got. *Syn.* ESSENCE OF ERGOT OF RYE, CONCENTRATED INFUSION OF E.; ESSENTIA SECALIS CORNUTI, LIQUOR ERGOTÆ, INFUSUM ERGOTÆ CONCENTRATUM, L. *Prep.* Recent ergot of rye (reduced to coarse powder by pounding, or preferably by grinding it in a pepper-mill), 1½ lb., and boiling distilled water, 4 lbs., are digested together in a closed vessel, with frequent agitation, until cold, and then put into a wide-mouthed bottle, along with rectified spirit, 2 lbs.; the whole is then allowed to macerate for a week, after which the liquor is expressed and filtered. *Obs.* 4 fl. drs. of this essence are equal to 1 dr. of ergot in substance. It is 8 times the strength of the INFUSION (as usually prepared according to the formula of Pereira and others), and 2½ times the strength of the TINCTURE OF ERGOT of the London Apothecaries' Hall. This is the only ESSENCE or LIQUOR OF ERGOT known in the wholesale trade.

Liquor of Flints. See SOLUTION.

Libavius's Liquor. Bichloride of tin.

Liquor of Mat'ico. *Syn.* CONCENTRATED INFUSION OF MATICO; LIQUOR MATICONIS, INFUSUM MATICONIS CONCENTRATUM, L. *Prep.* From matico leaves, 1 lb.; rectified spirit, ½ pint; distilled water, 32 fl. oz.; digest 10 days, express, and filter. 1 fl. dr. added to 7 fl. drs. of water is equal to 1 fl. oz. of the common INFUSION.

Liquor of Myrrh. *Syn.* SOLUTION OF MYRRH; LIQUOR MYRRHÆ, LOCO LIQUAMINIS MYRRHÆ, L. *Prep.* (Ph. Bor.) Extract of myrrh (Ph. Bor.), 1 oz.; distilled water, 5 fl. oz.; mix thoroughly, decant, and strain. It should be of a brownish-yellow colour, and turbid. —*Dose.* ½ to 1 fl. dr.

Liquor of O'pium. *Syn.* LIQUOR OPII, L. O. CONCENTRATUS, L. OPIATUS, L. See BLACK DROP.[1]

1. (Messrs. Smith.) Opium, 4 oz., is made into an extract, and 'denarcotized' by ether; it is then dissolved in alcohol, filtered, evaporated nearly to dryness, and redissolved in water, q. s. to furnish 12 oz. of solution; to this is added, of rectified spirit, 2¾ oz., with water, q. s. to make the whole up to 16 oz.—*Dose.* 3 to 12 drops.

2. (Acetic; LIQUOR OPII ACETICUS, L.) See LAUDANUM (Houlton's).

3. (Citric; LIQUOR OPII CITRICUS, L.)—*a.* Powdered opium, 1½ oz.; lemon juice, 1½ pint; evaporate to one half, cool, add of rectified spirit, 5 fl. oz., and the next day decant or filter; same strength as 'LAUDANUM.'

b. (LIQUOR MORPHIÆ CITRATIS—Dr. Porter.) Opium, 4 oz.; citric acid, 2 oz.; triturate, and add of boiling water, 15 fl. oz.; digest with agitation for 24 hours, and filter. This last has above three times the strength of 'LAUDANUM.' It is sadly misnamed.

4. (Hydrochloric; SOLUTION OF MURIATE OF OPIUM; LIQUOR OPII HYDROCHLORICUS, L.—Dr. Nichol.) Powdered opium, 1½ oz.; distilled water, 1 pint; hydrochloric acid, 1½ fl. oz.; digest a fortnight, and strain with expression. Same strength as 'LAUDANUM.' According to Dr. Nichol, this is preferable to every other preparation of opium.

5. (Sedative; BATTLEY'S SEDATIVE SOLUTION OF OPIUM; LIQUOR OPII SEDATIVUS, L.) —*a.* Hard aqueous extract of opium (bruised), 3 oz., is boiled in water, 1½ pint, until dissolved; to the solution, when cold, rectified spirit, 6 oz., is added, together with water, q. s. to make the whole measure exactly 1 quart; the liquor is, lastly, filtered.

b. From hard extract of opium, 22 oz.; boiling water, 13 pints; rectified spirit, 3 pints; as the last.

c. From extract of opium—Ph. L., 4¼ oz.; water, 1 quart; boil till reduced to 34 fl. oz.; cool, filter, and add of rectified spirit, 5 fl. oz., and water, q. s. to make up exactly 1 quart.

Obs. The first two formulæ, which vary only in their quantities, are identical with that employed by Mr. Battley. As hard extract of opium is not always at hand, we have introduced a formula in which the ordinary extract is ordered. It gives a precisely similar product to the others, provided the cold aqueous decoction is filtered before adding the spirit. Battley's LIQUOR OPII SEDATIVUS is an excellent preparation, less exciting than opium or laudanum.—*Dose.* 10 to 30 drops. Dr. Christison states that 20 drops of Battley's solution are equal to 30 drops of the common tincture.

Liquor of Rhu'barb. *Syn.* LIQUOR RHEI, INFUSUM RHEI CONCENTRATUM, L. *Prep.* 1. Rhubarb (well bruised), 6¾ oz.; water, q. s.; rectified spirit, ½ pint; proceed as for INFUSION OF CALUMBA (conc.); to produce a quart. 8 times the usual strength.

2. See INFUSION OF RHUBARB (Concentrated).

3. See EXTRACT OF RHUBARB (Fluid).

Liquor of Sarsaparil'la. *Syn.* FLUID EXTRACT OF SARSAPARILLA; LIQUOR SARZÆ, ESSENTIA SARSAPARILLÆ, L. *Prep.* Either the simple of the compound liquor or sarsaparilla may be made from the corresponding decoction, or, preferably, the infusion prepared with water at 125° Fahr., by carefully evaporating it until sufficiently concentrated, and then straining it through flannel, and adding a little spirit. Jamaica sarsaparilla should be alone employed, as the other varieties, especially the Honduras, not only possess less medicinal virtue, and yield less extract, but are very liable to ferment and get mouldy, unless an undue proportion of spirit is added to them. See EXTRACT OF SARSAPARILLA (Fluid).

Liquor of Sen'na. *Syn.* LIQUOR SENNÆ, L. Both the FLUID EXTRACT and the CONCENTRATED INFUSION OF SENNA are called by this name, but more generally the former. The following are additional formulæ:—

[1] Under DROPS, page 415.

1. (Duncan.) Senna, 15 lbs.; boiling water, 5 galls.; proceed by the method of displacement, evaporate the product to 10 lbs, add of molasses, 6 lbs. (previously concentrated over a water bath until it begins to congeal on cooling), dissolve, and further add of rectified spirit, 1½ pint, together with water, q. s. to make the whole measure exactly 12 pints. Every fl. oz. represents 1 oz. of senna.

2. (Dr. Tweedy.) As the last, but using tincture of ginger (prepared with rectified spirit), 1½ pint, instead of the spirit there ordered.

Liquor of Soap. *Syn.* LIQUOR SAPONIS, L. See TINCTURE.

Styp'tic Liquor. *Syn.* LIQUOR STYPTICUS, L. *Prep.* (Ph. Slevico-Holsat. 1831.) Alum and sulphate of copper, of each, 1½ oz.; sulphuric acid, 1 oz.; water, 1 lb.; dissolve, and filter.

Liquor of Tarax'acum. *Syn.* FLUID EXTRACT OF DANDELION; EXTRACTUM TARAXACI FLUIDUM, LIQUOR TARAXACI, L. *Prep.* 1. Dandelion roots, (dried), 28 lbs., are rinsed in clean cold water, to remove dirt, and then sliced small, and macerated in enough cold water, to cover them, for 24 hours; the liquid is next pressed out, and after the fecula has subsided, the clear portion is decanted, and heated to 180° or 190° Fahr., to coagulate the albumen; the liquid is then filtered while hot, and evaporated by steam, or preferably by a current of warm air, until it is reduced to 22½ lbs.; to this, rectified spirit, 6 lbs., is added, and after thorough agitation, the vessel is set aside for a week or a fortnight, after which the clear portion is gently poured from the sediment and preserved in well-closed bottles in a cool place. A very fine article. It represents an equal weight of the root.

2. The expressed juice of dandelion is heated to near the boiling-point, strained, and evaporated, as the last, to a proper consistence; ¼th or ⅛th of rectified spirit is then added, and the liquid is otherwise treated as before. Very odorous and pale coloured.

3. Dried root (coarsely powdered), 1 lb.; water, 1¼ pint; rectified spirit, ½ pint; digest a week, express the liquor, pass it through a hair sieve into a bottle, and in 10 days decant the clear portion.

4. (Ph. Bor.) Extract of dandelion, 3 parts; water, 1 part (or q. s.); triturated together.

5. (W. Procter.) Fresh root, 2 lbs., is sliced and reduced to a pulp, and macerated with ⅛th of its bulk of rectified spirit for 24 hours; it is then subjected to strong pressure, the marc is treated with water containing a little spirit, 1 pint, and the liquid is again expressed; the mixed product is evaporated to 12 fl. oz., and when cold, rectified spirit, 4 fl. oz., is added, and the whole filtered.

Obs. Liquor of taraxacum has a very large [illegible] The *dose* is 1 to 2 fl. drs. See EX-[illegible]

Liquor of Valer'ian. See EXTRACT OF VALERIAN (Fluid).

Liquor of Vanil'la. *Syn.* FLUID EXTRACT OF VANILLA; LIQUOR VANILLÆ, EXTRACTUM V. FLUIDUM, L. *Prep.* 1. Vanilla (sliced), 1 lb.; rectified spirit, 3 pints; prepare a tincture either by displacement or maceration, and reduce it, by distillation at the lowest possible temperature, to 1½ lb.; put this into a strong bottle whilst hot, add of white sugar candy (in powder), ½ lb., cork down, and agitate the whole until it is nearly cold. Very fine. *Used* chiefly for its odour and flavour. It represents half its weight of vanilla.

2. (W. Procter.) Vanilla (cut into thin transverse slices), 1 oz.; sugar, 3 oz.; triturate, until reduced to fine powder, put it into a strong pint bottle, along with syrup, ½ pint; water, 2 oz.; tie down the cork, and set the bottle for half an hour in boiling water; cool, strain, and treat the residue in a like manner with a mixture of water, 6 fl. oz., and rectified spirit, 1 fl. oz.; lastly, mix the two products. Greatly inferior to the last.

LIQ'UORICE. *Syn.* STICK LIQUORICE; LIQUORITIA, GLYCYRRHIZÆ RADIX (B. P.), GLYCYRRHIZÆ RADIX, GLYCYRRHIZA (Ph. L. & D.), G. GLABRA (Ph. E.), L. "The root or underground stem of the *Glycyrrhiza glabra*, fresh and dried, cultivated in Britain." "The recent and the dried root of *Glycyrrhiza glabra*," or common liquorice. "The fresh root is to be kept buried in dried sand for use." (Ph. L.) It has a sweetish taste, and is slightly aperient, expectorant, and diuretic. It is a popular demulcent and pectoral. Its extract and solution are much used as a domestic remedy for cough. As a masticatory, it allays thirst and irritation. Its extract is the common LIQUORICE, SPANISH LIQUORICE, or SPANISH JUICE, of the shops. See EXTRACT, &c.

LIST. The border or selvage torn off a piece of cloth. It is used by the French polishers and law stationers to form their rubbers, and for numerous other purposes.

LITH'ARGE. *Syn.* SEMI-VITRIFIED OXIDE OF LEAD; PLUMBI OXYDUM (Ph. L.), PLUMBI OXYDUM SEMI-VITREUM (Ph. D.), LITHARGYRUM (Ph. E.), L. The litharge of commerce is semi-vitrified protoxide of lead, obtained chiefly by scraping off the drops that form on the surface of melted lead exposed to a current of air (dross of lead; plumbum ustum), and heating it to a full red, to melt out any undecomposed metal. The fused oxide, in cooling, forms a yellow or reddish semi-crystalline mass, which readily separates into scales; these, when ground, constitute the 'powdered litharge' of the shops. Litharge is also prepared by exposing red lead to a heat less ciently high to fuse it, and 'English thick; is obtained as a secondary product by tion, from argentiferous lead ore, often called 'silver stone.'

CINCHONÆ ISSATUM—

Pur. "Entirely, or almost entie last. See in dilute nitric acid. This sol

OLUTION (Chlo-

ened by sulphuretted hydrogen. Potassa throws down a white precipitate, which is redissolved by adding the same in excess. If sulphate of soda be added to 100 grs. of this oxide dissolved in nitric acid, 135 grs. of sulphate of lead is precipitated." (Ph. L.) "50 grs. dissolve entirely, and without effervescence, in 1½ fl. oz. of pyroligneous acid, and the solution precipitated by 53 grs. of phosphate of soda remains precipitable by more of the test." (Ph. E.) The solution in both acetic and nitric acid should be colourless. It is of great importance to the pharmaceutist to obtain pure litharge, as the slightest impurity will often colour and spoil his lead plaster (EMP. PLUMBI), and solution of diacetate of lead (LIQ. PLUMBI DIACETATIS).

Uses. Litharge is employed in pharmacy, to make plasters and several other preparations of lead; by painters as a 'drier' for oils; and for various other purposes in the arts.

Obs. The litharge of commerce is distinguished by its colour as LITHARGE OF GOLD (LITHARGYRUM AURI, L. AURIUM, L. CHRYSITIS), which is dark coloured and impure, and LITHARGE OF SILVER (SILVER STONE; LITHARGYRUM ARGENTI, L. ARGENTEUM, L. ARGYRITIS), which is purer, and paler coloured. The dark colour of the former is generally said to be owing to the presence of red lead. Foreign litharge generally contains copper and iron; and, not unfrequently, a little silver and silica. These are readily detected by the usual tests. In grinding litharge, about 1 lb. of olive oil is usually added to each 1 cwt., to prevent dust. The best solvents of litharge are nitric acid and acetic acid. As it slowly absorbs the carbonic acid of the air, it generally effervesces slightly when treated with acids, and this effervescence is stronger in proportion to its age. See LEAD.

LITH'IUM. Li. The metallic base of LITHIA, first obtained by Sir H. Davy by exposing hydrate of lithium in contact with mercury to galvanic action, and decomposing the resulting amalgam by distillation. It is now obtained by fusing pure chloride of lithium in a small, thick, porcelain crucible, and decomposing it while in a fused state by a current of electricity. It is a white metal, like sodium, very oxidizable, fusing at 356°, and having a sp. gr. of ·59. It is the lightest metal known. It belongs to the 'alkaline group,' of which potassium, sodium, cæsium, and rubidium, are the other members.

Lithium forms salts analogous to those of sodium, but usually somewhat less soluble. They can be distinguished from those of potassium and sodium by the phosphate and carbonate. Being only sparingly soluble in water, and those of barium, strontium, and calcium digest with forming crystallisable and soluble This last hisulphuric acid and oxalic acid,—and LAUDANUM of magnesium, by the solution of 4. (Hydrochexhibiting an alkaline reaction. platinum, they tinge the flame of the blowpipe carmine red. The salts of lithium may generally be formed by dissolving the hydrate or carbonate in dilute acids.

Lithium, Carbonate of. Li_2CO_3. *Syn.* CARBONATE OF LITHIA; LITHIÆ CARBONAS (B. P.). *Prep.* To an aqueous solution of sulphate of lithium, add a strong solution of carbonate of ammonium, collect the precipitate, drain, and press, wash with a little rectified spirit, and dry. By dissolving it in boiling water, and slowly evaporating the solution, crystals may be obtained.

Prop., &c. It resembles carbonate of magnesium in appearance; is soluble in about 100 parts of cold water, and in considerably less of boiling water, and is insoluble in alcohol. The tests for its purity given in the B. P. are—in giving no precipitate with oxalate of calcium or lime water, and leaving, when 10 grains are neutralised with sulphuric acid and ignited, 14·86 grains of dry sulphate. It has been proposed by M. Lipowitz, Dr. Garrod, and others, as a solvent for uric acid calculi. According to Biswanger, 1 part of carbonate of lithia in 120 parts of water takes up, at blood-heat, nearly 4 parts of uric acid. Mr. Alexander Ure recommends a dilute solution of this substance as an injection in lithic calculus, as it is a better solvent of uric acid than either borax or the alkaline carbonates. "Of all the various menstrua hitherto recommended, none appear to promise more favourably than the carbonate of lithia." "If by means of injections" (of this solution) "we can reduce a stone at the rate of a grain or more an hour, we shall not merely diminish the bulk of the calculus, but further loosen its cohesion, disintegrate it, so to speak, causing it to crumble down, and be washed away in the stream of urine." (Mr. A. Ure.)—*Dose.* 2 to 5 grs., twice or thrice a day; as an injection, 1 gr. to water, 1 fl. oz.

Lithium, Citrate of. $Li_3C_6H_5O_7$. *Syn.* LITHIÆ CITRAS (B. P.). A white deliquescent amorphous powder, made by acting on 50 grains of lithium carbonate with 100 of citric acid, and is readily soluble in 2½ parts of water.

Test., &c. 20 grains burnt at a low red heat until white leave 10·6 grains of carbonate of lithium. Its medical properties are similar to those of the carbonate.—*Dose.* 5 to 16 grains, largely diluted.

Lithium, Oxide of. Li_2O. *Syn.* LITHIA. An alkaline earth found in petalite, &c., and in small quantities in most mineral waters.

Prep. Petalite (a silicate of aluminum and lithium) in powder mixed with twice its weight of fluor spar is heated with strong sulphuric acid as long as acid vapours are given off. The residue is treated with ammonia, boiled, and filtered, evaporated to dryness, and heated to redness. The residue consists of sulphate of lithium, from which the oxide is obtained by decomposing it with acetate of barium, filtering and heating after having evaporated the solution to dryness.

This yields the so-called oxide, which is in reality the hydrate, LiHO, and is a white, non-volatile. soluble, caustic solid. The true oxide is a white powder decomposed by water forming the hydrate, and obtainable by igniting the metal in oxygen.

Lithia, Effervescing Solution of. *Syn.* LIQUOR LITHIÆ EFFERVESCENS. *Comp.* Water charged with carbonic acid and holding in solution carbonate of lithium.—10 fl. oz. contain 5 grains of the carbonate.—*Props.* Colourless liquid, possessing powerful diuretic properties. —*Use.* Antilithic, for dissolving calculi of uric acid.—*Dose.* 5 to 10 fl. oz.

LITHOGRAPHY. The art of tracing letters, figures, and other designs, on stone, and transferring them to paper by impression. Our notice of this beautiful and useful art must necessarily be brief.

There are two methods of lithography in general use. In the one, a drawing is made on the stone with a lithographic crayon, or with lithographic ink; in the other method, the design is made on lithographic paper, which, on being moistened and passed through the press, leaves its design on the surface of the stone, reversed. In either method, water acidulated with nitrous acid, oil of vitriol, or hydrochloric acid, is poured over the stone, and this, by removing the alkali from the chalk or ink, leaves the design on it in a permanent form, at the same time that it 'etches' away a portion of the lights, and renders the surface more absorbent of water.

The process of lithographic printing is as follows:—Water is thrown over the stone, the roller charged with printing ink is passed over the surface, the paper is applied, and a copy is obtained by the action of the lithographic press. The same process must be had recourse to for each copy. The nature of the stone is such that it retains with great tenacity the resinous and oily substances contained in the ink or crayon employed to form the design, and also absorbs water freely; this, combined with the peculiar affinity between resinous and oily substances, and their mutual power of repelling water, occasions the ink on the printing roller to adhere to the design, and to leave untouched the lights.

The stones are prepared for lithography by polishing in the ordinary way; the style of work for which they are intended determining the degree of labour bestowed upon them. For crayon drawings, the surface should have a fine grain, but the finish of the stone must depend upon the desired softness of the intended drawing; for writing or drawing on in ink, the surface must receive a higher polish, and must be finished off with pumice-stone and water

The best lithographic stones are obtained from Solenhofen, near Munich, and from Pappenheim, on the banks of the Danube. The white lias which lies immediately under the blue, near Bath, also yields good lithographic stones, and furnishes the principal portion of those employed in this country. See CRAYONS, INK, and PAPER.

LITHONTRYP'TICS. *Syn.* LITHOTRYPTICS; LITHONTRYPTICA, L. Under this head are intended numerous substances (LITHICS; LITHICA, L.) used to prevent the formation of urinary calculi, or to dissolve them when already formed. Those employed with the former intention are more correctly termed ANTILITHICS (ANTILITHICA, L.), and those with the latter, LITHONTRYPTICS, or LYTHONLYTICS (LITHONTRYPTICA, LITHONLYTICA, L.).

The following are the principal substances included under this head by pharmacological writers:—Alkalies and their carbonates, benzoic acid, borax, carbonate of lithia, effervescing solution of lithia, carbonic acid, cinnamic acid, diluents (generally), diuretics (generally), juniper, malic acid, Malvern waters, mineral acids, nitrosaccharate of lead, opium, phosphate of soda, phosphoric acid, poppies, turpentines, uva ursi, vegetable acids, vegetable astringents, vegetable bitters, Vichy waters, wall pellitory, water (pure).

LIT'MUS. *Syn.* TURNSOLE; LACMUS, LACCA CÆRULEA, L. MUSIVA, L. MUSCI, L. A blue substance prepared by the united influence of water, air, ammonia, and either potassa or soda, from *Rocella tinctoria*, *Lecanora tartarea*, or any of the other tinctorial lichens capable of yielding archil, by a process essentially similar to that adopted for the latter substance, except that chalk is generally used to form the paste, which is moulded into cakes and dried.

Pur., &c. "Soluble in both water and alcohol. Its blue colour is reddened by acids, and is restored by the addition of alkalies." (Ph. L. 1836.) It is extensively used by the dyer as a red and crimson colouring matter, and by the chemist as a test for acids. See ARCHIL, CUDBEAR, &c.

LIVE-LONG. Digestive candy. See CANDYING.

LIV'ER. *Syn.* HEPAR, L. A large abdominal viscus, the exclusive duty of which, until recently, was stated by physiologists to be to secrete bile; but the secretion of sugar for combustion in the lungs or capillaries is now said to be one of its chief duties. The liver is subject to several diseases, both functional and organic, among which inflammation (hepatitis) holds the most prominent place. The acute form of this disease is ushered in with pain in the region of the liver, with sickness, costiveness, and a strong, hard, and frequent pulse, with great pain about the clavicle and shoulders. There is cough, oppressed breathing, and often vomiting of bilious matter. The urine is scanty, and of a saffron-yellow colour, and the skin and eyes are also tinged yellow. The treatment consists chiefly in purging with saline accompanied with mercurials, the use of antimonials, and a blister applied over the region of the liver. Bitter tonics, as calumba, cascarilla, and gentian,

may afterwards be had recourse to; and if the patient resides in a hot climate a change to a temperate one should be made, if possible. Chronic hepatitis requires similar treatment, but of a less active character. The more usual causes of diseases of the liver, besides those common to the other viscera, are residence in a hot climate, and the excessive use of highly seasoned food and alcoholic liquors.

Liv'er. *Syn.* HEPAR, L. In *chemistry* and *pharmacy*, a term formerly applied to numerous substances, on account of their colour; as liver of antimony (HEPAR ANTIMONII), liver of sulphur (HEPAR SULPHURIS), &c.

LIXIVIA'TION. The process of dissolving out or extracting the saline matter of bodies, more especially of ashes, the residua of distillations, &c., by means of ablution or digestion in water. The solution so obtained is called a 'LYE,' 'LEY,' or 'LIXIVIUM,' and the salts resulting from the evaporation of such solutions 'LIXIVIAL SALTS.'

LLA'MA. *Syn.* GUANACO; LAMA, L. A genus of animals of the family *Bovidæ* and tribe *Camelina*. The llama is confined to South America, and may be regarded as the representative of the camel in the New World. The most important species are *Lama vicugna* (the VICUNA) and *L. Guanacus* (the GUANACO). The wool of llamas is woven into stuffs for *ponchos*, and made into cords, sacks, &c. See ALPACA.

LOAD'STONE. *Syn.* LODESTONE, MAGNESIAN STONE, MAGNETIC IRONSTONE. Native magnetic oxide of iron (Fe_3O_4). It is often found massive, frequently crystallised, and occasionally in beds of considerable thickness. Its colour varies from reddish-black to deep gray. Native magnets from Arabia, China, and Bengal, are commonly of a reddish colour, and are powerfully attractive. Those found in Germany and England have the colour of unwrought iron; those from Macedonia are more black and dull.

LOAM. A native mixture of clay, sand, aud oxide of iron, with more or less chalk. Loamy soils are of this description. They are called heavy or light, according to the proportion of clay; and sandy, calcareous, or gravelly, just as sand, gravel, or chalk, form a characteristic portion of them.

LOBEL'IA. *Syn.* INDIAN TOBACCO; LOBELIA (B. P., Ph. L. E. & D.), L. "The flowering herb of *Lobelia inflata*" (B. P., Ph. L.), or bladder-podded lobelia. The herb has an unpleasant odour, and an acrid, burning, nauseous taste, somewhat resembling that of tobacco. In small doses (1 to 3 grs.), it is expectorant and diaphoretic; in larger doses (5 to 15 grs.), nauseant and emetic; and in excessive doses, poisonous. According to Dr. Pereira, its principal value is that of an anti-spasmodic. It has been highly recommended by Dr. Elliotson in spasmodic asthma. He commences with small doses, and gradually increases them, unless headache or nausea occurs. Others give a full dose at or before the commencement of the fit. It has been also tried in croup, hooping-cough, and other diseases of the respiratory organs, with variable effect.

Lobelia is the panacea of Dr. Coffin, the author of the pretended system of medicine irreverently called 'Coffinism.'

LOBEL'IC ACID. The acid existing in decoction of lobelia. It closely resembles gallic acid. It reddens litmus, and is precipitated by several metallic salts.

LOBEL'INE. *Syn.* LOBELINA, L. A light yellowish-brown oily substance, found by Calhoun of Philadelphia in *Lobelia inflata*. It is volatile, soluble in alcohol, ether, and water; and in oil of turpentine, oil of almonds, and some other fixed oils; with the acids it forms crystallisable salts, which are soluble. It may be obtained from the seeds by the action of alcohol acidulated with acetic acid, evaporating, treating with magnesia and then with ether, and again evaporating. 1 oz. of the seeds furnishes 2 grs. When perfectly pure, 1 gr. will kill a large dog.

LOB'STERS. See SHELL FISH.

LOCK'SOY. Rice boiled to a paste and drawn into threads. *Used* to thicken soups. It is imported from China.

LOG'WOOD. *Syn.* CAMPEACHY WOOD; HÆMATOXYLUM (Ph. L. E. & D.), HÆMATOXYLI LIGNUM (B. P.), LIGNUM CAMPECHENSE, L. CAMPECHIANUM, L. The heart-wood of *Hæmatoxylon Campechianum*, a native of the coast of Campeachy, but now common in the West Indies and India. It is a valuable astringent, and its decoction, extract, and infusion, are useful remedies in chronic diarrhœa and dysentery, and in hæmorrhages, &c. The extract is an efficient substitute for catechu and kino.

Logwood is extensively employed in dyeing and calico printing, for the production of reds, violets, purples, blacks, drabs, &c. It readily yields its colour both to spirit and boiling water. The colouring matter requires a large quantity of water to dissolve it, but when dissolved can be concentrated to any degree by boiling down. The infusion is of a fine red, turning on the purple or violet; acids turn it on the yellow, and alkalies deepen it. To stuffs mordanted with alum, it gives various shades of violet and purple, according to the proportions of the materials. By using solution of tin as the mordant, various shades of red, lilac, and violet, may be obtained. The addition of a little Brazil wood is commonly made to brighten the red. With a mordant of sulphate or acetate of iron, it dyes black; and with the addition of a little sulphate of copper, grays of various shades. It is, however, chiefly employed, in conjunction with gall-nuts, for blacks, to which it imparts a lustre and velvety appearance. Silk is usually turned through the cold decoction, but for wool the decoction is used either hot or boiling. Logwood is one of the cheapest and most easily managed of the dye stuffs. It

is also used to make ink. See HEMATOXYLIN, INK, &c.

LO'HOCH. See LINCTUS.

LOR'ICA. A species of lute applied as a coating to chemical vessels before exposing them to the fire. Its application is called LORICATION. See LUTE.

LO'TION. *Syn.* LOTIO, L. An external application, or wash, consisting of water holding in solution medicinal substances. Lotions may be prepared of any soluble medicaments that are capable of exerting their action by contact with the skin. Writers on pharmacology have arranged them in classes, as sedative, anodyne, stimulant, &c., according to their effects. Sedative and refrigerant lotions are commonly employed to allay inflammation;—anodyne and narcotic lotions, to relieve pain;—stimulant lotions, to induce the maturation of tumours, &c.;—detergent lotions, to clean foul ulcers;—repellent and resolvent lotions, to discuss tumours, remove eruptions, &c.;—counter-irritant lotions, to excite a secondary morbid action, with the intention of relieving one already existing. Lotions are usually applied by wetting a piece of linen with them and keeping it on the part affected; or, in slight cases, by moistening the part with the fingers previously dipped into them. Lotions are more agreeable if made with rose water, but are not thereby rendered more efficacious. In all cases, distilled water, or filtered soft water, is alone admissible as the solvent.

As lotions are, in general, mere extemporaneous or magistral preparations, it will, of course, be only necessary here to give the formulæ for a few of those which are the most useful or the most frequently employed. These will serve as examples from which others may be prepared. As a general rule, the medium dose of any substance dissolved in a fluid ounce of distilled water, forms a lotion of the proper strength, under all ordinary circumstances; or, what is the same thing, the medium dose in grains, taken in scruples, is sufficient for a pint of such a lotion. Thus, the dose of sulphate of zinc is 1 to 3 grs., therefore— $\frac{1+3}{2} = 2$ grs., which is the proportion of sulphate of zinc, to be taken for 1 fl. oz. of water, or 40 grs. for 1 pint. Again, the dose of bichloride of mercury is $\frac{1}{8}$ to $\frac{3}{4}$ gr.; therefore— $\frac{\frac{1}{8}+\frac{3}{4}}{2} = \frac{7}{16}$ gr.; or nearly $\frac{1}{2}$ gr. per fl. oz., and 8 grs. per pint. In this method extreme or unusual doses, as, for instance, those of sulphate of zinc, as an emetic, in poisoning, &c., are not taken into the calculation. In all cases in which lotions are intended for extremely susceptible parts, it is proper to dilute them with an equal bulk of water. When intended for eye-waters (COLLYRIA), they should be diluted with at least 3 to 4 times their bulk of water. See EMBROCATION, LINIMENT, &c.

Lotion of Ac'etate of Ammo''nia. *Syn.* LOTIO AMMONIÆ ACETATIS, L. *Prep.* 1. Solution of acetate of ammonia, 1 part; water, 2 parts.

2. (Hosp. F.) Solution of acetate of ammonia, rectified spirit, and water, equal parts. Discutient and refrigerant. In ordinary inflammations.

Lotion of Ac'etate of Lead. *Syn.* LOTIO PLUMBI ACETATIS, L. *Prep.* 1. (Collier) Acetate of lead, 1 dr.; distilled water, 8 fl. oz. Sometimes a little vinegar is added. In excoriations, burns, sprains, contusions, &c. See SOLUTION OF DIACETATE OF LEAD.

2. Acetate of lead, 2 grs.; distilled water, 1 oz. (Ophthalmic Hospital.)

Lotion of Ac'etate of Zinc. *Syn.* LOTIO ZINCI ACETATIS, L. *Prep.* 1. (Béral.) Acetate of zinc, 1½ dr.; water, 1 pint. Astringent; similar to lotion of sulphate of zinc.

2. Acetate of zinc, 1 to 2 grs.; water, 1 oz. An astringent collyrium in ophthalmia, and as injection in gonorrhœa after the acute stage has passed. Neither tincture nor wine of opium gives a precipitate with this lotion.

Lotion, Acetic. *Syn.* LOTIO ACETI, L. *Prep.* 1. Vinegar, 1 part; water, 2 or 3 parts. For bruises, contusions, &c., and as a general refrigerant application to sound parts.

2. Vinegar, 1 fl. oz.; cold water, ½ pint; as a wash in chronic ophthalmia, &c.

Lotion, Acid. See LOTIONS OF ACETIC, NITRIC, and PHOSPHORIC ACID, &c.

Lotion of Acon'itine. *Syn.* LOTIO ACONITINÆ, L. *Prep.* (Turnbull.) Aconitine, 8 grs.; rectified spirit, 2 fl. oz. In neuralgia; applied by means of a small piece of sponge mounted at the end of a stick. It must never be employed when the skin is broken or abraded; and it would be wise, in most cases, to dilute it with double its volume of proof spirit.

Lotion, Al'kaline. *Syn.* LOTIO ALKALINA, L. POTASSÆ CARBONATIS, L. *Prep.* (P. Cod.) From salt of tartar, 1 oz.; water, 1 pint. Stimulant and detergent. Diluted with an equal bulk of water, it forms an excellent cosmetic wash to remove scurf from the hair. Sometimes it is made with almond milk instead of water.

Lotion of Al'um. *Syn.* LOTIO ALUMINIS, L. *Prep.* From alum, 1½ dr.; distilled or rose water, 1 pint. Astringent. For sore gums, nipples, excoriations, &c.

Lotion, Ammoni'acal. *Syn.* LOTIO AMMONIÆ, L. AMMONIACALIS, L. *Prep.* 1. Liquor of ammonia, 3 fl. drs.; cold water, 5 fl. oz. As a stimulant to indolent ulcers, and in certain skin diseases.

2. (Swediaur.) Liquor of ammonia, spirit of thyme, and spirit of camphor, equal parts. In headaches; applied to the forehead and temples, and in other cases, as a counter-irritant. In most cases it should be used diluted.

3. (Opiated—Dr. Kirkland.) Sal volatile, 3½ fl. oz.; tincture of opium, ½ fl. oz.; water,

4 fl. oz. Anodyne, stimulant, and resolvent.

Lotion, Antiphlogis'tic. *Syn.* LOTIO ANTIPHLOGISTICA, L. *Prep.* 1. (Copland.) Solution of diacetate of lead, 3 fl. drs.; solution of acetate of ammonia, 2 fl. oz.; distilled water, 1 pint. Refrigerant, sedative, and repellent. *Used* to allay inflammation, &c.

2. (A. T. Thomson.) Opium, 2 drs., distilled vinegar, ½ pint. Anodyne and refrigerant; in swelled joints, &c.

Lotion of Ar'nica. *Syn.* LOTIO ARNICÆ, L. *Prep.* 1. Tincture of arnica, 1 fl. dr.; rose water, 2½ fl. oz. In contusions, bruises, extravasations, &c.

2. (Niemann.) Arnica flowers, ½ oz.; hot vinegar, 3 fl. oz.; boiling water, 5 fl. oz.; infuse until cold, and strain. In acute hydrocephalus; or with water, q. s. to measure a pint, as a common lotion.

Lotion, Arsen'ical. *Syn.* LOTIO ARSENICALIS, L. ACIDI ARSENIOSI, L. *Prep.* 1. Arsenious acid, 5 grs.; water, 1 pint. In psoriasis, &c.

2. (Compound—M. le Febre.) Arsenious acid, 8 grs.; boiling water, 16 fl. oz.; dissolve, and add, of extract of hemlock, 1 oz.; solution of diacetate of lead, 3 fl. oz.; tincture of opium, 1 fl. dr. Every morning, in cancer.

Astrin'gent Lotion. *Syn.* LOTIO ASTRINGENS, L. See LOTIONS OF ALUM, SULPHATE OF ZINC, &c.

Lotion, Barlow's. *Prep.* From sulphuret of potassium (in powder), 3 drs.; soap (sliced), 1½ dr.; lime water, 7½ fl. oz.; proof spirit, 2 fl. oz.; dissolve. In itch, ringworm, &c.

Lotion, Bateman's. *Prep.* From bichloride of mercury, 2 grs.; compound spirit of lavender, 1 fl. oz.; dissolve, and add of distilled water, 4 fl. oz. In obstinate cutaneous eruptions, more especially those of a papular character.

Lotion of Belladon'na. *Syn.* LOTIO BELLADONNÆ, L. *Prep.* (Graefe.) Extract of belladonna, ½ dr.; dilute solution of diacetate of lead, ½ pint. Applied to tumours and glandular enlargements.

Lotion of Benzoin. LOTIO BENZOINI. Tincture of benzoin, 1; rose water, 40. A nice lotion to protect the face from the heat of the sun.

Lotion of Bichlo"ride of Mercury. *Syn.* LOTIO HYDRARGYRI BICHLORIDI, L. H. CHLORIDI CORROSIVI, L. *Prep.* 1. Corrosive sublimate, 5 to 10 grs.; distilled water, 1 pint. The addition of 5 or 6 grs. of hydrochlorate of ammonia, or as many drops of hydrochloric acid, increases the solvent action of the water, and renders the preparation less liable to change. Some persons dissolve the sublimate in 1 or 2 fl. drs. of rectified spirit before adding it to the water; but this is unnecessary. In obstinate eruptions, glandular swelling, obstinate sores, &c.; also as an injection.

2. (Good.) Corrosive sublimate, 1 dr.; sal ammoniac, 2 drs.; nitre, 4 drs.; water, 6 fl. oz.; dissolve. In itch, &c. For *use*, it should be diluted with about 3 times its bulk of water.

3. (LOTIO HYDRARGYRI AMYGDALINA—St. B. Hosp.) Blanched bitter almonds, 1 oz.; water, 1 pint; make an emulsion, and add of bichloride of mercury (dissolved in a little rectified spirit), 10 grs. This resembles GOWLAND'S LOTION, and may be used for it.

Lotion of Bismuth. LOTIO BISMUTHI. Nitrate of bismuth, 6 grs.; corrosive sublimate, ½ gr.; spirits of camphor, 1½ minim; water, 1 oz. A soothing lotion in chronic skin affections.

Lotion, Black. See MERCURIAL LOTION.

Lotion of Bo"rax. *Syn.* LOTIO BORACIS, L. BORACICA, L. *Prep.* 1. (Dr. Abercrombie.) Borax, 2½ drs.; distilled vinegar, ¼ pint. In ringworm.

2. (Copland.) Borax (in powder), 1 dr.; rose water and orange-flower water, of each, 3 fl. oz.; dissolve. A fragrant and effective application to sore gums, sore nipples, excoriations, &c.

3. (Dr. Johnson.) Borax, 2 drs.; precipitated chalk, 1 oz.; rose water and rectified spirit, of each, 3 oz. For sore nipples.

4. (Dr. Meigs.) Borax, ½ oz.; sulphate of morphia, 6 grs.; rose water, 8 fl. oz. To allay itching and irritation, especially pruritus vulvæ.

5. Borax, 1; rose water, 24. Cosmetic.

Lotion, Bro'mine. *Syn.* LOTIO BROMINII, L. *Prep.* (Dr. Glover.) Bromine, 1 dr.; water, 1 pint. As an application to scrofulous ulcers.

Lotion for Burns. See LINIMENT.

Lotion, Camphora'ted. See EVAPORATING LOTION.

Lotion of Cap'sicum. *Syn.* LOTIO CAPSICI, L. *Prep.* (Griffith.) Tinctures of capsicum and camphor, of each, 4 fl. oz.; liquor of ammonia, 2 fl. oz. A powerful rubefacient and counter-irritant.

Lotion of Car'bonate of So'da. *Syn.* LOTIO SODÆ CARBONATIS, L. *Prep.* From carbonate of soda, ½ oz.; water, 1 pint. To allay itching and irritation. See ALKALINE LOTION.

Lotion of Cher'ry Laurel. *Syn.* LOTIO LAURO-CERASI, L. *Prep.* 1. Cherry-laurel water (distilled), 1½ fl. oz.; distilled water, ½ pint. Anodyne; useful to allay irritation, &c. Some persons with delicate skin employ it as a wash after shaving.

2. Cherry-laurel water (distilled), 4 oz.; rectified spirit and ether, of each, 1 fl. oz.; extract of belladonna, 2 drs.; agitate well together in the cold. An excellent application in neuralgia, painful tumours, &c.

Lotion for Chilblains. See CHILBLAIN, LINIMENT, &c.

Lotion of Chlo"rate of Soda. *Syn.* LOTIO SODÆ CHLORATIS, L. *Prep.* (Darling.) Chlorate of soda, 5 drs.; water, ½ pint. In pruritus, &c.

Lotion of Chlo"ride of Ammonium. LOTIO

AMMONII CHLORIDI. Chloride of ammonium, 1 oz.; rectified spirit, 1 oz,; water, 10 oz. To this vinegar is sometimes added. *Used* as a dressing for bruises. See also LOTION OF HYDROCHLORATE OF AMMONIA.

Lotion of Chlo"ride of Lead. *Syn.* LOTIO PLUMBI CHLORIDI, L. *Prep.* (Tuson.) Chloride of lead, 1 dr.; hot distilled water, 1 pint; dissolve. In cancerous ulcerations, painful neuralgic tumours, &c.

Lotion of Chloride of Tin. *Syn.* LOTIO STANNI CHLORIDI, L. *Prep.* (Nauche.) Chloride of tin, 1 gr.; distilled water, 2 to 3 fl. oz. In cancerous ulcerations.

Lotion of Chloride of Zinc. *Syn.* LOTIO ZINCI CHLORIDI, L. *Prep.* 1. Chloride of zinc, 10 grs. (or solution, ½ fl. dr.); water, 1 pint. As a disinfectant and preventive lotion.

2. (Voght.) Chloride of zinc, 8 grs.; extract of aloes, 40 grs.; distilled water, 4 fl. oz. In atonic and foul ulcers.

Lotion, Chlorina'ted. *Syn.* LOTIO CHLORINATA, L. *Prep.* 1. (LOTIO CALCIS CHLORINATÆ.)—*a.* From chloride of lime, 3 drs.; water, 1 pint; agitate together for some time, and strain through muslin.

b. (Derheims.) Chloride of lime, 1 oz.; water, 1 quart; triturate and filter.

2. (LOTIO SODÆ CHLORINATÆ.) From chloride of soda, as the last. They are both excellent washes for foul ulcers, the itch, &c.; and, when diluted, for the teeth, to sweeten the breath, remove the smell of tobacco smoke, to prevent infection, and for various purposes. When intended for application to very tender or abraded surfaces, they must be largely diluted with water.

Lotion of Chlo"roform. *Syn.* LOTIO CHLOROFORMI, L. *Prep.* Chloroform (pure), 1½ fl. oz.; rectified spirit and cold distilled water, of each, ½ pint. Anodyne. A piece of oiled silk should be laid over the rag to prevent evaporation. The lotion made with water, as commonly prescribed, is inert.

Lotion for Corns. See CORN.

Lotion of Cre'asote. *Syn.* LOTIO CREASOTI, L. *Prep.* 1. Creasote, 2 fl. drs.; liquor of potassa, 3 fl. drs.; water, ½ pint.

2. Creasote, 3 fl. drs.; vinegar and water, of each, ½ pint. In burns, itch, phagedenic ulcerations, ringworm, chancre, &c.

Lotion of Cy'anide of Potas'sium. *Syn.* LOTIO POTASSI CYANIDI, L. *Prep.* 1. (Cazenave.) Cyanide of potassium, 10 grs.; emulsion of bitter almonds, 6 fl. oz. In chronic eruptions and other cases attended with much itching or irritation.

2. (Foy.) Cyanide of potassium, 8 grs.; distilled water, 1 fl. oz. In neuralgia, acute rheumatism, &c.; applied by means of compresses of linen. Both the above are poisonous if swallowed.

Lotion of Delphin'ine. *Syn.* LOTIO DELPHINIÆ, EMBROCATIO D., L. *Prep.* (Dr. Turnbull.) Delphinine, 20 to 60 grs.; rectified spirit, 2 fl. oz. *Used* as LOTION OF VERATRIA.

Lotion of Diac'etate of Lead. *Syn.* GOULARD'S LOTION; LOTIO PLUMBI DIACETATIS, L. The dilute liquor of diacetate of lead (LIQ. PLUMBI DIACETATIS DILUTUS—Ph. L.), See SOLUTION. Also Solution of subacetate of lead (B. P.), 3 minims, with 7 minims to 1 oz. water.

Lotion, Evap'orating. *Syn.* LOTIO EVAPORANS, L. VAPORANS, L. SPIRITUS DILUTI, L. *Prep.* 1. (Copland.) Sulphuric ether, rectified spirit, and solution of acetate of ammonia, of each, 1½ fl. oz.; rose water, 3½ fl. oz.

2. (Guy's Hosp.) Rectified spirit, 1 part; water, 5 parts.

3. (Erasmus Wilson.) Rectified spirit, 1 part; water, 4 to 6 parts.

4. (CAMPHORATED — Ware.) Camphor, ½ dr.; elder flowers, ½ oz.; rectified spirit, 4 oz.; digest 24 hours, and strain.

Obs. The above are soothing and refrigerant, if allowed to evaporate by free exposure; stimulant, if the evaporation is prevented by covering the part with the hand, or a piece of oiled silk. They are useful applications in nervous headaches, restlessness, itching and irritability of the skin, &c. "A little rose water added to the simple water makes an agreeable addition, and sometimes camphor water (julep), or a little Goulard's extract, may be deemed advantageous, when a greater degree of calming effect is required." (Eras. Wilson.) Eau de Cologne, diluted with an equal quantity of water, is often used as an evaporating lotion.

Lotion of Gall-nuts. *Syn.* LOTIO GALLÆ, L. *Prep.* From gall-nuts (bruised), ½ oz.; boiling water, 1 pint; infuse until cold, and strain. Astringent. An excellent application to sore nipples, or to strengthen them before suckling; spirit of wine, 3 fl. oz., may be advantageously added to the cold infusion, and a like portion of water omitted. See DECOCTION.

Lotion of Glyc'erin. *Syn.* LOTIO GLYCERINI, L. GLYCERINÆ, L. *Prep.* 1. Glycerin, 1 oz.; water, 1 pint. To allay itching, and remove dryness, &c., in various skin diseases; also in chaps of the nipples, lips, and hands. For the latter purpose the addition of 2 to 3 drs. of borax is recommended by some writers.

2. Glycerin, 1 oz.; thick mucilage, 2 oz.; lime water, 7 oz. In burns, scalds, chaps, excoriations, &c.

3. (Startin.) Glycerin, 1 oz.; extract of belladonna, 1 dr.; soap liniment, 3 oz.; triturate together. In bruises, sprains, and swelled joints; gouty, neuralgic, and rheumatic pains, &c.

4. (Startin.) Trisnitrate of bismuth, ½ dr.; tincture of foxglove and dilute nitric acid, of each, 1 fl. dr.; glycerin, 4 drs.; rose water, 8½ fl. oz. To allay the itching in prurigo, and some other skin diseases.

Obs. Various lotions may be prepared by dissolving active medicinal substances in glycerin.

Lotion, Goulard's. See LOTION OF DIACETATE OF LEAD.

Lotion, Gout. *Syn.* LOTIO ANTARTHRITICA, L. *Prep.* 1. Glycerin, 1 oz.; extract of belladonna, 3 drs.; veratrine, 10 grs., dissolved in rectified spirit, 2 fl. oz.; mix, and further add of water, 17 fl. oz. It is poisonous if swallowed.

2. ('SCUDAMORE'S G. L.') From camphor mixture, 9 fl. oz.; rectified spirit, 3 fl. oz. The above are applied on rags or compresses, or are poured on the surface of poultices.

Lotion, Gowland's. This celebrated nostrum is prepared as follows:—Take of Jordan almonds, 1 oz.; bitter almonds, ½ oz.; blanch them, and make an emulsion in soft water, 1 pint; to this add of bichloride of mercury, 15 grs., previously dissolved in rectified spirit, 2 fl. drs., together with enough water to make the whole measure 1 pint, and put it into bottles.

Obs. This preparation is chiefly used as a cosmetic to improve the complexion; and also as a wash for obstinate eruptions and minor glandular swellings and indurations. As a beautifier of the complexion, it is employed by simply wetting the skin with it, either by means of the corner of a napkin or the fingers dipped into it, after which it is gently wiped off with a dry cloth. Dr. Paris represents this nostrum to contain ½ dr. of corrosive sublimate in every pint, which is not the case.

Lotion, Granville's Counter-irritant. See LINIMENT OF AMMONIA (Compound).

Lotion, Hem'lock. *Syn.* LOTII CONII, L. *Prep.* (Mid. Hosp.) Extract of hemlock, 3 drs.; opium, 1 dr.; boiling water, 1 pint; digest until cold, and strain. Anodyne and resolvent; in glandular enlargements, painful ulcers, cancer, indurations, rheumatism, neuralgia, &c.

Lotion, Hooping Cough. (Struve's). LOTIO ANTIPERTUSSICA, L. *Prep.* (Paris.) Potassio-tartrate of antimony, 1 dr.; tincture of cantharides, 1 oz.; water, 2 oz. This is a powerful counter-irritant, and should be used with caution, as it is apt to induce a troublesome eruption on the parts to which it is frequently applied.

Lotion of Hydrochlo"rate of Ammonia. *Syn.* LOTIO AMMONIÆ HYDROCHLORATIS, L. *Prep.* 1. (WEAKER.) From sal ammoniac, 1 to 4 drs.; water, 1 pint. As a wash in itch, ulcers, tender feet, swelled joints, &c.

2. (STRONGER.) From sal ammoniac, 1 to 2 oz.; water, 1 pint. In contusions, chronic tumours, extravasations, chilblains, &c., when the skin is not broken. Both are stimulant and resolvent or discutient. Vinegar is often substituted for the whole or part of the water, and sometimes a fifth or sixth part of rectified spirit is added. See also LOTION OF CHLORIDE OF AMMONIUM.

Lotion, Hydrochlo"ric. *Syn.* LOTIO ACIDI HYDROCHLORICI, L. *Prep.* 1. Hydrochloric acid, 1 fl. oz.; water, 1 pint. In lepra, and several other skin diseases.

2. (Foy.) Hydrochloric acid, 1 part; water, 16 parts. In chilblains, when the skin is unbroken.

Lotion, Hydrocyan'ic. *Syn.* LOTIO HYDROCYANICI, L. ACIDI HYDROCYANICI, L. *Prep.* 1. (Magendie.) Medicinal hydrocyanic acid, 1 to 2 fl. drs.; lettuce water, 1 pint. In hepatic affections.

2. (Sneider.) Medicinal acid, 1½ fl. dr.; rectified spirit and water, of each, 6 fl. oz.

3. (A. T. Thomson.) Medicinal acid and rectified spirit, of each, 2 fl. drs.; acetate of lead, 16 grs.; distilled water, 7½ fl. oz. In impetigo, &c.

Obs. Lotions of prussic acid are employed to allay pain and irritation in various chronic skin diseases, especially the scaly and itchy eruptions; and in cancer, &c., with variable success. See HYDROCYANIC ACID.

Lotion of Hyposul'phite of Soda. *Syn.* LOTIO SODÆ HYPOSULPHITIS, L. *Prep.* (Startin.) Hyposulphite of soda and alum, of each, 1½ dr.; eau de Cologne, ½ fl. oz.; rose water, 7½ fl. oz. In the advanced stages of acne.

Lotion of I'odide of Ar'senic and Mer'cury. *Syn.* LOTIO ARSENICI ET HYDRARGYRI HYDRIODATIS, L. *Prep.* From Donovan's solution, 1 part; water, 9 parts. In lepra, psoriasis, and other scaly skin diseases. See SOLUTION.

Lotion of Iodide of Potas'sium. *Syn.* LOTIO POTASSII IODIDI, L. *Prep.* 1. From iodide of potassium, 1 to 2 drs.; water, 1 pint. In the usual cases in which iodurctted preparations are employed.

2. (Dr. O. Ward.) Iodide of potassium, 1 dr.; water, ¾ pint. In itch. (See *below.*)

Lotion of Iodide of Zinc. *Syn.* LOTIO ZINCI IODIDI, L. *Prep.* (Ross.) Iodine, 1½ dr.; zinc filings, 1 dr.; water, 8 fl. oz.; digest with heat until the liquid becomes coloured, then filter. In enlarged tonsils.

Lotion of I'odine. *Syn.* LOTIO IODINII, L. *Prep.* From iodine, 2 grs.; rectified spirit, 1 fl. dr.; dissolve, well agitate the solution with distilled water, 1 pint, and filter. An excellent wash for scrofulous ulcers, and in chronic ophthalmia, cutaneous scrofula, and several chronic skin diseases, particularly in highly sensitive habits.

Lotion, Compound, of Iodine. *Syn.* LOTIO IODI COMP., L. *Prep.* 1. Iodide of potassium, 80 grs.; iodine, 60 grs.; water, 1 oz.

2. (Cazenave.) Iodide of potassium and iodide of sulphur, of each, 1 dr.; water, 1 pint. In itch; either alone or diluted with an equal bulk of water.

3. (Dauvergne.) Iodine, 3 drs.; iodide of potassium, 6 drs.; water, 3 fl. oz.; dissolve, and label the bottle No. 1. Sulphuret of potassium, 4 oz.; water, 8 fl. oz.; dissolve. For use, a teaspoonful of No. 1, and a table-spoonful of No. 2, are to be added to about a pint of water. In itch, and several other skin diseases.

4. (Lugol.) Iodine, 1 to 2 grs.; iodide of potassium, 3 to 6 grs.; water, 1 pint. In scro-

fulous ophthalmia, fistulas, &c.; and as a wash in numerous skin diseases.

5. (Righini.) Chloride of lime, 4 drs.; water, 2½ fl. oz.; triturate together, filter into a stoppered bottle, and add of tincture of iodine, 1 dr. With a pint of water, it forms an effective application in itch.

6. (Soubeiran.) Iodide of patassium, 1 oz.; iodine, ½ oz.; water, 6 oz.; dissolve. *Used* as iodine paint; also as a caustic to touch the surfaces of scrofulous ulcers, and the eyelids in scrofulous ophthalmia.

7. Iodide of potassium, ½ dr.; iodine, 16 grs.; water, 1 pint. This is the common and best form of iodine lotion, but for certain purposes it is used much stronger. (See *above*.)

Lotion of Iron with Conium. LOTIO FERRI CUM CONIO. Sulphate of iron, 8 grs.; extract of conium, 8 grs.; water, 1 oz.

Lotion, Itch. *Syn.* LOTIO ANTIPSORICA, L. *Prep.* (Cazenave.) Sulphuret of potassium, 1 dr.; soft soap, 2 drs.; water, 8 fl. oz.; dissolve. An excellent remedy for the itch. It leaves little smell behind, and does not soil the linen. (See *above*.)

Lotion, Kirkland's. See LOTION OF MYRRH.

Lotion of Lemon Juice. *Syn.* LOTIO SUCCI LIMONIS, L. *Prep.* From the freshly expressed juice of lemon, diluted with 4 or 5 times its bulk of water. To render it more agreeable, rose water may be employed, or a few drops of eau de Cologne added. It is cooling and detergent, and forms an excellent application to foul ulcers, and to allay the itching in numerous cutaneous affections.

Lotion of Lime Wa'ter. *Syn.* LOTIO CALCIS SPIRITUOSA, L. *Prep.* (Ph. Chirur.) Rectified spirit, 4 oz.; lime water, 8 fl. oz. See EVAPORATING LOTION (*above*).

Lotion, Mammil'lary. *Syn.* LOTIO BALSAMI PERUVIANI COMPOSITA, L. *Prep.* (Iverg.) Balsam of Peru, 1 dr.; yolk of 1 egg; make an emulsion, and add of spirit of wild thyme, 3 fl. oz. For sore nipples; to be followed, whilst still wet, by a 'dusting' with a powder composed of Peruvian bark, 1 dr.; gum arabic, 2 drs.

Lotion, Mercu'rial. *Prep.* 1. (BLACK WASH, BLACK LOTION, MILD PHAGEDENIC L.; LOTIO NIGRA (B.P.), L. HYDRARGYRI CINEREA, L. H. NIGRA, L. H. CHLORIDI CUM CALCE, L. MERCURIALIS N., AQUA PHAGEDÆNICA MITIS, L.) —*a.* (B. P.) From calomel, 3 grs.; lime water, 1 oz.; well shaken together.

b. (Mid. Hosp.) To the last add of thick mucilage, 1 fl. oz.

c. (Guy's Hospital.) From calomel, 1 dr., to lime water, 8 fl. oz.

Obs. Black wash is a favourite application to all kinds of syphilitic and scrofulous sores. The bottle should be well shaken before the lotion is applied.

2. YELLOW WASH, Y. LOTION, PHAGEDENIC L.; LOTIO FLAVA, L. PHAGEDÆNICA, AQUA P., LOTIO HYDRARGYRI FLAVA, L. H. BICHLORIDI CUM CALCE, L.)—*a.* (B. P.) Corrosive sublimate, 18 grs.; lime water, 10 oz.; well shaken together.

b. (St. B. Hosp.) Corrosive sublimate, 20 grs.; lime water, 6 fl. oz. *Used* as the last, but it is stronger and more active, from containing a little undecomposed bichloride.

Lotion of Myrrh. *Syn.* KIRKLAND'S LOTION; LOTIO MYRRHÆ, L. *Prep.* 1. (Dr. Kirkland.) Tincture of myrrh and lime water, equal parts. In scorbutic ulcers and gums.

2. (Compound; LOTIO MYRRHÆ COMPOSITA, L.—Ph. Chirur.) Honey of roses and tincture of myrrh, of each, 2 fl. drs.; lime water, 2½ fl. oz. As No. 1; also used as a dentifrice.

Lotion of Ni'trate of Bis'muth. *Syn.* LOTIO BISMUTHI NITRATIS, L. *Prep.* (Cutan. Hosp.) Subnitrate or trisnitrate of bismuth, ½ dr.; corrosive sublimate, 12 grs.; spirit of camphor, ½ fl. dr.; water, 1 pint. In itch, and some other eruptions.

Lotion of Nitrate of Sil'ver. *Syn.* LOTIO ARGENTI NITRATIS, L. *Prep.* 1. Nitrate of silver, 15 grs.; nitric acid, 10 drops; distilled water, ½ pint. As a wash for indolent ulcers, sore legs, &c.

2. (Jackson.) Nitrate of silver, 10 grs.; water, 1 fl. oz. For bed-sores; applied, at first, twice or thrice a day.

3. (Schreider.) Nitrate of silver, ½ dr.; nitric acid, 10 drops; water, 1½ fl. oz. In chilblains, soft corns, &c.

Lotion of Nitrate of Silver (Strong.) LOTIO ARGENTI NITRATIS FORTIS. Nitrate of silver, 60 grs.; distilled water, 1 oz.

Lotion, Etherial, of Nitrate of Sil'ver. LOTIO ARGENTI NITRATIS ÆTHEREA. Nitrate of silver, 20 grs.; distilled water, 1 dr.; spirit of nitrous ether, 1 oz.

Lotion of Ni'tre. *Syn.* LOTIO POTASSÆ NITRATIS, L. *Prep.* 1. Nitre, 3 drs.; vinegar, ¼ pint; water, ¼ pint.

2. Nitre, 2 drs.; sal ammoniac, 1 dr.; vinegar and water, of each, ½ pint. In sprains, contusions, extravasations, tender feet, chilblains, &c. Diluted with an equal bulk of water, it is a popular application to 'black eyes.'

Lotion of Ni'tric Acid. *Syn.* LOTIO ACIDI, L. ACIDI NITRICI, L. *Prep.* 1. (Collier.) Nitric acid, ½ fl. oz.; water, 1 pint. In lepra, and other scaly skin diseases.

2. (Phœbus.) Nitric acid, 1 fl. dr.; laudanum, 1½ fl. dr.; rose water, ½ pint. For venereal ulcers.

Lo'tion of Nitromuriat'ic Acid. *Syn.* LOTION OF AQUA REGIA. *Prep.* (Copland.) Nitromuriatic acid, 1½ dr.; water, 1 pint. In gangrene and mortification.

Lotion of Nux Vom'ica. *Syn.* LOTIO NUCIS VOMICÆ, L. *Prep.* 1. Alcoholic extract of nux vomica, 10 grs.; rectified spirit and water, of each, 2½ fl. oz. In amaurosis.

2. (Radius.) Alcoholic extract of nux vomica, 8 grs.; liquor of ammonia (stronger),

½ fl. oz.; rectified spirit, 2 fl. oz. In paralysed limbs.

Lotion of O'pium. *Syn.* LOTIO OPII, L. OPIATA, L. *Prep.* 1. (Christison.) Opium, 40 grs.; water, ¼ pint; infuse, add to the filtered liquid a solution of sugar of lead, 40 grs., in water, ¼ pint, and filter.

2. (St. B. Hosp.) Opium, 1½ dr.; boiling water, 1 pint; triturate and strain. Anodyne; the first is also refrigerant and discutient.

Lotion of Ox'ide of Zinc. *Syn.* LOTIO ZINCI OXYDI, L. *Prep.* 1. (Augustin.) Oxide of zinc, 1 dr.; elder-flower water, 1½ fl. oz. In pustular erysipelas.

2. (Hosp. F.) Oxide of zinc, ½ dr.; mucilage, 2 fl. drs.; water, 6 fl. drs. As an astringent and desiccant, in scrofulous eruptions, excoriations, moist chaps, &c.

Lotion, Phageden'ic. See MERCURIAL LOTION (*above*).

Lotion of Phosphor'ic Acid. *Syn.* LOTIO ACIDI PHOSPHORICI, L. *Prep.* (Pereira.) Dilute phosphoric acid (Ph. L.), 1 fl. oz.; water, ½ pint. In caries and fistula.

Lotion of Potas'sa. See. LOTIO POTASSÆ, L. *Prep.* From liquor of potassa, 1 fl. oz.; water, 1 pint. Detergent; in scorbutic eruptions, and foul ulcers, and to prevent infection.

Lotion of Potas'sio-tar'trate of An'timony. *Syn.* LOTIO ANTIMONIALIS, L. ANTIMONII POTASSIO-TARTRATIS, L. RUBEFACIENS, L. *Prep.* 1. Tartar emetic, 1 dr.; tincture of camphor, 2 fl. drs.; water, 1 pint. As a local stimulant. Diluted with twice or thrice its weight of water, it is employed as a collyrium in chronic ophthalmia, and in specks on the cornea.

2. (Sir Wm. Blizard.) Tartar emetic, 20 grs.; boiling water, 1 fl. oz. *Used* to cleanse foul ulcers, to repress fungous growths and warts, and in ring-worm, &c.

3. (Pereira.) Tartar emetic, 1 dr.; boiling water, 1½ fl. oz.; dissolve. Employed as a local irritant instead of the ointment. All the above are rubefacient and counter-irritant. See ANTIMONY.

Lotion of Quin'ine. *Syn.* LOTIO QUINÆ, EMBROCATIO Q., L. *Prep.* From disulphate of quinine, 1 dr.; rectified spirit, 5 fl. oz. Applied over the spine in intermittents.

Lotion, Sapona'ceous. *Syn.* LOTIO SAPONIS, L. SAPONACEA (Ph. L. 1746), L. *Prep.* From liquor of carbonate of potassa, ½ oz.; olive oil, 4 oz.; rose water, 12 oz.; agitate together. Emollient; chiefly as a cosmetic.

Lotion, Saviard's. *Prep.* (Foy.) Caustic potassa, 1 dr.; camphor, 20 grs.; sugar, 1 oz.; water, 1 pint. As a wash for indolent ulcers.

Lotion, Struve's. See HOOPING COUGH LOTION.

Lotion of Sul'phate of Cop'per. *Syn.* LOTIO CUPRI SULPHATIS, L. *Prep.* 1. Blue vitriol, 1 dr.; camphor julep, 1 pint. For phagedenic ulcers, and in itch, &c.

2. (Dr. Graves.) Sulphate of copper, 10 grs.; water, 1 fl. oz. In chilblains, ring-worm &c.

3. (Lloyd.) Sulphate of copper, 1 oz.; water, 1 pint. In itch; either alone or diluted.

Lotion of Sul'phate of Iron. *Syn.* LOTIO FERRI SULPHATIS. Sulphate of iron, 2 grs.; water, 1 oz.

Lotion of Sul'phate of Zinc. *Syn.* LOTIO ZINCI SULPHATIS, L. *Prep.* 1. Sulphate of zinc, ¾ dr.; water, 1 pint. Astringent; in some chronic skin diseases, as a wash for loose, flabby granulations, and for ulcers that discharge profusely, &c.

2. (Collier.) Sulphate of zinc, 2 drs.; water, 1 pint. As a counter-irritant in pains of the joints, periosteum, old sprains, &c.

Lotion of Tar. *Syn.* LOTIO PICIS LIQUIDÆ, L. *Prep.* (Saunders.) Quicklime, 6 oz.; water, 2½ pints; slake, add of tar, 4 oz., and boil to one half. This liquid may be advantageously employed in various chronic skin diseases, especially those affecting the heads of children. See INFUSION OF TAR, &c.

Lotion of Valer'ian. *Syn.* LOTIO VALERIANÆ, EMBROCATIO ANTIHYSTERICA, E. EMMENAGOGA, L. *Prep.* From tincture of valerian and proof spirit, equal parts. In hysteria, suppressions, &c.

Lotion of Vera'trine. *Syn.* LOTIO VERATRIÆ, L. *Prep.* (Dr, Turnbull.) Veratrine, 20 to 60 grs.; rectified spirit, 2 oz. In gout, rheumatism, &c. It is extremely poisonous, and must only be used where the skin is sound, and then with great caution.

Lotion of Ver'digris. *Syn.* LOTIO ÆRUGINIS, L. CUPRI CITRATIS, L. *Prep.* From verdigris, 3 drs.; vinegar, ¼ pint; water, ¾ pint. As a wash for indolent scrofulous and venereal ulcers.

Lotion of Vin'egar. See ACETIC LOTION (*above*).

Lotion, Yel'low. See MERCURIAL LOTION (*above*).

LOZ'ENGE. *Syn.* TROCHE; TROCHISCUS, TABELLA, L.; TABLETTE, Fr. A small cake, often medicated, consisting principally of powdered sugar, made into a mass with some glutinous liquid, without the aid of heat, and dried. The form given to lozenges (TROCHES; TABELLÆ, TROCHISCI, TABLETTES) is generally that of a small round tablet or flattened cylinder; but originally they were exclusively made in the shape of a lozenge or rhomb, from which circumstance their familiar name is derived. LOZENGES are distinguished from DROPS or PASTILLES by the non-employment of heat in their preparation; and from PASTES, by the latter being formed of vegetable juice or pulp, and having a softer consistence.

In the preparation of lozenges the dry ingredients, separately reduced to a very fine powder, are first perfectly mixed together, and then beaten into a stiff paste with the glutinous liquid employed to give them form; the mass is next rolled out to a desired thickness,

and cut into pieces of the proper shape by means of a small cylinder or punch of steel or tin-plate, called a 'lozenge-cutter.' The newly formed lozenges are lastly dried by placing them on an inverted sieve or frame covered with paper in a dry, warm, and airy situation, and are frequently turned until they become hard and brittle, due care being taken to preserve them from dust and dirt. To prevent the mass adhering to the fingers and utensils during the process of manufacture, a little finely powdered starch, or a very little olive oil, scented with the same aromatic as that contained in the lozenges, may be used. Mucilage of gum arabic or of gum tragacanth, thin isinglass size, or the strained white of egg, are the substances usually employed to make the pulverulent materials adhere together. A strained decoction of Irish moss is now frequently used for the same purpose, for inferior qualities. The larger the proportion of gum which enters into the composition of lozenges, the slower they dissolve in the mouth; hence powdered gum is frequently added to the other materials to increase their quality in this respect, as well as to give additional solidity to those which, like chalk, for instance, are of a peculiarly dry or crumbly nature. Starch and potato flour are often added to lozenge-masses in lieu of a portion of the sugar, and even plaster of Paris is not unfrequently employed to give them weight; frauds which are readily detected in the manner noticed under GUM and SUGAR.

As a general rule, MEDICATED LOZENGES should weigh from 8 to 10 grs. each, and a medium dose of their active ingredient should be distributed through the bulk of 6 to 8 of them, in which case 3 to 5 of them may be safely taken as a dose, or sucked during the lapse of 3 or 4 hours. This will be useful in the preparation of those for which no established proportions are given. In 'sending out' compounds of this class containing active medicaments, as morphia or opium, the retailer as well as the manufacturer should be careful that the quantity contained in each lozenge is plainly marked on the label.

In lozenges intended for MOUTH COSMETICS, or to perfume the breath, ambergris is generally regarded as the most appropriate perfume; but hard smokers frequently prefer cloves and cinnamon, and some ladies give the preference to roses, orange flowers, and orris or violets.

Lozenges are coloured with the same stains as are used for liqueurs and sweetmeats.

Lozenges, as well as all other similar articles of confectionery, should be preserved in well-closed glass bottles, or jars, or in tin canisters, so as to be perfectly excluded from the air and damp.

Lozenges, Absor'bent. TROCHISCI ANTACIDI, L. *Prep.* 1. Take of precipitated chalk, ½ lb.; gum arabic, 2 oz.; double refined white sugar, 14 oz.; all in impalpable powder; oil of nutmeg, ½ fl. dr.; pass the mixture through a fine sieve, beat it up with mucilage, q. s., roll the mass into a thin sheet, and cut it into lozenges; lastly, dry them by exposing them on a sheet of white paper to the air, out of contact with dust.

2. As the last, but substituting heavy carbonate of magnesia, 1½ oz., for an equal weight of chalk. In diarrhœa, heartburn, acidity, &c. See CHALK LOZENGES, MAGNESIA L., SODA L., &c.

Lozenges, Aca'cia. See GUM LOZENGES.

Lozenges, Acid'ulated. *Syn.* ACIDULATED LEMON LOZENGES, TARTARIC ACID L.; TROCHISCI ACIDI TARTARICI (Ph. E.), L. *Prep.* From tartaric acid, 2 drs.; oil of lemon, 10 drops; white sugar, 8 oz.; mucilage, q. s. to make a lozenge-mass. The same ingredients mixed with heat form ACIDULATED or ACID DROPS. Both are useful in coughs, hoarseness, sore throats, &c. See CAYENNE LOZENGES, CITRIC ACID L., ROSE L., &c.

Lozenges, Al'kaline. See SODA LOZENGES, VICHY L., &c.

Lozenges, Al'um. *Syn.* TROCHISCI ALUMINIS, L. Each lozenge contains 1½ gr. of alum. As an astringent. See ASTRINGENT LOZENGES.

Lozenges, An'iseed. *Syn.* TROCHISCI ANISI, L. *Prep.* From oil of aniseed, 1½ fl. dr.; finest white sugar, 1 lb.; mucilage, q. s. Carminative and stomachic. In colic, griping, &c.; and as a pectoral.

Lozenges, Anthelmin'tic. See WORM LOZENGES.

Lozenges, Antimonial. *Syn.* TROCHISCI ANTIMONIALES, MORSULI STIBII KUNKELII, L.; TABLETTES DE KUNKEL, Fr. *Prep.* (P. Cod.) Levigated sulphuret of antimony and cardamom seeds, of each, 1 oz.; almonds (blanched), 2 oz.; cinnamon, ½ oz.; sugar, 13 oz.; mucilage of tragacanth, q. s.; to be divided into 15-gr. lozenges. As an alterative.

Lozenges, Ape''rient. *Syn.* TROCHISCI APERIENTES, L. Each lozenge contains 1 gr. each of calomel and scammony, and 2 grs. of jalap; or, instead of the last, ¼ gr. of jalapine. 2 to 3 for a dose.

Lozenges, Astrin'gent. *Syn.* TROCHISCI ASTRINGENTES, L. Each lozenge contains 1½ gr. of alum and 2 grs. of catechu. In spitting of blood, relaxed uvula, sore throat, &c. See ALUM LOZENGES.

Lozenges, Bark. *Syn.* TROCHISCI CINCHONÆ, L. *Prep.* (P. Cod.) Cinchona, 2 oz.; cinnamon, 2 drs.; white sugar, 14 oz.; mucilage of gum tragacanth, q. s.; mix, and divide into 16-gr. lozenges. Tonic.

Lozenges, Bath. *Syn.* DAWSON'S LOZENGES. From extract of liquorice and gum arabic, of each, 1½ oz.; sugar, 17 oz. It is both rolled into lozenges and formed into pipes. Demulcent; in tickling coughs, &c.

Lozenges, Bicarbonate of Soda. TROCHISCI SODÆ BICARBONATIS. Bicarbonate of soda, in powder, 3600 grs. (8¼ oz.); refined sugar, 25

oz.; gum acacia, in powder, 1 oz.; mucilage, 2 oz.; distilled water, 1 oz.; mix, and form in 720 lozenges. Each lozenge contains 5 grs. of bicarbonate of soda.—*Dose.* 1 to 6 lozenges.

Lozenges, Bis'muth. *Syn.* TROCHISCI BISMUTHI, L. *Prep.* 1. (B. P.) Subnitrate of bismuth, 346 grs.; carbonate of magnesia, 4 oz.; precipitated chalk, 6 oz.; sugar, 29 oz.; gum acacia, 1 oz.; mucilage, 2 oz.; rose water, a sufficiency; make 720 lozenges. Each lozenge contains 2 grains of subnitrate of bismuth.—*Dose.* 1 to 6 lozenges.

2. (Trousseau.) Each lozenge contains 1 gr. of subnitrate of bismuth. Tonic and antispasmodic; in chronic dyspepsia, gastrodynia, nausea, cramp of the stomach, &c.

Lozenges, Black Cur'rant. TROCHISCI RIBIS NIGRI, L. *Prep.* From inspissated juice of black currants and sugar, of each, in powder, 1 lb.; tartaric acid, ½ oz.; mucilage, q. s. In hoarseness, &c.

Lozenges, Bo''rax. *Syn.* TROCHISCI BORACIS, L. Each lozenge contains 3 grs. of borax. One occasionally in aphthous sore mouth, sore throat, &c.

Lozenges, Bromide of Ammonium. Each lozenge contains 2 grs. of bromide of ammonium.—*Dose.* 1 to 3 lozenges.

Lozenges, Burnt Sponge. *Syn.* TROCHISCI SPONGIÆ, T. S. USTÆ, L. *Prep.* (P. Cod.) Burnt sponge, 4 oz.; sugar, 12 oz.; mucilage of tragacanth, q. s.; divide into 12-gr. lozenges. In scrofula, glandular enlargements, &c.

Lozenges, Caca'o. *Syn.* TROCHISCI BUTYRI CACAO, L. Each lozenge contains 1-3rd of its weight of pure cacao butter. In habitual constipation; and in phthisis, scrofula, &c., instead of cod-liver oil; taken *ad libitum.* They are usually scented with roses.

Lozenges, Caffe'ine. *Syn.* TROCHISCI CAFFEINÆ, L. Each lozenge contains ¼ gr. of caffeine and ½ gr. of citric acid. In hemicrania, hypochondriasis, &c.

Lozenges, Cal'omel. *Syn.* WORM LOZENGES; TROCHISCI CALOMELANOS, T. HYDRARGYRI CHLORIDI, L. *Prep.* (P. Cod.) Each lozenge contains 1 gr. of calomel. Alterative, &c. They afford a simple way of introducing mercury into the system. During their use, salt food and acid liquors should be avoided. When given for worms, they should be followed, in a few hours, by a purge.

Lozenges, Cam'phor. *Syn.* TROCHISCI CAMPHORÆ, L. Each lozenge contains ¾ gr. of (finely powdered) camphor. They must be kept in a well-corked bottle.

Lozenges, Car'bonate of Lime. See CHALK LOZENGES.

Lozenges, Cat'echu. *Syn.* CACHOU LOZENGES; TROCHISCI CATECHU (B. P.), T. DE TERRA JAPONICA, L.; TABLETTES DE CACHOU, Fr. *Prep.* 1. (Ph. E. 1744.) Catechu, 2 oz.; tragacanth, ½ oz.; white sugar, 12 oz.; rose water, q. s.

2. (P. Cod.) Extract of catechu, 4 oz.; sugar, 16 oz.; mucilage of gum tragacanth, q. s.; for 10-gr. lozenges.

3. (TRO. CATECHU ET MAGNESIÆ—P. Cod.) Magnesia, 2 oz.; powdered catechu, 1 oz.; sugar, 13 oz.; mucilage of gum tragacanth (made with cinnamon water), q. s. to mix.

4. (PERFUMED.) See CACHOU AROMATISÉ and PASTILS.

5. (B. P.) Pale catechu, in powder, 720 grs.; refined sugar, in powder, 25 oz.; gum arabic, in powder, 1 oz.; mucilage, 2 oz.; distilled water, a sufficiency; divide into 720 lozenges. Each lozenge contains 1 gr. of catechu.—*Dose.* 1 to 3 lozenges.

Obs. All the above are taken in diarrhœa, in relaxation of the uvula, in irritation of the larynx, and as cosmetics to fasten the teeth, and disguise a fetid breath. The one containing magnesia (No. 3) is also sucked in dyspepsia, acidity, and heartburn.

Lozenges, Cayenne'. *Syn.* TROCHISCI CAPSICI, L. Flavoured with essence or tincture of capsicum or cayenne, with a very concentrated Chili vinegar, or a little pure soluble cayenne pepper.

2. (ACIDULATED.) To each lb., add of tartaric acid, ½ oz. Both are used in dyspepsia, and to promote digestion and create an appetite. They have also been recommended in temporary deafness arising from exposure to cold. They are generally tinged of a light pink or red colour.

Lozenges, Chalk. *Syn.* HEARTBURN LOZENGES; TROCHISCI CRETÆ (Ph. E.), T. CARDIALGICI, TABELLÆ CARDIALGICÆ, L. *Prep.* (Ph. E.) Prepared chalk, 4 oz.; gum arabic, 1 oz.; nutmeg, 1 dr.; white sugar, 6 oz.; rose or orange-flower water, q. s. Antacid and absorbent. 3 or 4 sucked *ad libitum;* in heartburn, dyspepsia, diarrhœa, acidity of the stomach and bowels, &c.

Lozenges, Char'coal. *Syn.* TROCHISCI CARBONIS, L. *Prep.* 1. (P. Cod.) Prepared charcoal, 4 oz.; white sugar, 12 oz.; mucilage, q. s. to mix. In diarrhœa, cholera, dyspepsia, &c.

2. (TRO. CARBONAS CUM CHOCOLATÂ—M. Chevallier.) Charcoal and white sugar, of each, 1 oz.; chocolate, 3 oz.; mucilage of gum tragacanth, q. s. to mix. Nutritious; used as the last.

Lozenges, Ching's Worm. *Prep.* 1. (YELLOW.) From saffron, ½ oz.; boiling water, 1 pint; infuse, strain, add of calomel, 1 lb.; powdered white sugar, 28 lbs.; mix well, make a mass with mucilage of tragacanth, and divide it into 7000 lozenges. Each lozenge contains 1 gr. of calomel.

2. (BROWN.) From calomel, 7 oz.; resinous extract of jalap, 3½ lbs.; white sugar, 10 lbs.; mucilage of tragacanth, q. s.; mix, and divide into 6125 lozenges. Each lozenge contains ½ gr. of calomel and 3½ grs. of resinous extract of jalap. 1 to 6 of the yellow lozenges over night, as a vermifuge, followed by an equal

number of the brown ones the next morning fasting.

Lozenges, Chlo"rate of Potassa. *Syn.* TROCHISCI POTASSÆ CHLORATIS, L. *Prep.* 1. Each lozenge contains 1½ gr. of chlorate of potassa. In phthisis, sore throat, &c. 6 to 12 a day.

2. (B. P.) Chlorate of potash, in powder, 3600 grs. (8¼ oz.); refined sugar, in powder, 25 oz.; gum acacia, in powder, 1 oz.; mucilage, 2 oz distilled water, 1 oz., or a sufficiency; mix the powders, and add the mucilage and water to form a proper mass; divide in 720 lozenges. Each lozenge contains 5 grs. of chlorate of potash.—*Dose.* 1 to 6 lozenges.

Lozenges, Chloride of Ammonium. Each lozenge contains 2 to 3 grs. of chloride of ammonium. *Used* in bronchitis.—*Dose.* 2 to 4 lozenges.

Lozenges, Chlo"ride of Gold. 1. (TROCHISCI AURI CHLORIDI, L.) Each lozenge contains $\frac{1}{10}$ gr. of neutral chloride of gold. 2 to 4 daily; in scrofula, cancer, &c.

2. (With SODA; TROCHISCI AURI ET SODII CHLORIDI, T. SODII AURO-CHLORIDI, L.—Chrestien.) Each lozenge contains $\frac{1}{10}$th gr. of soda-chloride of gold. Two daily; as the last.

Lozenges, Chloride of Lime. *Syn.* TROCHISCI CALCIS CHLORIDI, T. C. CHLORINATÆ, L. Each lozenge contains ¼ gr. of dry chloride of lime. They are frequently tinged with a little carmine. *Used* to sweeten the breath, and whiten the teeth. They do not keep well.

Lozenges, Choc'olate. *Syn.* TROCHISCI CHOCOLATÆ, L. From vanilla chocolate pressed into sheets, and cut into pieces whilst hot.

Lozenges, Cincho'na. *Syn.* TROCHISCI CINCHONÆ EXTRACTI, L. Each lozenge contains 1½ gr. of dry extract of bark. A little cinnamon or nutmeg is often added. See BARK LOZENGES.

Lozenges, Cin'namon. *Syn.* TROCHISCI CINNAMOMI, L. From cinnamon (in fine powder), 1 oz., or the essential oil, 1 fl. dr., to each lb. of sugar. Carminative and stomachic. CASSIA LOZENGES are made in the same way, and are frequently substituted for them.

Lozenges, Cit'rate of Iron. *Syn.* TROCHISCI FERRI CITRATIS, L. Each lozenge contains 1½ gr. of ammonio-citrate of iron. As a mild chalybeate tonic. They are sometimes made with equal parts of sugar and vanilla chocolate.

Lozenges, Citrate of Magne'sia. *Syn.* TROCHISCI MAGNESIÆ CITRATIS, L. Each 15-gr. lozenge contains 8 grs. of pure citrate of magnesia. Laxative.

Lozenges, Cit'ric Acid. *Syn.* TROCHISCI ACIDI CITRICI, L. *Prep.* (P. Cod.) Citric acid, 3 drs.; sugar, 16 oz.; essence of lemon, 16 drops; mucilage of tragacanth, q. s.; mix, and divide into 12-gr. lozenges. In coughs, hoarseness, &c.

Lozenges, Clove. *Syn.* TROCHISCI CARYOPHILLI, L. From cloves (powdered along with sugar), 2 oz., or essential oil, 1 fl. dr., to each lb. of sugar. They are frequently coloured. Carminative and stomachic; also used as a restorative after fatigue, added to chocolate to improve its flavour, and sucked to sweeten the breath.

Lozenges, Cough. *Syn.* PECTORAL LOZENGES, PULMONIC L.; TROCHISCI ANTICATARRHALES, L. *Prep.* 1. (Black-currant lozenge-mass, 1 lb.; ipecacuanha (in very fine powder, 2 drs. For 12-gr. lozenges.

2. To the last add of powdered opium and camphor, 1½ dr.

3. To either No. 1 or 2 add of oil of aniseed, 1½ fl. dr.

4. (TABLETTES DE TRONCHIN.) From powdered gum arabic, 8 oz.; oil of aniseed, 16 drops; extract of opium, 12 grs.; kermes mineral, 1 dr.; pure extract of liquorice, 2 oz.; white sugar, 32 oz.; water, q. s.; mix, and divide into 10-gr. lozenges.

5. (TABLETTES DE VANDAMME.) From benzoic acid, 1 dr.; orris powder, 2 drs.; gum arabic (powdered), 1 oz.; starch, 2 oz.; sugar, 16 oz.; water, q. s.; mix and divide into 15-gr. lozenges.

6. Each lozenge contains ½ gr. of lactucarium, ⅓ gr. of powdered ipecacuanha, and $\frac{1}{12}$ gr. of powdered squills, together with ⅓rd of their weight of pure extract of liquorice.

Obs. To render the above serviceable in coughs, hoarseness, &c., the bowels should be kept gently open with some mild aperient, and a light diet adopted, with abstinence from stimulating liquors. See EMETINE LOZENGES, IPECACUANHA L., &c.

Lozenges, Cro'ton Oil. *Syn.* TROCHISCI CROTONIS, L. *Prep.* (Soubeiran.) Croton oil, 5 drops; powdered starch, 40 grs.; white sugar, 1 dr.; chocolate, 2 drs.; divide into 30 lozenges; 5 or 6 generally prove cathartic.

Lozenges, Cu'bebine. *Syn.* TROCHISCI CUBEBINI, L. *Prep.* (Ph. Hamb.) Copaiba and extract of cubebs, of each, 6 oz.; yolks of 3 eggs; mix, add of powdered marshmallow root, 6 oz.; make it into pipes of 12 grs. each, and roll them in sugar. In gleet, &c., and in affections of the mucous membranes of the throat and fauces. Lablonye orders them to be made of sugar, and flavoured with oil of peppermint.

Lozenges, Cu'bebs. *Syn.* TROCHISCI CUBEBÆ, L. *Prep.* (Spitta.) Cubebs, 2 drs.; balsam of tolu, 6 grs.; mix, and add of extract of liquorice, 1 oz.; syrup of tolu, 1 dr.; powdered gum, q. s.; divide into 10-gr. lozenges. One of these, allowed to melt gradually in the mouth, is said to alleviate the obstruction in the nose, in coryza.

Lozenges, D'Arcet's. See VICHY LOZENGES.

Lozenges, Diges'tive. See RHUBARB LOZENGES, GINGER L., DIGESTIVE CANDY, &c.

of poppies, 2 oz.; powdered tragacanth, 4 oz.; sugar, 10 oz.; rose water, q. s. to form a lozenge mass.

Lozenges, Em'etine. *Syn.* TROCHISCI EMETINÆ, L. *Prep.* (Magendie.)—1. From impure or coloured emetine, 32 grs. (or pure emetine, 8 grs.); white sugar, 2 oz.; mucilage, q. s. to mix; divide into 64 lozenges. Emetic. —*Dose.* 1 for a child, and 4 for an adult. They are generally tinged of a pink colour with carmine.

2. From impure or coloured emetine, 32 grs. (or pure emetine, 8 grs.); sugar, 4 oz.; mucilage, q. s.; divide inio 256 lozenges. Pectoral. 1 every hour, or oftener, for an adult. The last are intended to take the place of ipecacuanha lozenges, but are rather stronger.

Lozenges, Escharot'ic. *Syn.* TROCHISCI ESCHAROTICI, L. *Prep.* (P. Cod.) Corrosive sublimate, 2 drs.; starch, 4 drs.; mucilage of tragacanth, q. s.; mix, and divide into 3-gr. oat-shaped granules. For external use only. See CAUSTIC (Zinc).

Lozenges, Ferrocy'anide of Iron. *Syn.* TROCHISCI FERRI FERROCYANIDI, T. CÆRULEI, L. Each lozenge contains 1½ gr. of pure Prussian blue. Alterative, febrifuge, and tonic; in epilepsy, intermittents, diseases of the ganglionic system, &c.

Lozenges, Fruit. *Prep.* From juice of black currants (boiled to the consistence of an extract), 1 lb.; juice of red currants (similarly treated), ½ lb.; powdered gum tragacanth, ¼ lb.; sugar, 3 lbs.; raspberry syrup, q. s.; pear essence, a few drops. Resemble black currant lozenges, but are more agreeable.

Lozenges, Garana'. See PAULLINIA LOZENGES.

Lozenges, Gin'ger. *Syn.* TROCHISCI ZINGIBERIS, L. *Prep.* From the best unbleached Jamaica ginger and gum arabic, of each, in very fine powder, 1½ oz.; double refined lump sugar, 1 lb.; rose water (tinged with saffron), q. s. A still finer quality may be made by using an equivalent proportion of essence of ginger, instead of the powder. Inferior qualities are prepared with coarser sugar, to which some starch is often added. Ginger lozenges are carminative and stomachic, and are useful in flatulency, loss of appetite, dyspepsia, &c.

Lozenges, Gold. *Syn.* TROCHISCI AURI, L. Each lozenge contains $\frac{1}{12}$ gr. of pulverulent gold.

Lozenges, Gum. *Syn.* TROCHISCI ACACIÆ (Ph. E.), T. GUMMI ARABICI, T. GUMMOSI, L. *Prep.* 1. (Ph. E.) Gum arabic, 4 oz.; starch, 1 oz.; white sugar, 12 oz.; (all in very fine powder;) rose water, q. s.

2. (P. Cod.) Gum arabic, 1 lb.; sugar, 3 lbs.; orange-flower water, 2 fl. oz.

3. (Transparent) From the same materials, but employing a gentle heat. Demulcent; used to allay tickling coughs.

Lozenges, Gum Tra'gacanth. *Syn.* TROCHISCI TRAGACANTHÆ, T. GUMMI T., L. *Prep.* (Ph. E. 1744.) Compound powder of tragacanth, 3 oz.; sugar, 12 oz.; rose water, 4 fl. oz. Resemble the last, but are more durable in the mouth.

Lozenges, Heart'burn. See CHALK LOZENGES, &c.

Lozenges, Iceland Moss. *Syn.* TROCHISCI LICHENIS, L. (P. Cod.) Contain half their weight of dried and powdered lichen jelly. Resemble gum lozenges.

Lozenges, Indian Hemp. *Syn.* TROCHISCI CANNABIS, T. C. INDICI, L. (Ebriard.) Each lozenge contains $\frac{1}{12}$ gr. of extract of Indian hemp.

Lozenges, I'odide of Iron. *Syn.* TROCHISCI FERRI IODIDI, L. Each lozenge contains ½ gr. of dry iodide of iron. 12 to 20 daily; in amenorrhœa, chlorosis, scrofulous debility, &c. They are generally flavoured with a little nutmeg or cinnamon.

Lozenges, Iodide of Potassium. *Syn.* TROCHISCI POTASSII IODIDI, L. Each lozenge contains 1 gr. of iodide of potassium, flavoured with nutmeg or cinnamon. 10 to 15 daily; in scrofula, indurations, &c. One of the best ways of taking iodide of potassium.

Lozenges, Ipecacuan'ha. *Syn.* TROCHISCI IPECACUANHÆ, L. *Prep.* 1. (P. Cod., Hamb. do., and Ph. U. S.) Each lozenge contains ¼ gr. of ipecacuanha.

2. (TRO. IPECAC. CUM CAMPHORÂ.) Each lozenge contains ½ gr. of camphor, and ¼ gr. of ipecacuanha.

3. (TRO. IPECAC. CUM CHOCOLATÂ—P. Cod.) Each lozenge contains 1 gr. of ipecacuanha, and 12 grs. of chocolate *à la vanille.* The above are pectoral and expectorant, and are very useful in tickling and chronic coughs, hoarseness, &c.

Lozenges, Ipecacuanha and Morphia. *Syn.* TROCHISCI IPECACUANHÆ ET MORPHIÆ. (B.P.) Each lozenge contains $\frac{1}{12}$ gr. ipecacuanha and $\frac{1}{60}$ gr. hydrochlorate morphia.—*Dose.* 1 to 6 lozenges. See MORPHIA AND IPECACUANHA LOZENGES.

Lozenges, I'ron. *Syn.* TROCHISCI FERRI, T. CHALYBEATI, L. 1. Each lozenge contains 1 gr. of Quevenne's iron. See LOZENGES, REDUCED IRON, p 724.

2. (TRO. FERRI CARBONATIS.) Each lozenge contains 1½ gr. of saccharine carbonate of iron. They are both mild and excellent chalybeates. See STEEL LOZENGES.

Lozenges, Ju'jube. See JUJUBE PASTE.

Lozenges, Ker'mes Mineral. *Syn.* TROCHISCI KERMETIS, L. *Prep.* 1. (P. Cod.) Each lozenge contains ½ gr. of kermes mineral, and about ¾ gr. of gum, made up with sugar and orange-flower water. Diaphoretic and expectorant.

2. (Compound.) As the last, but with the addition of ⅛ gr. of opium, ¼ gr. of squills, and ½ gr. of ipecacuanha. Anodyne and expectorant; both are very useful in catarrhs.

Lozenges, Lactate of Iron. *Syn.* TROCHISCI FERRI LACTATIS, L. *Prep.* (Cap.) Each lozenge contains 1 gr. of lactate of iron. Tonic. *Useful* in debility, accompanied with a diseased state of the organs of digestion.

Lozenges, Lac'tic Ac'id. *Syn.* TROCHISCI ACIDI LACTICI, L. Each lozenge contains 1 gr. of lactic acid to about 12 grs. of sugar. They are best flavoured with vanilla or nutmeg. In dyspepsia, &c., especially in gouty subjects. Those prepared by Magendie's formula contain a larger proportion of acid, but are much too sour for frequent use.

Lozenges, Lactuca''rium. *Syn.* TROCHISCI LACTUCARII, L. *Prep.* (Ph. E.) Prepared with lactucarium in the same manner as the opium lozenges, Ph. E. Each of these lozenges contains from $\frac{1}{6}$ to $\frac{1}{7}$ gr. of lactucarium. Anodyne and demulcent. *Used* to allay tickling coughs, &c.

Lozenges, Lavender. *Syn.* TROCHISCI LAVANDULÆ, L. From $\frac{3}{4}$ fl. dr. of Mitcham oil of lavender to each lb. of sugar, and tinged red with liquid lake or carmine; or violet, with litmus or indigo. *Used* chiefly to scent the breath. Those of the shops are generally deficient in odour.

Lozenges, Lem'on. *Syn.* TROCHISCI LIMONIS, T. LIMONUM, L. *Prep.* 1. From $1\frac{1}{2}$ fl. dr. of oil of lemon to each 1 lb. of double refined white sugar.

2. (Acidulated.) See CITRIC and TARTARIC ACID LOZENGES.

Obs. Lemon lozenges and drops are agreeable sweetmeats, and those that are acidulated are often very useful to promote expectoration in coughs, &c. The last are also made into drops as well as lozenges, when they form the 'ACIDULATED LEMON DROPS' of the shops. Those that are made of citric acid are by far the most wholesome. Both lemon lozenges and drops are generally coloured with infusion of saffron or turmeric.

Lozenges, Lettuce. *Syn.* TROCHISCI LACTUCÆ, L. *Prep.* From extract of lettuce, extract of liquorice, gum, and sugar, equal parts. Anodyne and demulcent; in obstinate cough without expectoration. See LACTUCARIUM LOZENGES.

Lozenges, Li'chen. See ICELAND MOSS LOZENGES.

Lozenges, Liq'uorice. *Syn.* BLACK LOZENGES; TROCHISCI GLYCYRRHIZÆ, T. G. GLABRÆ, T. BECHICI NIGRI, L. *Prep.* (1. Ph. E.) Extract of liquorice and gum acacia, of each, 6 oz.; white sugar, 12 oz.; dissolve in water, q. s.; evaporate to a paste, and form into lozenges. Pectoral and demulcent. *Useful* to allay tickling coughs and remove hoarseness.

2. (With OPIUM.) See OPIUM LOZENGES.

Lozenges, Magne'sia. *Syn.* HEARTBURN LOZENGES; TROCHISCI MAGNESIÆ (Ph. E.), L. *Prep.* 1. (Ph. E.) Carbonate of magnesia, 6 oz.; powdered white sugar, 3 oz.; oil of nutmeg, 20 drops; mucilage of tragacanth, q. s. to mix.

2. (Ph. U. S.) Calcined magnesia, 4 oz.; sugar, 12 oz.; nutmeg, 1 dr.; mucilage of tragacanth, q. s.; for 10-gr. lozenges.

3. (Wholesale.) Calcined magnesia, 3 oz.; powdered gum tragacanth, 1 oz.; double refined lump sugar, $\frac{3}{4}$ lb.; rose or orange-flower water, q. s. to make a lozenge mass.

Obs. Magnesia lozenges are very useful in heartburn, acidity, and indigestion. The confectioners generally omit the nutmeg, and make their mucilage with either rose or orange-flower water, or else add the dry gum to the mass, and then mix up the powders with one or other of these liquids. It is also an improvement to use calcined magnesia, which is about twice as strong as the carbonate, and consequently less need be employed.

Lozenges, Manna. *Syn.* TROCHISCI MANNÆ, L. *Prep.* (Van Mons.) Powdered tragacanth, 1 dr.; white sugar, 12 oz.; manna, 3 oz.; orange-flower water, q. s. to mix. Demulcent, and in large numbers slightly laxative.

Lozenges, Marsh-Mallow. *Syn.* TROCHISCI ALTHÆÆ, L.; TABLETTES DE GUIMAUVE, Fr. *Prep.* (P. Cod.) Marsh-mallow root (decorticated and finely powdered), 2 oz.; sugar, 14 oz.; mucilage of tragacanth (made with orange-flower water), q. s. Demulcent and expectorant. *Useful* to allay the irritation in cough, &c. The preparations of marsh-mallow have always been highly esteemed as pectorals by the vulgar.

Lozenges, Min'ium. *Syn.* TROCHISCI MINII (Ph. E. 1744), L. *Prep.* From red lead, 1 dr.; corrosive sublimate, 2 drs.; crum of bread, 1 oz.; rose water, q. s.; to be made up into oat-like grains. For external use only.

Lozenges, Morphia. *Syn.* TROCHISCI MORPHIÆ (B. P., Ph. E.), T. M. HYDROCHLORATIS, L. *Prep.* 1. (Ph. E.) Hydrochlorate of morphia, 20 grs.; tincture of tolu, $\frac{1}{2}$ fl. oz.; powdered white sugar, 25 oz.; dissolve the hydrochlorate in a little warm water, mix it with the tincture and the sugar, make a mass with mucilage of gum tragacanth, q. s., and divide it into 15-gr. lozenges. Each lozenge contains about $\frac{1}{40}$ gr. of hydrochlorate of morphia. *Used* as opium lozenges, but are pleasanter. The morphia lozenges of the shops generally contain $\frac{1}{24}$ gr. of hydrochlorate of morphia. (Pereira.)

2. (With IPECACUANHA; TROCHISCI MORPHIÆ ET IPECACUANHÆ—Ph. E.) As the last, adding of ipecacuanha, 1 dr. Each lozenge contains about $\frac{1}{10}$ gr. of hydrochlorate of morphia, and $\frac{1}{12}$ gr. of ipecacuanha. Anodyne and expectorant; in tickling coughs, &c., and to allay pain.

3. Hydrochlorate of morphia, 20 grs.; tincture of tolu, $\frac{1}{2}$ oz.; refined sugar, in powder, 24 oz.; gum arabic, in powder, 1 oz.; mucilage, 2 oz., or a sufficiency; boiling distilled water, $\frac{1}{2}$ oz. Divide the mass into 720 lozenges. Each lozenge contains $\frac{1}{36}$ gr. of hydrochlorate of morphia.—*Dose.* 1 or 2 occasionally, for cough.

Lozenges, Morphia and Ipecacuanha. *Syn.* TROCHISCI MORPHIÆ ET IPECACUANHÆ (B. P.) Hydrochlorate of morphia, 20 grs.; ipecacuanha, in fine powder, 60 grs.; tincture of tolu, $\frac{1}{2}$ oz.; refined sugar, in powder, 24 oz.; gum arabic, in powder, 1 oz.; mucilage, 2 ozs., or a

sufficiency; distilled water, ½ oz.; divide the mass into 720 lozenges. Each lozenge contains $\frac{1}{360}$ grs. of hydrochlorate of morphia and $1\frac{1}{2}$ gr. of ipecacuanha.—*Dose.* 1 or 2 occasionally, for cough.

Lozenges, Ni'tre. *Syn.* TROCHISCI NITRICI, L. *Prep.* 1. (Ph. E. 1783.) Nitre, 3 oz.; white sugar, 9 oz.; mucilage of tragacanth, q. s. to mix. Diuretic; but chiefly sucked, without swallowing, to remove incipient sore throat.

2. (Camphorated; TROCHISCI NITRI CAMPHORATI, L.—Chaussier. Each lozenge contains $\frac{1}{5}$ gr. of opium, ½ gr. of camphor, and 1 gr. of nitre. In hoarseness, sore throat, &c.

Lozenges, Nut'meg. *Syn.* TROCHISCI MYRISTICÆ, L. From oil of nutmeg, 1 fl. dr., to each lb. of sugar, and coloured with infusion of saffron. Carminative and stomachic; in colic, &c.

Lozenges, O'pium. *Syn.* ANODYNE LOZENGES; TROCHISCI OPII (Ph. E.), T. GLYCYRRHIZÆ CUM OPIO, L. *Prep.* 1. (B. P., Ph. E.) Opium (strained), 2 drs.; tincture of tolu, ½ oz.; triturate together, add of powdered sugar, 6 oz.; extract of liquorice (soft) and powdered gum acacia, of each, 5 oz.; mix, and divide into 10-gr. lozenges. Each lozenge contains $\frac{1}{6}$ to $\frac{1}{7}$ gr. of opium. *Used* to allay tickling cough and irritation of the fauces, and as an anodyne and hypnotic.

2. (Ph. U. S.) Opium (in fine powder), 2 drs.; extract of liquorice, gum arabic, and sugar, of each, 5 oz.; oil of aniseed, ½ fl. dr.; water, q. s.; divide into 6-gr. lozenges. Each lozenge contains $\frac{1}{10}$ gr. of opium. As the last.

3. Extract of opium, 72 grs.; tincture of tolu, ½ oz.; refined sugar (in powder), 2 oz.; extract of liquorice, 6 oz.; distilled water, a sufficiency. Divide the mass into 720 lozenges. Each lozenge contains $\frac{1}{10}$ gr. of extract of opium.—*Dose.* 1 to 2 lozenges.

Lozenges, Or'ange. *Syn.* TROCHISCI AURANTII, L. From oil of orange, $1\frac{1}{2}$ fl. dr. to each lb. of sugar, and infusion of saffron for colouring. By adding nitric or tartaric acid, 3 drs., 'ACIDULATED ORANGE LOZENGES' will be formed.

Lozenges, Orange-flow'er. *Syn.* TROCHISCI AURANTII FLORUM, L. *Prep.* (P. Cod.) Powdered sugar, 1 lb.; neroli, 1 dr.; orange-flower water, q. s.; make it into drops (pastilli); or, omit the water, and make it into lozenges with mucilage of tragacanth made with orange-flower water. Delightfully fragrant.

Lozenges, Or'ris-root. *Syn.* TROCHISCI IRIDIS, L. *Prep.* From orris-root (in very fine powder), 1 oz.; sugar, 1 lb.; mucilage of tragacanth, q. s. to mix. *Used* to perfume the breath.

Lozenges, Ox'alate of Potassa. *Syn.* TROCHISCI POTASSÆ OXALATIS, T. P. SUPER-OXALATIS, L. AS ACIDULATED LOZENGES, but using quadroxalate of potassa (salt of sorrel) instead of tartaric acid. (See *below.*)

Lozenges, Oxal'ic Acid. *Syn.* TROCHISCI ACIDI OXALICI, L. AS ACIDULATED LOZENGES, but using oxalic acid instead of tartaric acid. The last two are refrigerant, but their use is objectionable, especially for patients who labour under the oxalic diathesis. In large quantities they are poisonous.

Lozenges, Paregor'ic. *Syn.* TROCHISCI PAREGORICI, L. Medicated with 2 fl. oz. of paregoric, and 2 drs. of tartaric acid, to each lb. of sugar, and tinged of a pink colour with lake or cochineal. As a pectoral in catarrhs, &c.

Lozenges, Paullin'ia. *Syn.* TROCHISCI PAULLINIÆ, T. GUARANÆ, L. *Prep.* (Dr. Gavrelle.) Each lozenge contains nearly ½ gr. of extract of garana or paullinia, and is flavoured with vanilla. 12 to 20 daily, as an alternative and tonic; in chlorosis, diarrhœa, &c.

Lozenges, Pec'toral. *Syn.* TROCHISCI PECTORALES, T. BECHICI, L. *Prep.* 1. (Dr. Grunn.) Powdered squills, 4 parts; extract of lettuce, 8 parts; ipecacuanha, 18 parts; manna, 125 parts; sugar, 250 parts; mucilage of tragacanth, q. s. to mix.

2. (Magendie.) See EMETINE LOZENGES.

3. (BLACK; T. BECHICI NIGRI.) See LIQUORICE LOZENGES.

4. (WHITE; T. BECHICI ALBI.) Orris root, 4 drs.; liquorice powder, 6 drs.; starch, $1\frac{1}{2}$ oz.; sugar, 18 oz.; mucilage of tragacanth, q. s. to make a lozenge-mass.

5. (YELLOW; T. BECHICI FLAVI.) Powdered orris root, 6 drs.; starch, 4 drs.; liquorice powder, 3 drs.; saffron, 2 drs.; sugar, 8 oz.; mucilage of tragacanth, q. s. to mix.

Obs. All the above are used as demulcents in coughs, colds, &c. Nos. 1 and 2 are anodyne as well as demulcent. For other formulæ, see COUGH LOZENGES, LIQUORICE L., OPIUM L., &c.

Lozenges, Pel'litory. *Syn.* TROCHISCI PYRETHRI, L. *Prep.* From pellitory, mastic, and tragacanth, of each, in fine powder, equal parts; orange-flower water, q. s. to mix. In toothache.

Lozenges, Pep'permint. *Syn.* TROCHISCI MENTHÆ PIPERITÆ, L. *Prep.* 1. (P. Cod.) Oil of peppermint, 1 dr.; powdered sugar, 16 oz.; mucilage of tragacanth, q. s.

2. (Ph. U. S.) Oil of peppermint, 1 fl. dr.; sugar, 12 oz.; mucilage of tragacanth, q. s.

3. (Wholesale.) 1 fl. dr. of the finest Mitcham oil of peppermint to each lb. of the finest double refined white sugar, with mucilage of either gum arabic or tragacanth to mix.

Obs. The best peppermint lozenges are made of the very finest double refined sugar, and of English oil of peppermint only; carefully mixed up with very clear mucilage. The commoner qualities are made by employing inferior lump sugar and foreign oil of peppermint, or, what is better, English oil of peppermint, but in a less proportion than for the better sorts. The addition of starch, in quantity varying from $\frac{1}{5}$ to $\frac{2}{3}$ of the whole mass is also commonly made to them; and in the

cheapest varieties even plaster of Paris or chalk is occasionally introduced by unprincipled makers. The addition of a very small quantity of blue smalts, reduced to an impalpable powder, is commonly made to the sugar, to increase its whiteness. 'TRANSPARENT' or 'SEMI-TRANSPARENT PEPPERMINT LOZENGES' are made from the same materials as the opaque ones; but the sugar is not reduced to quite so fine a powder, and the cake is rolled thinner before cutting it. A little oil of almonds or of olives is also occasionally mixed with the ingredients, to promote the transparency; but it tends to render the lozenges less white.

Peppermint lozenges and drops are useful in flatulency, nausea, and griping; and judging from the enormous and constantly increasing demand for them, they are more highly esteemed by the public than all other lozenges and confections.

Lozenges, Pontefract. These are made of the purest refined juice or extract of liquorice, and have long been esteemed as a demulcent.

Lozenges, Pop'py. *Syn.* TROCHISCI PAPAVERIS, L. *Prep.* From extract of poppies, 3 oz.; sugar, 15 oz.; powdered gum tragacanth, 2 oz.; rose water, q. s. to mix. *Used* in coughs as an anodyne and demulcent, in lieu of opium lozenges.

Lozenges, Pulmon'ic. See COUGH LOZENGES, PECTORAL L., WAFERS, &c.

Lozenges, Quinine'. *Syn.* TROCHISCI QUIVINÆ SULPHATIS, L. *Prep.* (Soubeiran.) Each lozenge contains about $\frac{1}{10}$ gr. of sulphate (disulphate) of quinine. Tonic, and stomachic, in dyspepsia, &c.; but to render them useful, the quantity of the alkaloid should be doubled.

Lozenges, Reduced Iron. *Syn.* TROCHISCI FERRI REDACTI. (B. P.) Reduced iron, 720 grs.; refined sugar, in powder, 25 oz.; gum arabic, in powder, 1 oz.; mucilage, 2 oz.; distilled water, 1 oz., or a sufficiency. Mix the iron, sugar, and gum, and add the mucilage and water to form a proper mass. Divide into 720 lozenges, and dry them in a hot-air chamber with a moderate heat. Each lozenge contains 1 gr. of reduced iron.—*Dose.* 1 to 6 lozenges.

Lozenges, Rhu'barb. *Syn.* DIGESTIVE LOZENGES; TROCHISCI RHEI, L. *Prep.* (P. Cod.) Powdered rhubarb, 1 oz.; sugar, 11 oz.; mucilage of tragacanth, q. s.; divide into 12-gr. lozenges. Stomachic and laxative. Sucked before dinner, they excite the appetite, and after it promote digestion. They are frequently aromatized with a little cinnamon or vanilla. See Candy (Digestive).

Lozenges, Rose. *Syn.* TROCHISCI ROSÆ, L. *Prep.* 1. (ACIDULATED; T. R. ACIDÆ.) From otto, 5 to 10 drops; citric or tartaric acid, 3 drs.; sugar, 1 lb.; mucilage, q. s.

2. (Ph. E. 1746.) Red-rose leaves (powdered), 1 oz.; sugar, 12 oz.; mucilage, q. s.

3. (PÂTE DE ROSE LOZENGES.) As No. 1, using one half of the acid.

4. (RED; T. R. RUBRI.) As No. 1; but coloured with liquid lake, or infusion of cochineal.

Obs. Some makers add of starch, 4 oz., substitute oil of rhodium for otto of roses, and use mucilage made with rose water; but the quality of course suffers. They are chiefly used to perfume the breath.

Lozenges, Saf'fron. *Syn.* TROCHISCI CROCI, L. *Prep.* From hay saffron (in fine powder), 1 oz.; white sugar, 1 lb.; mucilage of gum tragacanth, q. s. to mix. Anodyne, pectoral, and emmenagogue; but chiefly used to raise the spirits in hypochondriasis.

Lozenges, San'tonine. *Syn.* TASTELESS WORM LOZENGES; TROCHISCI SANTONINI, L. Each lozenge contains ½ gr. (nearly) of santonine. 5 to 10 daily, as a vermifuge.

Lozenges, So'da. *Syn.* TROCHISCI SODÆ BICARBONATIS (Ph. E.), L. *Prep.* 1. (Ph. E.) Bicarbonate of soda, 1 oz.; powdered gum arabic, ½ oz.; sugar, 3 oz.; mucilage, q. s.

2. (Wholesale.) From bicarbonate of soda and powdered gum tragacanth, of each, 2 oz.; double refined lump sugar, ¾ lb.; rose water, q. s. to mix. In acidity, heartburn, &c. See VICHY LOZENGES.

3. (With GINGER; TROCHISCI SODÆ ET ZINGIBERIS, L. To the last, add of ginger (in very fine powder), 1½ oz.; powdered gum, ½ oz.

Lozenges, Squills. *Syn.* TROCHISCI SCILLÆ, L. 1. Each lozenge contains ½ gr. of powdered squills and 2 grs. of extract of liquorice.

2. (With IPECACUANHA; TROCHISCI SCILLÆ ET IPECACUANHÆ, L. As the last, adding for each lozenge ¼ gr. of powdered ipecacuhana. Both the above are useful cough lozenges.

Lozenges, Starch. *Syn.* TROCHISCI AMYLI, T. BECHICI ALBI, L. See PECTORAL LOZENGES.

Lozenges, Steel. *Syn.* TROCHISCI FERRI, T. CHALYBEATI, L. *Prep.* (P. Cod.) Levigated iron filings, 1 oz.; sugar, 10 oz.; cinnamon, 2 drs.; mucilage of tragacanth, q. s.; mix, and divide into 480 lozenges. Tonic. See IRON LOZENGES.

Lozenges, Sul'phur. *Syn.* TROCHISCI SULPHURIS, L. *Prep.* (P. Cod.) From sulphur (pure precipitate), 2 oz.; sugar, 16 oz.; mucilage of tragacanth (made with rose water), q. s. to mix. Useful in piles and some skin diseases.

Lozenges, Tannic Acid. *Syn.* TROCHISCI ACIDI TANNICI (B. P.) Tannic acid, 360 grs.; tincture of tolu, ½ oz.; refined sugar, 25 oz.; gum acacia, 1 oz.; mucilage, 2 oz.; distilled water, 1 oz. Dissolve the tannic acid in the water; add first the tincture of tolu previously mixed with the mucilage, then the gum and the sugar, also previously well mixed. Form the whole into a proper mass, divide into 720 lozenges, and dry them in a hot-air chamber with a moderate heat. Each lozenge contains ½ gr. of tannic acid.—*Dose.* 1 to 6 lozenges.

Lozenges, Tarta'ric Acid. See ACIDULATED LOZENGES.

Lozenges, Tolu'. *Syn.* BALSAMIC LOZENGES; TROCHISCI TOLUTANI, T. BALSAMICÆ, L. *Prep.* 1. (P. Cod.) Balsam of tolu and rectified spirit, of each, 1 oz.; dissolve, add of water, 2 fl. oz., heat the mixture in a water bath, and filter; make a mucilage with the filtered liquid, and gum tragacanth (in powder), 80 gr.; add of sugar, 16 oz.; make a mass, and cut it into lozenges.

2. (Wholesale.) As the last, but using only one half the weight of balsam of tolu. Pectoral and balsamic.

Lozenges, Tronchin's. *Syn.* TABLETTES DE TRONCHIN, Fr. See COUGH LOZENGES.

Lozenges, Vanil'la. *Syn.* TROSCHISCI VANILLÆ, L. *Prep.* 1. Essence of vanilla, 3 fl. dr., to each lb. of sugar.

2. (Guibourt.) From vanilla triturated to a fine powder with 7 times its weight of sugar. Antispasmodic, nervine, and stomachic. *Used* to sweeten the breath, to flavour chocolate, &c.

Lozenges, Vichy. *Syn.* D'ARCET'S LOZENGES; TROCHISCI SODÆ, L.; PASTILLES DE VICHY, Fr. *Prep.* 1. (P. Cod.) Bicarbonate of soda, 1 oz.; powdered sugar, 19 oz.; mucilage of gum tragacanth, q. s.; mix, and divide into 20-gr. lozenges.

2. (D'Arcet.) As the last, adding a little oil of pepperment to give a slight flavour. Antacid or absorbent; in heartburn, &c.

Lozenges, Vi'olet. *Syn.* TROCHISCI VIOLÆ, T. VIOLARUM, L. *Prep.* Orris lozenges coloured with the juice of violets.

Lozenges, Wistar's Cough. *Prep.* Gum arabic, extract of liquorice, and sugar, of each, 2½ oz.; powdered opium, 1 dr.; oil of aniseed, 40 drops; for 60 lozenges. One, three or four times a day.

Lozenges, Worm. *Syn.* TROCHISCI ANTHELMINTICI, MORSULI CONTRA VERMES, L. Most of the advertised nostrums under this name have a basis of calomel (about 1 gr. per lozenge), and require to be followed by a purge a few hours afterwards.

1. (Ph. Austr. 1836.) Ethereal extract of wormseed, 1 dr.; jalap, starch, and sugar, of each, 2 drs.; mucilage of gum tragacanth, q. s.; divide into 60 lozenges.

2. (Ph. Dan. 1840.) Wormseed, 1 oz.; ethiops mineral and jalape, of each, 3 drs.; cinnamon, 2 drs.; sugar, 7 oz.; rose water, q. s. See CALOMEL, CHING'S, SANTONINE LOZENGES, &c. (*above*).

Lozenges, Zinc. *Syn.* TROCHISCI ZINCI, T. Z. SULPHATIS, L. *Prep.* (Dr. Copland.) Each lozenge contains ½ gr. of sulphate of zinc. Antispasmodic, expectorant, and tonic; and in quantity emetic.

LU'CIFERS. See MATCHES.

LUMBA'GO. Rheumatism of the loins. It is distinguished from nephritis, or inflammation of the kidneys, by the pain being aggravated on stooping. The treatment consists of strong stimulant embrocations or liniments, or of blisters over the part affected, with active aperients, warmth, and diaphoretics (as Dover's powder) at bedtime. The hot or vapour bath often gives almost immediate relief. See RHEUMATISM.

LU'MINOUS PHIAL. See PHOSPHORUS.

LU'NA CORNEA. [L.] *Syn.* HORN SILVER. Fused chloride of silver.

LU'NAR CAUSTIC. Fused nitrate of silver. See CAUSTIC and SILVER.

LUNGS. In anatomy, the organ of respiration occupying the thorax or chest. See RESPIRATION.

LU'PULIN. *Syn.* LUPULINA, LUPULINE. Under this name two products are known, namely—1. (LUPULINIC GRAINS, L. GLANDS.) The yellow powder obtained from the dried strobiles or catkins of the hops, by gently rubbing and sifting them.—*Dose.* 5 to 10 grs.; as an anodyne, tonic, &c.

2. The aromatic bitter principle of hops.

Prep. The aqueous extract of the yellow powder or lupulinic grains of the strobiles, along with a little lime, are treated with rectified spirit; the filtered tincture is evaporated to dryness, redissolved in water, and the solution is again filtered, and evaporated to dryness; the residuum is, lastly, washed with ether, and allowed to dry.

Prop., &c. The latter product is a yellowish-white, bitter, uncrystallisable substance, soluble in 20 parts of water, very soluble in alcohol, and slightly so in ether. The yellow powder above alluded to (No. 1) is improperly called lupulin; a name which appears more appropriate to the pure bitter principle than to the lupulinic grains.

Adult. The lupulin sold to brewers is largely adulterated with quassia. In some samples, lately examined, the quassia amounted to 70 per cent.

LU'PUS. In pathology, a disease affecting the skin, remarkable for eating away the parts which it attacks with extreme rapidity. It is generally confined to the face, and commences with small, spreading ulcerations, which become more or less concealed beneath bran-like scabs, and end in ragged ulcers, which gradually destroy the skin and muscular tissue to a considerable depth.

LUSTRE. See PLUMBAGO.

LUTE. *Syn.* LUTING; LUTUM, CÆMENTUM, L. A composition employed to secure the joints of chemical vessels) or as a covering to protect them from the violence of the fire.

Prep. 1. Linseed meal, either alone or mixed with an equal weight of whiting, and made into a stiff paste with water. It soon becomes very hard and tough.

2. Ground almond cake, from which the oil has been pressed, mixed up as the last. Both the above are much used for stills, retorts, and other vessels that are not exposed to a heat higher than about 320° Fahr. They are capable of resisting the action of the fumes of

volatile oils, spirits, weak acids, &c., for some time.

3. Fresh-slaked lime made into a paste with strained bullock's blood or size. As the last.

4. Plaster of Paris made into a paste with water, and at once applied. It bears a nearly red heat, but becomes rather porous and friable.

5. Powdered clay or whiting made into putty with water and boiled linseed oil. This is commonly known as 'fat lute.'

6. A mixture of powdered clay and ground bricks, made up with water or a solution of borax. For joining crucibles, &c., which are to be exposed to a strong heat.

7. Pipe-clay and horse-dung, made into a paste with water. As a coating for glass vessels, to preserve them from injury from exposure to the fire. This composition is used by the pipe-makers, and will stand unharmed the extremest heat of their kiln for 24 hours. It is applied by spreading it on paper.

8. As the last, but employing shredded tow or plumbago for horse-dung.

Obs. For the joints of small vessels, as tubes, &c., especially those of glass or earthenware, pieces of vulcanized Indian tubing, slipped over and tied above and below the joint, are very convenient substitutes for lutes, and have the advantage of lasting for a long time, and bearing uninjured the heat at which oil of vitriol boils. Flat rings or "washers" of vulcanised rubber are also excellent for still heads, &c., whenever the parts can be pinched together by screws or clamps.

LYCOPO'DIUM. The fine powder known in commerce under this name consists of the minute spores of the common club moss, or *Lycopodium clavatum*. It is exceedingly combustible; thrown suddenly from a powder-puff or bellows across the flame of a candle, it produces the imitation flashes of lightning of our theatres. The powder is also employed as a 'dusting powder' in excoriations, and to roll up boluses and pills.

MACARO'NI. This only differs from VERMICELLI in the size of the pipes, which are about as large as a goose-quill. When properly dressed, it is very wholesome and nutritious. A pleasant dish may be made by boiling macaroni in water until soft, either with or without a little salt, draining off the water, and then stewing it with a little butter, cream, or milk, and grated cheese, adding spice to palate. It may be made into a 'form' and browned before the fire.

MAC'AROONS (English). *Prep.* Take of sweet almonds, 1 lb.; blanch and beat them to a paste, add of lump sugar 1¼ lb.; whites of 6 eggs; the grated yellow peel of 2 lemons; mix well, make it into 'forms,' cover with wafer paper, and bake in a moderate oven.

MACE. *Syn.* MACIS, L. The tough membranous, lacerated, covering (ariliode) of the NUTMEG. It has a flavour and odour more agreeable than that of nutmeg, which in its general properties it resembles. It is *used* as a flavouring by cooks, confectioners, and liquoristes; and in medicine as a carminative. See OIL, &c.

MACERA'TION. *Syn.* MACERATIO, L. The steeping of a substance in cold water, for the purpose of extracting the portion soluble in that menstruum. The word is also frequently applied to the infusion of organic substances in alcohol or ether, or in water, either alkalised or acidulated.

MACK'EREL. The *Scomber scombrus* (Linn.), a well-known spiny-finned sea-fish, much esteemed at certain seasons for the table. Though nutritious, it is very apt to disagree with delicate stomachs, and occasionally induces symptoms resembling those of poisoning.

MAD'DER. *Syn.* RUBIA, RUBIÆ RADIX, L. The root of *Rubia tinctorum* (Linn.), or dyer's madder. The best madder has the size of a common goose-quill, a reddish appearance, and a strong odour. As soon as the roots are taken from the ground they are picked and dried; and before use they are ground in a mill. Levant, Turkey, and Smyrna madder, is imported whole; French, Dutch, and Zealand madder, ground. The finest quality of ground madder is called 'crop' or 'grappe;' 'ombro' and 'gamene' are inferior sorts, and 'mull' the worst.

Madder contains several distinct principles, as—madder red, or alizarin;—madder purple, or purpurin;—madder orange, or rubiacin;—madder yellow, or xanthin, &c. The first of these (noticed *below*) is by far the most important.

• *Pur.* Madder is frequently adulterated with logwood, Brazil wood, and other dye-stuffs of inferior value; and also, not unfrequently, with brick-dust, red ochre clay, sand, mahogany saw-dust, bran, &c. These admixtures may be detected as follows:

1. When dried at 212° Fahr., and then incinerated, not more than 10% to 12% of ash should be left.

2. It should not lose more than 50% to 56% by exhaustion with cold water.

3. When assayed for alizarin (see *below*), the quantity of this substance obtained should be equal to that from a sample of the same kind of madder which is known to be pure, and which has been treated in precisely the same manner. The operation may be conducted as follows:—500 grs. of the sample are weighed, and, after being dried by the heat of boiling water or steam, are gradually added to an equal weight of concentrated sulphuric acid, contained in a glass vessel, and stirred with a glass rod; after a few hours the charred mass is washed with cold water, collected on a filter, and dried by the heat of boiling water; the carbonised mass ('garacine') is next powdered, and treated with successive portions of rectified spirit, to which a little ether has been added, at first in the cold, and afterwards

with heat, until the liquid is no longer coloured by it, when the mixed tincture is filtered, and evaporated (distilled) to dryness; the weight of the residuum, divided by 5, gives the per-centage of red colouring matter present. Or,—The dried carbonized matter is exhausted by boiling it in a solution of 1 part of alum in 5 or 6 parts of water, and the decoction, after being filtered whilst in the boiling state, is treated with sulphuric acid as long as a precipitate falls, which is washed, dried, and weighed as before.

Uses, &c. Madder has been given in jaundice and rickets, and as an emmenagogue.—*Dose.* ½ dr. to 2 drs., twice or thrice a day. It is principally employed as a dye-stuff. See RED DYES, IVORY, PURPURIN, &c., also *below*.

MADDER RED. *Syn.* ALIZARIN. $C_{14}H_8O_4$. 2 Aq. The red colouring principle of madder, first obtained in a separate form by Robiquet.

Prep. 1. The aqueous decoction of madder is treated with dilute sulphuric acid as long as a precipitate falls, which, after being washed, is boiled in a solution of chloride of aluminum as long as it gives o ut colour; the liquid is then filtered, precipitated with hydrochloric acid, and the precipitate washed and dried. It may be purified from a little adhering purpurin, by dissolving it in alcohol, again throwing it down with hydrate of aluminum, boiling the precipitate with a strong solution of soda, and separating the alizarin from its combination with alumina by means of hydrochloric acid; it is lastly crystallised from alcohol.

2. (Meillet.) Alum, 3 parts, is dissolved in water at 140° Fahr., 30 parts, and madder, 43 parts, added to the solution; the whole is then gently boiled for 30 or 40 minutes, after which it is thrown upon a filter, and submitted to strong pressure; this treatment is repeated with fresh solutions a second and a third time; the mixed filtrates are then decanted, and when nearly cold, oil of vitriol, 1 part, diluted with twice its bulk of water, is added, care being taken to stir the liquid all the time; the supernatant fluid is next decanted, and the residuum well washed, and, lastly, dried in the air. If required quite pure, it is dissolved, whilst still moist, in a solution of 1½ times its weight of carbonate of potassa in 15 parts of water, and, after reprecipitation with sulphuric acid, is washed and dried as before.

3. (Robiquet & Colin.) Powdered madder is exhausted with water of a temperature not exceeding 68° Fahr., and, after being dried, 1 part of it is boiled for 15 or 20 minutes in a solution of alum, 8 parts, in water, 40 parts; the liquid is filtered whilst boiling, the marc well washed with a fresh solution of alum, the mixed liquids precipitated with sulphuric acid, and the precipitate washed and dried, as before.

Obs. Alizarin has recently been produced artificially by Graebe and Liebermann from anthracene ($C_{14}H_{10}$), a liquid hydrocarbon existing in coal-tar. For a description of the process see the 'Journal of the Chemical Society.'

4. Madder exhausted by 2 or 3 macerations in 5 or 6 times its weight of cold water, is submitted to strong pressure, to remove adhering water, and the marc, whilst still moist, is mixed with ½ its weight of oil of vitriol diluted with an equal quantity of water; the whole is kept at the temperature of 212° for an hour, and after being mixed with cold water is thrown on a linen strainer, well washed with cold water, and dried.

5. From powered madder and oil of vitriol, equal parts, without heat, as described under MADDER.

6. (F. Steiner.) The 'used madder' of the dye-works is run into filters, and precipitated with sulphuric acid; the matter thus obtained is put into bags and rendered as dry as possible by hydraulic pressure; the pressed cake is next crumbled to pieces, placed in a leaden vessel, and treated with 1-5th of its weight of oil of vitriol, afterwards assisting the action of the acid by introducing steam to the mixture; the resulting dark brown carbonized mass is, lastly, well washed, dried, powdered, and mixed with about 5% of carbonate of soda, when it is ready for sale.

Obs. The last three formulæ produce the 'GARANCE' or 'GARANCINE' of commerce, now so extensively used in dyeing.

Prop., &c. Pure anhydrous alizarin crystallises in magnificent orange-red crystals, which may be fused and sublimed; it is freely soluble in alkaline solutions, which it colours purple or violet; and in oil of vitriol, giving a rich red colour; water throws it down from the last unchanged; it is also soluble in hot alcohol, a hot solution of alum, and, less freely, in hot water. Hydrated alizarin occurs in small scales resembling mosaic gold. When impure, it generally forms shining reddish-brown scales. Commercial 'garancine' is a deep brown or puce-coloured powder, and will probably, ere long, entirely supersede crude madder for dyeing. The properties of garancine as a dye-stuff are precisely similar to those of madder. A solution of alum added to a solution of alizarin, and precipitated by carbonate of potassa, furnishes a rose lake; which, after being washed with water and dried, possesses a most charming tint.

MAGILP'. *Syn.* MEGELLUP. A mixture of pale linseed oil and mastic varnish, employed by artists as a 'vehicle' for their colours. The proportions vary according to the work. It is thinned with turpentine.

MAG'ISTERY. *Syn.* MAGISTERIUM, L. The old name of precipitates. The following are the principal substances to which this term has been applied:—MAGISTERY OF ALUM, hydrate of alumina; M. OF BISMUTH, sub-nitrate of bismuth; M. OF DIAPHORETIC ANTIMONY, washed diaphoretic antimony; M. OF

OPIUM (Ludolph's), crude morphia; M. OF LAPIS CALAMINARIS or M. OF ZINC, hydrated oxide of zinc.

MAGNESIA. See MAGNESIUM, OXIDE OF.

MAGNE'SIAN APE''RIENT (Effervescing). *Prep.* 1. Heavy carbonate of magnesia, 2 lbs.; tartaric acid and double refined lump sugar, of each 1½ lb.; bicarbonate of soda (dried without heat), 1 lb.; each separately dried and in very fine powder; essential oils of orange and lemon, of each, ½ fl. dr.; mix well in a warm, dry situation, pass the whole through a sieve, put it into warm, dry bottles, and keep them well corked.

2. As the last, but substituting calcined magnesia, 1 lb., for the heavy carbonate, and adding sugar, ¾ lb. The preceding furnish a very pleasant effervescing saline draught.

3. (MOXON's.)—*a.* Take of sulphate of magnesia, 2 lbs.; dry it by a gradually increased heat, powder, add of tartaric acid (also dried and powdered), 1½ lb.; calcined magnesia, ½ lb.; finely powdered white sugar, 3 lbs.; bicarbonate of soda (dried without heat), 1 lb.; essence of lemon, 1 dr.; mix, and proceed as before.

b. (Durande.) Carbonate of magnesia, 1 part; bicarbonate of soda, tartrate of soda and potassa (sel de Seignette), and tartaric acid, of each, 2 parts; mix as before.

c. (Pharm. Journ.) Sulphate of magnesia and bicarbonate of soda, of each, 1 lb.; tartaric acid, ½ lb.; mix as before. The last two are much less agreeable than the others.

4. Carbonate of magnesia, 2 parts; calcined magnesia, ¼ parts; citric acid, 13 parts; lump sugar, 25 parts; essence of lemon, q. s. to flavour. Very agreeable. This is known as 'ROGÉ'S PURGATIF.'

Obs. The above are very useful and popular medicines in indigestion, heartburn, nausea, habitual costiveness, dyspepsia, &c.—*Dose.* ½ to 2 dessert-spoonfuls, thrown into tumbler 3 parts filled with cold water, rapidly stirred and drunk whilst effervescing, early in the morning fasting, or between breakfast and dinner.

MAGNESIAN LEMONADE'. See CITRATE OF MAGNESIA (*above*) and LEMONADE (Aperient).

MAGNE'SIUM. Mg. *Syn.* MAGNIUM, TALCIUM. The metallic radical of magnesia. The existence of this metal was demonstrated by Sir H. Davy, in 1808; but it was first obtained in sufficient quantity to examine its properties by Bussy, in 1830.

Prep. 5 or 6 pieces of sodium, about the size of peas, are introduced into a test-tube, and covered with small fragments of chloride of magnesium; the latter is then heated to near its point of fusion, when the flame of the lamp is applied to the sodium, so that its vapour may pass through the stratum of heated chloride; when the vivid incandescence that follows is over, and the whole has become cold, the mass is thrown into water, and the insoluble metallic portion collected and dried.

Commercial magnesium is prepared by evaporating solution of the chlorides of sodium and magnesium, in the proportion of 1 to 3, to dryness, mixing with one quarter of its weight of fluor spar and a like amount of sodium, and heating to bright redness in an iron crucible of proper construction.

On a larger scale it is prepared by heating to redness a mixture of chloride of magnesium, 9 parts; fused chloride of sodium, 1½ parts; fluoride of calcium, 1½ parts; and sodium in slices, 1½ parts.

Prop., &c. In colour and lustre it resembles silver, but in chemical properties is more like zinc; its sp. gr. is only 1·743; it is malleable; fusible at a red heat, and can be distilled like zinc; unaffected by dry air and by cold water; burns with brilliancy when heated to dull redness in air or oxygen gas, yielding oxide of magnesium; inflames spontaneously in chlorine, yielding chloride of magnesium; it dissolves in the acids with the evolution of hydrogen gas, and pure salts of magnesium result.

It has been used somewhat extensively as an illuminating agent for photographing at night, and also for the purpose of affording a brilliant light for microscopic and magic lantern effects.

Magnesium, Carbonate of (Light). *Syn.* LIGHT CARBONATE OF MAGNESIA; CARBONATE OF MAGNESIA; MAGNESIA; MAGNESIÆ CARBONAS LEVIS (B. P.) *Prep.* 1. (Ph. L.) Sulphate of magnesium, 4 lbs., and carbonate of sodium, 4 lbs. 9 oz.; boiling distilled water, 4 galls.; dissolve the salts separately in one half the water, filter, mix the solutions, and boil for 2 hours, constantly stirring with a spatula, distilled water being frequently added to compensate for that lost by evaporation; lastly, the solution being poured off, wash the precipitated powder with boiling distilled water, and dry it. The formulæ of the Ph. E. & D. are essentially the same, except that the ebullition is limited to from 10 to 20 minutes.

2. (B. P.) Similar to the foregoing except that precipitation takes place in the cold. The formula of this compound is $(Mg.\ CO_3)_3.Mg(HO)_2.4H_2O$.

3. (HENRY'S.) Ordinary carbonate of magnesia, the washing of which has been finished with a little rose water.

4. Add a solution of carbonate of potassium or sodium to the bittern or residuary liquor of the sea-salt works, and well wash and dry the precipitate as before. This is known in commerce as 'Scotch magnesia."

Obs. The carbonate of magnesia of commerce is usually made up into cakes or dice, while drying; or it is permitted to drain and dry in masses, which are then cut into squares with a thin knife. It is powdered by simply rubbing it through a wire sieve. The presence of iron in the solution of the sulphate of magnesium, when the crude salt is employed, and which is destructive to the beauty of the preparation may be got rid of by the addition of lime water until the liquor acquires a slight

alkaline reaction and subsequent decantation after repose.

Magnesium, Carbonate of (Heavy). *Syn.* HEAVY CARBONATE OF MAGNESIA; MAGNESIÆ CARBONAS (B. P.). *Prep.* 1. Apothecaries' Hall. A saturated solution of sulphate of magnesium, 1 part, is diluted with water, 3 parts, and the mixture heated to the boiling-point; a cold saturated solution of carbonate of sodium, 1 part (all by measure), is then added, and the whole is boiled with constant agitation until effervescence ceases; boiling water is next freely poured in, and after assiduous stirring for a few minutes, and repose, the clear liquid is decanted, and the precipitate thrown on a linen cloth and thoroughly washed with hot water; it is, lastly, drained, and dried in an iron pot.

2. (Ph. D.) Dissolve sulphate of magnesium, 10 oz., in boiling distilled water, ½ pint; and carbonate of sodium (cryst.), 12 oz., in boiling distilled water, 1 pint; mix the two solutions, and evaporate the whole to dryness by the heat of a sand bath; then add of boiling water, 1 quart, digest with agitation for half an hour, and wash the insoluble residuum as before; lastly, drain it, and dry it at the temperature of boiling water.

3. (B. P.) White granular powder precipitated from a boiling solution of sulphate of magnesium by a solution of carbonate of sodium, the whole evaporated to dryness, and the dry residue digested in water, collected on a filter, and washed.

Prop. The ordinary or light carbonate of magnesia is a white, inodorous, tasteless powder, possessing similar properties to calcined magnesia, except effervescing with acids, and having less saturating power. An ounce measure is filled by 45 to 48 grs. of the powder lightly placed in it. The heavy carbonate is sometimes fully thrice as dense (see *below*), but in other respects is similar.

Dose. As an antacid, ½ to a whole teaspoonful, 3 or 4 times daily; as a laxative, ½ dr. to 2 drs. It is commonly taken in milk. It is apt to produce flatulence, but in other respects is preferable to calcined magnesia.

General remarks. Although commonly called 'carbonate of magnesia,' the above substance, whether in the light or heavy form, appears to be a compound of carbonate with hydrate, in proportions which are not perfectly constant. (For B. P. formula see preceding article.) On account of the excess of base in its composition, it was formerly regarded as a subsalt (subcarbonate of magnesia). A great deal has been written uselessly respecting the preparation of these carbonates, about which, however, there is neither mystery nor difficulty, as some writers would lead their readers to suppose. If the solutions are very dilute, the precipitate is exceedingly light and bulky; if otherwise, it is denser. By employing nearly saturated solutions, and then heating them and mixing them together whilst very hot, a very heavy precipitate is obtained, but it is apt to be gritty or crystalline. The same occurs when cold solutions are mixed, and no heat is employed. The lightest precipitate is obtained from cold, highly dilute solutions, and subsequent ebullition of the mixture.

Mr. Pattinson, a chemist of Gateshead, prepares a very beautiful and pure heavy carbonate from magnesian limestone. The latter is calcined at a dull red heat (not hotter) for some time, by which the carbonic anhydride is expelled from the carbonate of magnesium, but not from the carbonate of calcium, which hence continues insoluble. The calcined mass is next reduced to a milk with water in a suitable cistern, and the carbonic anhydride resulting from its own calcination forced into it under powerful pressure. The result is a saturated solution of carbonate of magnesium, the lime remaining unacted on so long as the magnesia is in excess. The solution by evaporation yields the heavy carbonate, whilst carbonic anhydride is expelled, and may be again used in the same manufacture. 154 to 160 grs. of the heavy carbonate are required to fill an ounce measure when lightly placed in it, by which it appears to be fully thrice as dense as the light carbonate. The bicarbonate of magnesium (magnesiæ bicarbonas, L.) exists only in solution. The so-called 'fluid magnesias' of Murray, Dinneford, Husband, &c., are solutions of this salt. The small prismatic crystals which are deposited when 'fluid magnesia' is exposed to the air for some time consist of hydrated neutral carbonate, and not bicarbonate, as is sometimes stated.

Magnesium, Chloride of. $MgCl_2$. *Syn.* MAGNESII CHLORIDUM, L. *Prep.* (Liebig.) By dissolving magnesia in hydrochloric acid, evaporating to dryness, adding an equal weight of chloride of ammonium, projecting the mixture into a red-hot platinum crucible, and continuing the heat till a state of tranquil fusion is attained. On cooling, it forms a transparent, colourless, and very deliquescent mass, which is anhydrous, and soluble in alcohol.

Obs. Without the addition of the chloride of ammonium, it is impossible to expel the last portion of the water, without at the same time driving off the chlorine, in which case nothing but magnesia is left. The fused mass should be poured out on a clean stone, and when solid, broken into pieces, and at once transferred to a warm, dry bottle. The P. Cod. orders the solution to be evaporated to the sp. gr. 1·384, and to be put, whilst still hot, into a wide-mouthed flask to crystallise.—*Dose.* 1 to 4 drs.; as a laxative.

Magnesium, Citrate of. $Mg_3(C_6H_5O_7)_2$. *Syn.* MAGNESIÆ CITRAS, L. *Prep.* There is some difficulty in obtaining this salt in an eligible form for medicinal purposes. When precipitated from a solution, it is insoluble. The following formulæ can be highly recommended.

1. (Parrish.) Dissolve crystallized citric acid, 100 gr., in water, 15 drops, and its own 'water of crystallization' by the aid of heat; then stir in calcined magnesia, 35 gr.; a pasty mass will result, which soon hardens, and may be powdered for use.

Obs. The chief practical difficulty in this process results from the great comparative bulk of the magnesia, and the very small quantity of the fused mass with which it is to be incorporated. A part of the magnesia is almost unavoidably left uncombined, and the salt is consequently not neutral. The uncombined earth should be dusted off the mass before powdering the latter. A high temperature must be avoided.

2. (Robiquet.) Citric acid, 35½ parts, is powdered and dissolved in boiling water, 10⅝ parts; when the solution is cold, and before it crystallizes, it is poured in a wide earthen vessel, kept cold by surrounding it with water; then, by means of a sieve, carbonate of magnesium, 21⅓ parts, is distributed evenly and rapidly over the surface without stirring; when the reaction ceases, the mixture is beaten rapidly as long as it retains its pasty consistence. The salt should be dried at a temperature not exceeding 70° Fahr.

3. Effervescing; MAGNESIÆ CITRAS EFFERVESCENS, L.)—*a.* Citric acid (dried and powdered), 7 parts; heavy carbonate of magnesium, 5 parts; mix, and preserve in well-corked bottles.

b. (Ellis.) Mix powdered citric acid 2½ oz., with powdered sugar, 8 oz.; triturate to a fine powder, and drive off the water of crystallization by the heat of a water bath; add citrate of magnesium (prepared by fusion), 4 oz., and oil of lemons, 10 drops, and mix intimately; then add bicarbonate of sodium, 3 oz., and again triturate until the whole forms a fine powder, which must be preserved in stoppered bottles. From 1 to 3 table-spoonfuls, mixed in a tumbler of water, furnishes an effervescing draught in which the undissolved portion is so nicely suspended, that it can be taken without inconvenience.

c. (Extemporaneous.) Citric acid (cryst.), 20 grs.; carbonate of magnesium, 14 grs.; mix in a tumbler of cold water, and drink the mixture whilst effervescing. A pleasant saline.

Obs. A dry white powder, sometimes sold as citrate of magnesia in the shops, is quite a different preparation to the above, and does not contain a particle of citric acid. The following formula is that of a wholesale London drug-house that does largely in this article:—

Calcined magnesia, magnesium oxide, 1¼ lb. (or carbonate, 2 lbs.); powdered tartaric acid, 1½ lb.; bicarbonate of sodium, 1 lb.; dry each article by a gentle heat, then mix them, pass the mixture through a fine sieve in a warm dry room, and keep it in well-corked bottles. A few drops of essence of lemon and 3 lbs. of finely powdered sugar are commonly added to the above quantity. This addition renders it more agreeable.

Prop., &c. Citrate of magnesium is a mild and agreeable laxative; its secondary effects resemble those of the carbonate.—*Dose.* As a purgative, ½ to 1 oz. The dose of the effervescing citrate must depend on the quantity of magnesia present. A solution of this salt in water, sweetened and flavoured with lemon, forms magnesian lemonade.

Magnesium, Boro-citrate of. *Syn.* MAGNESIÆ BORO-CITRAS, L. *Prep.* (Cadet.) Boracic acid (in powder), 113 grs.; oxide of magnesium, 80 grs.; mix in a porcelain capsule, and add enough of a solution of citric acid, 260 grs., in water, 3½ pints, to form a thin paste; then add the remainder of the citric solution, and gently evaporate, with constant stirring, to dryness. A cooling saline, and, in small doses, emmenagogue and lithontriptic.—*Dose.* As an aperient, 3 to 6 drs.

Magnesium, Oxide of. MgO. *Syn.* OXIDE OF MAGNESIUM, CALCINED MAGNESIA, MAGNESIA (B. P., Ph. L.).

Prep. 1. (B.P.) Magnesium carbonate, heated in a crucible until all the carbonic anhydride is driven off.

Prop., &c. White heavy powder, scarcely soluble in water, but readily soluble in acids without effervescence. Its solution in hydrochloric acid, neutralised by a mixed solution of ammonia and ammonium Chloride, gives a copious crystalline precipitate when sodium phosphate is added to it. See next preparation.

Magnesia levis. (B. P.) *Syn.* LIGHT MAGNESIA. *Prep.* (B. P.) 1. Light carbonate of magnesium heated in a cornish crucible until all the carbonic anhydride is driven off.

A bulky white powder, differing from the magnesia (B. P.) only in its density, the volume occupied by the same weight being 3½ to 1.

The properties of the two varieties of magnesium oxide are identical, and are used in medicine as antacids, laaxitives, and antitithics, and much used in dyspepsia, heartburn, &c. —*Dose.* 10 to 20 grs. as an antacid and 20 to 60 grs. as a purgative.

Magnesium, Phosphate of. $MgHPO_4$, 6Aq. *Syn.* MAGNESIÆ PHOSPHAS, L. *Prep.* From the mixed solutions of phosphate of sodium and sulphate of magnesium, allowed to stand for some time. Small, colourless, prismatic crystals, which, according to Graham, are soluble in about 1000 parts of cold water. Phosphate of magnesium exists in the grains of the cereals, and in considerable quantity in beer. It is also found in guano.

Magnesium and Ammonium, Phosphate of. $MgNH_4.PO_4$, 6 Aq. *Syn.* AMMONIO-PHOSPHATE OF MAGNESIA; MAGNESIÆ ET AMMONIÆ PHOSPHAS, L. This compound falls as a white crystalline precipitate whenever ammonia or carbonate of ammonium is added, in excess, to a solution of a salt of magnesium

which has been previously mixed with a soluble phosphate, as that of soda. It subsides immediately from concentrated solutions, but only after some time from very dilute ones.

Prop., &c. Ammonio-phosphate of magnesium is very slightly soluble in pure water; when heated, it is resolved into pyrophosphate of magnesium, and is vitrified at a strong red heat. It is found in wheaten bran, guano, potatoes, &c., and occasionally forms one of the varieties of urinary calculi.

Magnesium, Silicates of. There are several native silicates of magnesia, more or less pure, of which, however, none is directly employed in medicine. Meerschaum and steatite or soapstone are well-known varieties. Serpentine is a compound of silicate and hydrate of magnesium. The minerals augite and hornblende are double salts of silicic acid, magnesium, and calcium with some ferrous oxide. The beautiful crystallized mineral called chrysolite is a silicate of magnesium, coloured with ferrous oxide. Jade is a double silicate of magnesium and aluminum, coloured with chromic oxide.

Magnesium, Sulphate of. $MgSO_4$, 7 Aq. *Syn.* EPSOM SALT, MAGNESIÆ SULPHAS (B. P. Ph. L. E. & D.), SAL EPSOMENSIS, L. This compound was originally extracted from the saline springs of Epsom, Surrey, by Dr. Grew, in 1695. It is now exclusively prepared on the large scale, and from either magnesian limestone or the residual liquor of the sea-salt works.

Prep. 1. From dolomite or magnesian limestone.—*a.* The mineral, broken into fragments, is heated with a sufficient quantity of dilute sulphuric acid to convert its carbonates into sulphates; the sulphate of magnesium is washed out of the mass with hot water, and the solution, after defecation, is evaporated and crystallized.

b. The 'limestone,' either simply broken into fragments or else calcined (burnt), and its constituent quicklime and oxide magnesium converted into hydrates by sprinkling (slaking) it with water, is treated with a sufficient quantity of dilute hydrochloric acid to dissolve out all the calcinum hydrate without touching the magnesium hydrate; the residuum of the latter, after being washed and drained, is dissolved in dilute sulphuric acid, and crystallized as before.

2. From bittern.—*a.* The residual liquor or mother-water of sea-salt is boiled for some hours in the pans which are used during the summer for the concentration of brine; the saline solution is then skimmed and decanted from some common salt which has been deposited, after which it is concentrated by evaporation, and, finally, run into wooden coolers; in about 36 hours, 1-8th part of Epsom salts usually crystallizes out. This is called 'singles.' By re-dissolving this in water, and re-crystallization, 'doubles,' or Epsom salts fit for the market, are obtained. A second crop of crystals may be procured by adding sulphuric acid to the mother-liquor, and re-concentrating the solution, but this is seldom had recourse to in England. Bittern yields fully 5 parts of sulphate of magnesia for every 100 parts of common salt that has been previously obtained from it.

b. A concentrated solution of sulphate of sodium is added to bittern, in equivalent proportion to that of the chloride of magnesium in it, and the mixed solution is evaporated at the temperature of 122° Fahr. (Ure); cubical crystals of common salt are deposited as the evaporation proceeds, after which, by further concentration and repose, regular crystals of sulphate of magnesia are obtained.

c. A sufficient quantity of calcined and slaked magnesian limestone is boiled in bittern to decompose the magnesium salts, and the liquid is evaporated, &c., as before. This is a very economical process.

Prop. Small acicular crystals, or (by careful crystallization) large four-sided rhombic prisms; colourless; odourless, transparent; slightly efflorescent; extremely bitter and nauseous; when heated, it fuses in its water of crystallization, the larger portion of which readily passes off, but one equivalent of water is energetically retained; at a high temperature it runs into a species of white enamel; it dissolves in its own weight of cold water, and in 3-4ths of that quantity of boiling water; it is insoluble in both alcohol and ether. Sp. gr. 1·66.

Pur. Sulphate of magnesium is soluble in an equal weight of water at 60° Fahr., by which it may be distinguished from sulphate of sodium, which is much more soluble.

An aqueous solution in the cold is not precipitated by oxalate of ammonium. The precipitate given by carbonate of sodium from a solution of 100 grs. should, after well washing and heating to redness, weigh 16·26 grs. (B. P.)

Digested in alcohol, the filtered liquid does not yield a precipitate with nitrate of silver, nor burn with a yellow flame, and evaporates without residue. "Not deliquescent in the air." (Ph. L.) 100 grs. of the pure crystallized sulphate yield 16¼ grs. of calcined magnesium oxide. (Pereira.) 10 grs., dissolved in 1 fl. oz. of water, and treated with a solution of carbonate of ammonium, are not entirely precipitated by 280 minims of solution of phosphate of sodium. (Ph. E.)

Uses, &c. Salphate of magnesium is an excellent cooling purgative, and sometimes proves diuretic and diaphoretic.—*Dose.* 1 dr to 1 oz., as a purgative, or an antidote in poisoning by lead. Large doses should be avoided. Instances are on record of their having proved fatal. Dr. Christison mentions the case of a boy 10 years old, who swallowed 2 oz. of salts, and died within 10 minutes. The best antidote is an emetic. A small quantity of Epsom salts, largely diluted with water (as a drachm to ½ pint or ¾ pint), will usually purge as much

as the common dose. This increase of power has been shown by Liebig to result rather from the quantity of water than the salt. Pure water is greedily taken up by the absorbents; but water holding in solution saline matter is rejected by those vessels, and consequently passes off by the intestines.

Obs. Oxalic acid has occasionally been mistaken for Epsom salt, with fatal results. They may be readily distinguished from each other by the following characteristics:—

Epsom Salt.	Oxalic Acid.
Tastes extremely bitter and nauseous.	Tastes extremely sour.
Turns milky when dissolved in water and mixed with carbonate of sodium or carbonate of potassium; and after a time, a white sediment subsides.	Effervesces when mixed with carbonate of sodium or carbonate of potassium, and the liquid in a few seconds becomes transparent.

Magnesium, Tar'trate of. *Syn.* Magnesiæ tartras, Magnesia tartarica, L. *Prep.* By saturating a solution of tartaric acid with carbonate of magnesium, and gently evaporating to dryness. It is only very slightly soluble in water.—*Dose.* 20 to 60 grs., or more; in painful chronic maladies of the spleen. (Pereira, *ex* Radmacher.) The effervescing tartrate of magnesium, commonly sold under the name citrate has already been noticed.

Magnesium and Potas'sium, Tartrate of. *Syn.* Potassio-tartrate of magnesia; Magnesiæ potassio-tartras, M. et potassæ tartras, L. *Prep.* From acid tartrate of potassium (in powder,) 7 parts; carbonate of magnesium, 2 parts; water 165 parts; boiled until the solution is complete, and then evaporated and crystallized. A mild aperient.—*Dose.* 1 to 5 drs.; in scurvy, &c.

MAG'NET. *Syn.* Magnes, L. Besides its application to the loadstone, this name was formerly given to several compounds used in medicine.—Arsenical magnet (magnes arsenicalis), a substance once used as a caustic, consisted of common antimony, sulphur, and arsenious acid, fused together until they formed a sort of glass. Magnes epilepsiæ was native cinnabar.

MAHOG'ANY. This is the wood of *Swietenia Mahogoni* (Linn.), a native of the hotter parts of the new world. It is chiefly imported from Honduras and Cuba. The extract is astringent, and has been used in tanning, and as a substitute for cinchona bark. The wood is chiefly employed for furniture and ornamental purposes, and, occasionally, in shipbuilding.

Imitations of mahogany are made by staining the surface of the inferior woods by one or other of the following methods:

1. Warm the wood by the fire, then wash it over with aquafortis, let it stand 24 hours to dry, and polish it with linseed oil reddened by digesting alkanet root in it; or, instead of the latter, give the wood a coat of varnish, or French polish which has been tinged of a mahogany colour with a little aloes and annotta.

2. Socotrine aloes, 1 oz.; dragon's blood, ½ oz.; rectified spirit, 1 pint; dissolve, and apply 2 or 3 coats to the surface of the wood, previously well smoothed and polished; lastly, finish it off with wax or oil tinged with alkanet root.

3. Logwood, 2 oz.; madder, 8 oz.; fustic, 1 oz.; water, 1 gal.; boil 2 hours, and apply it several times to the wood boiling hot; when dry, slightly brush it over with a solution of pearlash, 1 oz.; in water, 1 quart; dry, and polish as before.

4. As the last, but using a decoction of logwood, 1 lb., in water, 5 pints. The tint may be brightened by adding a little vinegar or oxalic acid, and darkened by a few grains of copperas.

Stains and spots may be taken out of mahogany furniture with a little aquafortis or oxalic acid and water, by rubbing the part with the liquid, by means of a cork, till the colour is restored; observing afterwards to well wash the wood with water, and to dry it and polish it as before.

MAIZE. *Syn.* Indian corn. The seeds of *Zea Mays* (Linn.). Like the other corn plants, it belongs to the Grass family (*Graminaceæ*), and has albuminous grains sufficiently large and farinaceous to be ground into flour.

Maize is extremely nutritious, and although it is poorer in albuminoid matters than wheat, it is, of all the cereal grains, the richest in fatty oil, of which it contains about 9%. (Dumas and Payen.) It is remarkable for its fattening quality on animals, but is apt to excite slight diarrhœa in those unaccustomed to its use. Its meal is the 'polenta' of the shops. The peculiar starch prepared from it is known as 'corn flour,' 'maizena,' &c. In America, the young ears are roasted and boiled for food.

The centesimal composition of maize is as follows:—Flesh formers (albuminoid bodies), 9·9; heat and fat formers (starch, dextrin, and fat), 71·2, fibre, 4·0; ash, 1·4; water, 13·5.

MALAG'MA. In *pharmacy*, a poultice or emollient application.

MA'LIC ACID. $H_2C_4H_3O_5$. *Syn.* Acidum malicum, L. This acid exists in the juice of many fruits and plants, either alone, or associated with other acids, or with potassa or lime. In the juice of the garden rhubarb, it exists in great abundance, being associated with acid oxalate of potassa.

Prep. (Everitt.) The stalks of common garden rhubarb are peeled, and ground or grated to a pulp, which is subjected to pressure; the juice is heated to the boiling-point, neutralized with carbonate of potassa, mixed with acetate of lime, and the insoluble oxalate of lime which

falls is removed by filtration; to the clear and nearly colourless liquid, solution of acetate of lead is next added as long as a precipitate ('malate of lead') continues to form; this is collected on a filter, washed, diffused through water, and decomposed by sulphuric acid, avoiding excess, the last portion of lead being thrown down by a stream of sulphuretted hydrogen; the filtered liquid is, lastly, carefully evaporated to the consistence of syrup, and left in a dry atmosphere until it becomes converted into a solid and somewhat crystalline mass of malic acid. If perfectly pure malic acid is required, the malate of lead must be crystallised before decomposing it with sulphuretted hydrogen. *Prod.* 20,000 grs. of the peeled stalks yield 12,500 grs. of juice, of which one imperial gallon contains 11,139¼ grs. of dry malic acid.

Obs. By a similar process, malic acid may be prepared from the juice of the berries of the mountain ash (*Sorbus aucuparia*), just when they commence to ripen, or from the juice of apples, pears, &c.

Prop., &c. Malic acid is slightly deliquescent, very soluble in water, soluble in alcohol, and has a pleasant acidulous taste. The aqueous infusion soon gets mouldy by keeping. When kept fused for some time at a low heat, it is converted into fumaric acid; and when quickly distilled, it yields maleic acid, while fumaric acid is left in the retort. With the bases malic acid forms salts called malates. Of these the acid malate of ammonia is in large, beautiful crystals; malate of lead is insoluble in cold water, but dissolves in warm dilute acid, from which it separates on cooling in brilliant silvery crystals; acid malate of lime also forms very beautiful crystals, freely soluble in water; neutral malate of lime is only sparingly soluble in water; the first is obtained by dissolving the latter in hot dilute nitric acid, and allowing the solution to cool very slowly.

MALLEABILITY. The peculiar property of metals which renders them capable of extension under the hammer.

MALT, *Syn.* BINA, BYNE, BRASIUM, MALTUM, L. The name given to different kinds of grain, such as barley, bere or bigg, oats, rye, maize, &c., which have become sweet, from the conversion of a portion of their starch into sugar, in consequence of incipient germination artificially produced. Barley is the grain usually employed for this purpose.

Var. Independently of variations of quality, or of the grain from which it is formed, malt is distinguished into varieties depending on the heat of the kiln employed for its desiccation. When dried at a temperature ranging between 90 and 120° Fahr., it constitutes 'PALE MALT;' when all the moisture has exhaled, and the heat is raised to from 125 to 135°, 'YELLOW,' or 'PALE AMBER MALT,' is formed; when the heat ranges between 140° and 160°, the product receives the name of 'AMBER MALT;' at 160° to 180°, 'AMBER-BROWN,' or 'PALE BROWN MALT,' is obtained. ROASTED, PATENT, or BLACK MALT, and CRYSTALLISED MALT, are prepared by a process similar to that of roasting coffee. The malt is placed in sheet iron cylinders over a strong fire, and the cylinders made to revolve at the rate of about 20 revolutions per minute if roasted malt is required, or 120 if for crystallised malt. In the former case the finished malt has a dark brown colour; in the latter, the interior of the grain becomes dark brown, whilst the husk assumes a pale amber hue. The temperature must never exceed 420°, or the malt will become entirely carbonised.

Qual. Good malt has an agreeable smell and a sweet taste. It is friable, and when broken discloses a floury kernel. Its husk is thin, clean, and unshrivelled in appearance, and the acrospire is seen extending up the back of the grain, beneath the skin. The admixture of unmalted with malted grain may be discovered, and roughly estimated, by throwing a little into water, malt floats on water, but barley sinks in it. The only certain method, however, of determining the value of malt is to ascertain the amount of soluble matter which it contains, by direct experiment. This varies from 62 to 70⅝, and for good malt is never less than 66 to 67⅝. If we assume the quarter of malt at 324 lbs., and the average quantity of soluble matter at 66⅝, then the total weight of soluble matter will be fully 213¾ lbs. per quarter; but as this, "in taking on the form of gum and sugar" during the process of mashing, "chemically combines with the elements of water, so the extract, if evaporated to dryness, would reach very nearly 231 lbs.; and this reduced to the basis of a barrel of 36 gallons, becomes in the language of the brewer, 87 lbs. per barrel, which, however, merely means that the wort from a quarter of malt, if evaporated down to the bulk of a barrel or 36 gallons, would weigh 87 lbs. more than a barrel of water." (Ure.)

Assay. 1. A small quantity of the sample being ground in a coffee or pepper mill, 100 grs. are accurately weighed, and dried by exposure for about 1 hour at the temperature of boiling water. The loss in weight, in grains, indicates the quantity of moisture per cent. This, in good malt, should not exceed 6½ grs.

2. A second 100 grs. is taken and stirred up with about ½ pint of cold water; the mixture is then exposed to the heat of boiling water for about 40 minutes; after which it is thrown on a weighed filter, and the undissolved portion washed with a little hot water; the undissolved portion, with the filter, is then dried at 212° Fahr., and weighed. The loss in weight, less the per-centage of moisture last found, taken in grains, gives the per-centage of soluble matter. This should not be less than 66 grs. The same result will be arrived at by evaporating the filtered liquid and 'washings' to dryness, and weighing the residuum.

3. A third 100 grs. is taken and mashed with about ½ pint of water at 160° Fahr., for 2 or 3 hours; the liquid is then drained off, the residue gently squeezed, and the strained liquid, evaporated to dryness, as before, and weighed. This gives the per-centage of saccharine matter, and should not be less than about 71 grs., taking the above average of malt as the standard of calculation.

Uses, &c. Malt is chiefly employed in the arts of brewing and distillation. Both roasted and crystallised malt are merely used to colour the worts produced from pale malt. 1 lb. of roasted malt, mashed with 79 lbs. of pale malt, imparts to the liquor the colour and flavour of 'porter.' The paler varieties of malt contain the largest quantity of saccharine matter. After the malt has been kiln-dried, the rootlets may be removed by means of a sieve. Before malt is mashed for beer, it must be broken up, and the law requires that it be bruised or crushed by smooth metal rollers, and not ground by mill stones. It has also been proposed to employ malt, instead of raw grain, for fattening domestic animals, and as food for their young and those in a sickly state. Infusion of milk (sweet wort, malt tea) is laxative, and has been recommended as an antiscorbutic and tonic. It has been given with great advantage in scurvy; but for this purpose good, well-hopped, mild beer is equally serviceable and more agreeable. See BREWING, DISTILLATION, FERMENTATION, &c.

MALT LIQUORS. The qualities of ale, beer, and porter, as beverages, the detection of their adulteration, and the methods of preparing them, are described under their respective names and in the article upon 'BREWING'; the present article will, therefore, be confined to a short notice of the cellar management, and the diseases of malt liquors generally.

AGE. The appearance and flavour to which this term is applied can, of course, be only given to the liquor by properly storing it for a sufficient time. Fraudulent brewers and publicans, however, frequently add a little oil of vitriol (diluted with water) to new beer, by which it assumes the character of an inferior liquor of the class 1 or 2 years old. Copperas, alum, sliced lemons, Seville oranges, and cucumbers, are also frequently employed by brewers for the same purpose.

BOTTLING. Clean, sweet, and dry bottles, and sound and good corks, should be had in readiness. The liquor to be bottled should be perfectly clear; and if it be not so, it must be submitted to the operation of 'fining.' When quite fine, and in good condition, the bung of the cask should be left out all night, and the next day the liquor should be put into bottles, which, after remaining 12 or 24 hours, covered with sheets of paper to keep out flies and dust, must be securely corked down. Porter is generally wired over. The wire for this purpose should be 'annealed,' and not resilient. If the liquor is intended for exportation to a hot climate, the bottles should remain filled for 2 or 3 days, or more, before corking them. The stock of bottled liquor should be stored in a cool situation; and a small quantity, to meet present demands only, should be set on their sides in a warmer place to ripen. October beer should not be bottled before Midsummer, nor March beer till Christmas.

CLOUDINESS. Add a handful of hops boiled in a gallon of the beer, and in a fortnight fine it down.

FINING. See CLARIFICATION and BREWING.

FLATNESS. When the liquor is new, or has still much undecomposed sugar left in it, a sufficient remedy is to remove it into a warmer situation for a few days. When this is not the case, 2 or 3 pounds of moist sugar (foots) may be 'rummaged' into each hogshead. In this way a second fermentation is set up, and in a few days the liquor becomes brisk, and carries a head. This is the plan commonly adopted by publicans. On the small scale, the addition of a few grains of carbonate of soda, or of prepared chalk, to each glass, is commonly made for the same purpose; but in this case the liquor must be drunk within a few minutes, else it becomes again flat and insipid. This may be adopted for home-brewed beer which has become sour and vapid.

FOXING or BUCKING. The spontaneous souring of worts or beer during their fermentation or ripening, to which this name is applied, may generally be remedied by adding to the liquor some fresh hops (scalded), along with some black mustard seed (bruised). Some persons use a little made mustard, or a solution of alum or of catechu, and in a week or 10 days afterwards further add some treacle, or moist sugar.

Frosted beer is recovered by change of situation; by the addition of some hops boiled in a little sweet wort; or, by adding a little moist sugar or treacle to induce a fresh fermentation.

HEADING. This is added to thin and vapid beer to make it bear a frothy head. The most innocent, pleasant, and effective addition of this sort is a mixture of pure ammonio-citrate of iron and salt of tartar, about equal parts, in the proportion of only a few grains to a quart.

IMPROVING. This is the trade synonym of 'ADULTERATION' and 'DOCTORING.' Nevertheless there are cases in which 'improvement' may be made without affecting the wholesome character of the liquor. Of this kind is the addition of hops, spices, &c., during the maturation of beer that exhibits a tendency to deteriorate. For this purpose some persons cut a half-quartern loaf into slices, and after toasting them very high, place them in a coarse linen bag along with ½ lb. of hops, and 2 oz. each of bruised ginger, cloves, and mustard seed, and suspend the bag by means of a string a few inches below the surface of the beer (a hogshead), which is then bunged close. The

addition of a little ground capsicum in the same way is also a real improvement to beer, when judiciously made.

MUSTINESS. To each hogshead, racked into clean casks, add 1 lb. of new hops boiled in a gallon of the liquor, along with 7 lbs. of newly-burnt charcoal (coarsely bruised, and the fine dust sifted off), and a 4-lb. loaf of bread cut into thin slices and toasted rather black; 'rouse up' well every day for a week, then stir in of moist sugar 3 or 4 lbs., and bung down for a fortnight.

RECOVERING. This is said of unsaleable beer when rendered saleable, by giving it 'head' or removing its 'tartness.'

RIPENING. This term is applied to the regular maturation of beer. It is also used to express the means by which liquors already mature are rendered brisk, sparkling, or fit and agreeable for immediate use. In the language of the cellar, malt liquors are said to be 'up' when they are well charged with gaseous matter, and bear a frothy head. These qualities depend on the undecomposed sugar undergoing fermentation, which, when active, can only be of comparatively short duration, and should, therefore, be repressed rather than excited in beers not required for immediate consumption. When we desire to give 'briskness' to these liquors, whether in cask or bottle, it is only necessary to expose them for a few days to a slight elevation of temperature, by removing them, for instance, to a warmer apartment. This is the plan successfully adopted by bottlers. The addition of a small lump of white sugar to each bottle of ale or beer, or a teaspoonful of moist sugar to each bottle of porter, just before corking it, will render it fit for drinking in a few days in ordinary weather, and in 2 or 3 days in the heat of summer. A raisin or a lump of sugar candy is often added to each bottle with a like intention. The Parisians bottle their beer one day and sell it the next. For this purpose, in addition to the sugar as above, they add 2 or 3 drops of yeast. Such bottled liquor must, however, be drunk within a week, or else stored in a very cold place, as it will otherwise burst the bottles or blow out the corks.

ROPINESS. A little infusion of catechu or of oak bark, and some fresh hops, may be added to the beer, which in a fortnight should be rummaged well, and the next day 'fined' down.

SOURNESS. Powdered chalk, carbonate of soda, salt of tartar, or pearlash, is commonly added by the publicans to the beer, until the acidity is nearly removed, when 4 or 5 lbs. of moist sugar or foots per hogshead are 'rummaged' in, together with sufficient water to disburse double the amount of the outlay and trouble. Such beer must be soon put on draught, as it is very apt to get flat by keeping. Oyster shells and egg shells are also frequently used by brewers for the same purpose. To remove the acidity of beer, on the small scale, a few grains of carbonate of soda per glass may be added just before drinking it.

STORING. The situation of the beer-cellar should be such as to maintain its contents at a permanently uniform temperature, ranging between 44° and 50° Fahr., a condition which can only be ensured by choosing for its locality an underground apartment, or one in the centre of the basement portion of a large building.

VAMPING. Half fill casks with the old liquor, fill them up with some newly brewed, and bung close for 3 weeks or a month.

MALTING. The method of converting barley, wheat, oats, or any other description of grain into malt. There are four successive stages in the process of malting, viz. steeping, couching, flooring, and kiln-drying.

1. *Steeping or moistening.*—The grain is placed in a large wooden or stone cistern, and sufficient water run in to cover it. Here it remains for a period of from 40 to 60 hours, depending on the temperature of the weather, or until it becomes soft enough to be easily pierced with a needle, or crushed between the thumb and finger without yelding a milky juice. While in steep the grain swells, increasing nearly one fifth in bulk, and about 50 per cent. in weight. The water is then drained off, and the grain is ready for the next operation,

2. *Couching or germinating.*—From the cistern the swollen barley is thrown out into the couch frame to the depth of from 14 or 20 inches, where heat is generated and germination induced. Here it is allowed to remain for from 20 to 30 hours, according to the state of the weather, until the acrospire or pumule shoots forth. Were the grain to remain long in the couch, particularly in warm weather, it would be either unduly forced or turn sour. Whilst in couch it rises in temperature about 15 degrees, and gives off some of its extra moisture. This is called sweating, and as the rootlets now begin to shoot out, means must be taken to check the germination.

2. *Flooring or regulating.*—This consists in spreading the heated barley on the floor at different depths, according as it is required to increase or retard germination. During this stage of the operation the art of the maltster may be more properly said to commence, as now all his judgment is brought into requisition. The grain must be turned three or four times a day, and at each turning the layer is spread out more and more, until it is reduced to the depth of about three or four inches. The chief object to be attained by this operation is a regular germination of the grain.

4. *Kiln-drying.*—The sprouted barley is next spread in a thin layer on the malt kiln, and heat applied. The temperature to which the kiln is raised varies according to the pur-

pose for which the malt is required, the difference between pale, amber, and brown malt, depending solely on the degree of heat to which each has been subjected, and the manner in which the heat has been applied (see MALT). If the malt were not kiln-dried it would not keep, but would become mouldy. By the process of drying, the vitality of the seed is destroyed, and it may then be preserved without suffering further change.

Product.—Good barley yields about 80% by weight and 109% by measure, of dried and sifted malt. Of the loss by weight, 12% must be referred to water existing in the raw grain.

MAN"GANESE. Mn. *Syn.* MANGANESIUM, L. A hard, brittle metal, discovered by Gahn in the black oxide of manganese of commerce.

Prep. Reduce manganous carbonate to fine powder, make it into a paste with oil, adding about 1-10th of its weight of calcined borax, place the mixture in a Hessian crucible lined with charcoal, lute on the cover, and expose it to the strongest heat of a smith's forge for 2 hours; when cold, break the crucible and preserve the metallic button in naphtha.

Obs. The product is probably a carbide of manganese, just as steel is a carbide of iron. Deville has lately prepared pure manganese by reducing the pure oxide by means of an insufficient quantity of sugar charcoal in a crucible made of caustic lime.

Prop. As prepared by Deville, metallic manganese has a reddish lustre, like bismuth; it is very hard and brittle; when powdered, it decomposes water, even at the lowest temperature. Dilute sulphuric acid dissoves it with great energy, evolving hydrogen. Sp. gr. 7·13. In an oxidised state manganese is abundant in the mineral kingdom, and traces of it have been found in the ashes of plants and in mineral waters.

The salts of manganese may be easily prepared in a state of purity by dissolving the precipitated carbonate in the acids. Most of them are soluble, and several are crystallisable.

Tests. Manganous salts are distinguished as follows:—The hydrates of potassium and sodium give white precipitates insoluble in excess, and rapidly turning brown. The presence of ammonium salts interferes with these tests. Ammonia gives similar results.

Ferrocyanide of potassium gives a white precipitate. Sulphuretted hydrogen gives no precipitate in acid solutions, and precipitates neutral solutions only imperfectly; but in alkaline solutions it gives a bright, flesh-coloured, insoluble precipitate, which becomes dark brown on exposure to the air. Sulphide of ammonium in neutral solutions, also yields a similar precipitate, which is very characteristic. A compound of manganese fused with borax in the outer flame of the blowpipe gives a bead, which appears of a violet-red colour whilst hot, and upon cooling acquires an amethystine tint; this colour is lost by fusion in the inner flame. Heated upon platinum foil with a little carbonate of sodium, in the outer flame, it yields a green mass whilst hot, which becomes bluish green when cold.

Manganous Ace'tate. $Mn(C_2H_3O_2)_2$. *Syn.* ACETATE OF PROTOXIDE OF MANGANESE; MANGANII ACETAS, L. *Prep.* 1. By neutralising concentrated acetic acid with manganous carbonate, and evaporating the solution so that crystals may form.

Prop., &c. The crystals, when pure, are of a pale red colour; permanent in the air; soluble in alcohol, and in 3½ parts of water, and possess an astringent and metallic taste.—*Dose.* 5 to 10 grs., as an alterative, hæmatinic, &c.

Manganous Car'bonate. $MnCO_3$. *Syn.* CARBONATE OF PROTOXIDE OF MANGANESE; MANGANESII CARBONAS, L. *Prep.* Reduce the black oxide of manganese of commerce to fine powder, and after washing it in water acidulated with hydrochloric acid, dissolve it in strong hydrochloric acid, and evaporate the resulting solution to dryness; dissolve the residue in water, and add to the solution sufficient sodium carbonate to precipitate all the iron present; digest the mixed precipitate in the remainder of the liquid, filter, add ammonium sulphide until it begins to produce a flesh-coloured precipitate, then filter, and add sodium carbonate as long as a precipitate falls; lastly, well wash the newly-formed carbonate in water, and dry it by a gentle heat.

2. By directly precipitating a solution of the chloride with sodium carbonate, and washing and drying the powder, as before.

Prop., &c. A pale buff or cream-coloured powder; insoluble in water; freely soluble in acids; exposed to a strong heat, it loses its carbonic acid, absorbs oxygen, and is converted into the red oxide. It is chiefly employed in the preparation of the other salts of manganese.

Manganous Chlo"ride. $MnCl_2$. *Syn.* PROTOCHLORIDE OF MANGANESE, MURIATE OF M.; MANGANESII CHLORIDUM, L. *Prep.* 1. By saturating hydrochloric acid with manganous carbonate; the solution is gently concentrated by evaporation, when crystals may be obtained, or it is at once evaporated to dryness; in either case the product must be placed in warm, dry, stoppered bottles, and preserved from the air.

2. From the dark brown residual liquid of the process of obtaining chlorine from binoxide of manganese and hydrochloric acid; this liquid is evaporated to dryness, and then slowly heated to dull redness in an earthen vessel, with constant stirring, and kept at that temperature for a short time; the grayish-looking powder thus obtained is treated with water, and the solution separated from the ferric oxide and other insoluble matter by filtration; if any iron still remains, a little

manganous carbonate is added, and the whole boiled for a few minutes; the filtered solution is then treated as before. This is the least expensive and convenient source of this salt.

Prop., &c. Rose-coloured tabular crystals; inodorous; very soluble both in water and alcohol; very deliquescent; when gradually heated to fusion, the whole of the water is expelled, and at a red heat it slowly suffers decomposition. Astringent, tonic, hæmatinic, and alterative.—*Dose.* 3 to 10 grs.; in scorbutic, syphilitic, and certain chronic cutaneous affections; anæmia, chlorosis, &c.

Manganous Hydrate. $Mn(HO)_2$. *Syn.* HYDRATED PROTOXIDE OF MANGANESE. *Prep.* Formed by adding potassium hydrate to manganous sulphate, and filtering and drying, the precipitate in vacuo. White powder rapidly absorbing oxygen and burning first green and then brown from formation of higher oxides.

Manganous I'odide. MnI_2. *Syn.* MANGANESII IODIDUM, L. *Prep.* By dissolving the carbonate in hydriodic acid, and evaporating the filtered liquid in vacuo or out of contact with air.—*Dose.* 1 to 3 grs.; in anæmia, chlorosis, &c., occurring in scrofulous subjects.

Manganous Oxide. MnO. *Syn.* PROTOXIDE OF MANGANESE. *Prep.* By passing a current of hydrogen over manganous carbonate heated to whiteness in a porcelain tube. Olive green powder rapidly oxidizing on exposure to air, and soluble in acids forming manganous salts.

There are four other oxides and two oxyhydrates that may be treated of here, but of which only the peroxyde and the manganates and permanganates are of practical importance.

Manganous-manganic Oxide. Mn_3O_4, or MnO, Mn_2O_3. *Syn.* RED OXIDE OF MANGANESE, PROTOSESQUIOXIDE OF MANGANESE. Found native as "Hansmanite." It is produced by igniting manganous carbonate, or manganic, oxide, or manganic peroxide. Reddish-brown, coloured crystals or powder, and communicates an amethyst colour to glass when fused with it.

Manganous-manganic Peroxide. Mn_4O_7, or MnO_3, Mn_2O_3. *Syn.* INTERMEDIATE OXIDE OF MANGANESE. Found native as "Varvicile," as a black hard crystalline mass. Decomposed when heated into a lower oxide and oxygen.

Manganous Phosphate. $MnH.PO_4 + 6Aq$. *Syn.* PHOSPHATE OF PROTOXIDE OF MANGANESE; MANGANESII PHOSPHAS, L. *Prep.* By precipitating a solution of manganous sulphate with a solution of sodium phosphate. It must be preserved from the air.—*Dose.* 3 to 12 grs.; in anæmia, rickets, &c.

Manganous Sul'phate. $MnSO_4$. *Syn.* SULPHATE OF PROTOXIDE OF MANGANESE; MANGANESII SULPHAS, L. *Prep.* 1. By dissolving manganous carbonate in dilute sulphuric acid, and evaporating the filtered solution so that crystals may form, or at once gently evaporating it to dryness. Pure.

2. (Commercial.) By igniting manganic peroxide (pyrolusite) mixed with about 1-10th of its weight of powdered coal in an iron crucible or gas-retort, and digesting the residuum of the calcination in sulphuric acid, with the addition after a time of a little hydrochloric acid; the solution of manganous sulphate thus obtained, after defecation, is evaporated to dryness, and heated to redness as before; the mass, after ignition, is crushed small, and treated with water; the solution is nearly pure, the whole of the iron having been reduced into the state of insoluble peroxide. *Used* by the calico-printers. Cloth steeped in the solution, and afterwards passed through a solution of chloride of lime, is dyed of a permanent brown.

Prop., &c. Pale rose-coloured crystals of the formulæ $MnSO_4, 7Aq$; $MnSO_4, 5Aq$; or $MnSO_4, 4Aq$, according to the method of crystallizing, furnishing a solution of a rich amethystine colour. With sulphate of potassa, it forms a double salt ('manganese alum').—*Dose.* As an alterative and tonic, 5 to 10 grs.; as a cholagogue cathartic, 1 to 2 drs., dissolved in water, either alone or combined with infusion of senna. According to Ure, its action is prompt and soon over; 1 dr. of it occasions, after the lapse of an hour or so, one or more liquid bilious stools. In large doses it occasions vomiting, and in excessive doses it destroys life by its caustic action on the stomach. (Dr. G. C. Mitscherlich.) It has been administered with manifest advantage in torpor of the liver, gout, jaundice, syphilis, and certain skin diseases; and, combined with iron, in anæmia, chlorosis, rickets, &c.

Manganous Tar'trate. $MnC_4H_4O_6$. *Syn.* MANGANESII TARTRAS, L. *Prep.* By saturating a solution of tartaric acid with moist manganous carbonate. Alterative and tonic.—*Dose.* 4 to 12 grs.

Manganic Acid. H_2MnO_4. This acid has not yet been obtained free, but some of its salts are extensively employed as disinfectants, as "green Condy's fluid." The chief compounds are the following:

Manganate of Barium. $BaMnO_4$. Green insoluble powder, obtained by fusing barium hydrate, potassium chlorate, and manganic peroxide together, and washing the product.

Manganate of Potassium. K_2MnO_4. Finely powdered manganic peroxide, potassium chlorate, and potassium hydrate, made into a thick paste with water, and heated to dull redness. The fused product is treated with a small quantity of water, and crystallized by evaporation in vacuo.

Dark green, almost black crystals, readily soluble in water, but decomposed by excess, or by acids into manganic peroxide, and potassium permanganate.

Manganate of Sodium. M_2MnO_4. Prepared on the large scale by heating a mixture of

manganic peroxide and sodium hydrate to redness in a current of air. *Used* in strong solution as a disinfectant under the name of "Condy's green fluid."

Manganic Hydrate. $Mn_2(HO)_6$. *Syn.* HYDRATED SESQUIOXIDE OF MANGANESE. Found native as "manganite," in reddish-brown crystals. *Prep.* By passing a current of air through recently precipitated and moist manganous hydrate. Soft dark brown powder converted into the oxide by heat.

Manganic Oxide. Mn_2O_3. *Syn.* SESQUIOXIDE OF MANGANESE. Found native as "Braunite," and readily formed by exposing manganous hydrate to the action of air, and drying, or by gently igniting the peroxide brown or black powder decomposed by heat.

Manganic Peroxide. MnO_2. *Syn.* PERMANGANIC OXIDE, BINOXIDE OF MANGANESE, PEROXIDE OF MANGANESE, BLACK OXIDE OF MANGANESE, OXIDE OF MANGANESE, MANGANESII OXIDUM NIGRUM (B. P.), MANGANESII BINOXYDUM (Ph. L.), MANGANESE OXYDUM (Ph. E.).

It is the only oxide of manganese that is directly employed in the arts. It is a very plentiful mineral production, and is found in great abundance in some parts of the West of England. The manganese of the shop is prepared by washing, to remove the earthy matter and grinding in mills. The blackest samples are esteemed the best. It is chiefly used to supply oxygen gas, and in the manufacture of glass and chlorine; in dyeing and to form the salts of manganese. It has been occasionally employed in medicine, chiefly externally, in itch and porrigo, made into an ointment with lard. It has been highly recommended by Dr. Erigeler in scrofula. Others have employed it as an alterative and tonic with variable success. When slowly introduced into the system during a lengthened period, it is said to produce paralysis of the motor nerves. (Dr. Coupar.)—*Dose.* 3 to 12 grs., or more, thrice daily, made into pills.

Pur. Native binoxide of manganese (pyrolusite) is usually contaminated with variable proportions of argillaceous matter, calcium carbonate, ferric oxide, silica, and barium sulphate, all of which lower its value as a source of oxygen, and for the preparation of chlorine. The richness of this ore can, therefore, be only determined by an assay for its principal ingredient.

Assay. There are several methods adopted for this purpose, among which the following recommend themselves as being the most accurate and convenient.

1. A portion of the mineral being reduced to very fine powder, 50 grs. of it are put into the little apparatus employed for the analysis of carbonates described at page 295, together with about ½ fl. oz. of cold water, and 100 grs. of strong hydrochloric acid, the latter contained in the little tube (*b*); 50 grs. of crystallized oxalic acid are then added, the cork carrying the chloride of calcium tube fitted in, and the whole quickly and accurately weighed or counterpoised; the apparatus is next inclined so that the acid contained in the small tube may be mixed with the other contents of the flask, and the reaction of the ingredients is promoted by the application of a gentle heat; the disengaged chlorine resulting from the mutual decomposition of the hydrochloric acid and the manganic peroxide converts the oxalic acid into carbonic acid gas, which is dried in its passage through the chloride of calcium tube before it escapes into the air. As soon as the reaction is complete, and the residual gas has been driven off by a momentary ebullition, the apparatus is allowed to cool, when it is again carefully and accurately weighed. The loss of weight in grains, if doubled, at once indicates the per-centage richness of the mineral examined in manganic peroxide; or, more correctly, every grain of carbonic anhydride evolved represents 1·982 gr. of the peroxide.

2. (Fresenius and Will.) The apparatus employed is the 'alkalimeter' figured at page 24. The operation is similar to that adopted for the assay of alkalies, and is a modification of the oxalic acid and sulphuric acid test for manganese, originally devised by M. Berthier. The standard weight of manganic peroxide recommended to be taken by Fresenius and Will is 2·91 grammes, along with 6·5 to 7 grammes of neutral potassium oxalate. The process, with quantities altered to adapt it for employment in the laboratories of these countries, is as follows:—Manganic peroxide (in very fine powder), 50 gr.; neutral potassium oxalate (in powder), 120 grs.; these are put into the flask *A* (see engr., p. 24), along with sufficient water to about 1-4th fill it; the flask *A* and *B* (the latter containing the sulphuric acid) are then corked air-tight, and thus connected in one apparatus, the whole is accurately weighed. The opening of the tube *b* being closed by a small lump of wax, a little sulphuric acid is sucked over from the flask *B* into the flask *A*; the disengagement of oxygen from the manganese immediately commences, and this reacting upon the oxalic acid present, converts it into carbonic anhydride gas, which passing through the concentrated sulphuric acid in the flask *B*, which robs it of moisture, finally escapes from the apparatus through the tube *d*. As soon as the disengagement of carbonic acid ceases, the operator sucks over a fresh portion of sulphuric acid, and this is repeated at short intervals, until bubbles of gas are no longer disengaged. The little wax stopper is now removed, and suction is applied at *h* until all the carbonic acid in the apparatus is replaced by common air. When the whole has become cold, it is again weighed. The loss of weight, doubled, indicates the amount of pure manganic peroxide, in the sample, as before.

3. (Otto.) 50 grs. of the sample reduced to

very fine powder, are mixed in a glass flask, with hydrochloric acid, 1½ fl. oz., diluted with ½ oz. of cold water, and portions of ferrous sulphate, from a weighed sample, immediately added; at first in excess, and afterwards, in smaller doses, until the liquid ceases to give a blue precipitate with red prussiate of potash, or to evolve the odour of chlorine; heat being employed towards the end of the process. The quantity of ferrous sulphate consumed is now ascertained by again weighing the sample. If the peroxide examined was pure, the loss of weight will be 317 grs.; but if otherwise, the per-centage of the pure peroxide may be obtained by the rule of three. Thus: suppose only 298 grs. of the sulphate were consumed, then

317 : 100 : : 298 : 94,

and the richness of the sample would be 94%. The per-centage value of the oxide for evolving chlorine may be obtained by multiplying the weight of the consumed ferrous sulphate by ·2588, which, in the above case, would give 76% of chlorine. For this purpose as well as for chlorometry, the ferrous sulphate is best prepared by precipitating it from its aqueous solution with alcohol, and drying it out of contact with air until it loses its alcoholic odour.

Obs. Before applying the above processes, it is absolutely necessary that we ascertain whether the peroxide examined contains any carbonates, as the presence of these would vitiate the results. This is readily determined by treating it with a little dilute nitric acid:—if effervescence ensues, one or more carbonates are present, and the sample, after being weighed, must be digested for some time in dilute nitric acid in excess, and then carefully collected on a filter, washed, and dried. It may then be assayed as before. The loss of weight indicates the quantity of carbonates present, with sufficient accuracy for technical purposes. The determination of this point is the more important, as these contaminations not merely lessen the richness of the mineral in pure manganic peroxide, but also cause a considerable waste of acid when it is employed in the manufacture of chlorine.

Permanganic Acid. $HMnO_4$. Obtained by distilling cautiously potassium permanganate and sulphuric acid. Dark violet—black liquid, green by reflected light, and rapidly absorbing water forming a violet solution. Oxidises organic matter with explosive violence.

Permanganate of Barium. $Ba(MnO_4)_2$. Black soluble prisms, formed by decomposing silver permanganate by means of barium chloride, and cautiously evaporating.

Permanganate of Potassium. $HMnO_4$. *Prep.* Potassium chlorate, or nitrate, and potassium hydrate is made into a paste with water, and manganic peroxide added; the mass is dried and heated to redness. The residue is boiled with water, filled through asbestos, and evaporated down and recrystallized.

Dark purple, red, almost black anhydrous long prisms, readily soluble in 16 pints of water. Decomposed in presence of acids by most organic matter.

Permanganate of Silver. $AgMnO_4$. *Prep.* Precipitate a strong solution of silver nitrate by means of a concentrated solution of potassium permanganate. Small black prisms, soluble in 100 parts of water, with a purple colour.

Permanganate of Sodium. $NaMnO_4$. Obtained as a dark purple liquid by passing a current of carbonic anhydride through sodium manganate. Condy red fluid is chiefly a sodium permanganate dissolved in water.

MANGE. An eruptive disease, corresponding to the itch in man, resulting from the burrowing into the skin of minute animalcules (mites or *acari*), and common to several domestic animals, more especially the dog and horse. Like the itch, it is contagious. The causes are confinement, dirt, and bad living. The treatment should consist in the immediate removal of the cause, the frequent use of soft soap and water, followed by frictions with sulphur ointment or by solution of chloride of lime, the administration of purgatives, and a change to a restorative diet. Dun states, that in India a very efficient remedy for mange is employed by the native farriers, which consists of castor oil seeds well bruised, steeped for twelve hours in sour milk, and rubbed into the skin, previously thoroughly cleansed with soap and water. "The itchiness disappears almost immediately, and the acari are speedily destroyed." A dressing consisting of 1 oz. of chloride of zinc (Burnett's disinfectant fluid) and 1 quart of water may also be applied with advantage.

MAN"GEL WUR'ZEL. *Syn.* MANGOLD-WURZEL, HYBRID BEET, ROOT OF SCARCITY. The *Beta vulgaris*, var. *campestris*, a variety of the common beet. The root abounds in sugar, and has been used in Germany as a substitute for bread in times of scarcity. In these countries it is chiefly cultivated as food for cattle. The young leaves are eaten as spinach. The per-centage composition of mangold wurzel is as follows:—Flesh-formers (albuminoid bodies), 1·54; heat and fat-formers (sugar, &c.), 8·60; indigestible fibre, 1·12; ash, 0·96; 87·78.

MANHEIM GOLD. A gold-coloured brass. See GOLD (Dutch).

MAN'NA. *Syn.* MANNA (B. P., Ph. L. E. & D.), L. A concrete exudation from the stem of *Fraxinus ornus* and *F. rotundifolia*, obtained by incision. (B. P.) "The juice flowing from the incised bark" of "*Fraxinus rotundifolia* and *F. ornus*, hardened by the air." (Ph. L.) The finest variety of this drug is known as flake manna, and occurs in pieces varying from 1 to 6 inches long, 1 or 2 inches wide, and ½ to 1 inch thick. It has a yellowish-white or cream colour; an odour somewhat resembling honey, but less pleasant; a sweet, mawkish taste; and is light, porous, and friable. It is laxative in doses of 1 to 2 oz.

Manna, Factitious, made of a mixture of sugar, starch, and honey, with a very small quantity of scammony to give it odour and flavour, and to render it purgative, has been lately very extensively offered in trade, and met with a ready sale.

MAN'NACROUP. A granular preparation of wheat deprived of bran, used as an article of food for children and invalids. (Brande.)

MAN'NITE. $C_6H_{14}O_6$. *Syn.* MANNA SUGAR, MUSHROOM S.; MANNITA, L. A sweet, crystallizable substance, found in manna and in several other vegetable productions. It has been formed artificially by the action of sodium-amalgam upon an alkaline solution of cane sugar.

Prep. 1. Digest manna in boiling rectified spirit, and filter or decant the solution whilst hot; the mannite crystallizes as the liquid cools in tufts of slender, colourless needles.

2. (Ruspini.) Manna, 6 lbs.; cold water (in which the white of an egg has been beaten), 3 lbs.; mix, boil for a few minutes, and strain the syrup through linen whilst hot; the strained liquid will form a semi-crystalline mass on cooling; submit this to strong pressure in a cloth, mix the cake with its own weight of cold water, and again press it; dissolve the cake thus obtained in boiling water, add a little animal charcoal, and filter the mixture into a porcelain dish set over the fire; lastly, evaporate the filtrate to a pellicle, and set the syrup aside to crystallize. Large quadrangular prisms; perfectly white and transparent.

Prop., &c. Mannite has a powerfully sweet and agreeable taste; dissolves in 5 parts of cold water, and about half that quantity of boiling water; freely soluble in hot, and slightly so in cold alcohol; fuses by heat without loss of weight; with sulphuric acid it combines to form a new acid-compound. It is distinguished from the true sugars by its aqueous solution not being susceptible of the vinous fermentation, and not possessing the property of rotary polarization. When pure, it is perfectly destitute of purgative properties. It is now extensively imported from Italy, and is chiefly used to cover the taste of nauseous medicines, and as a sweetmeat.

MANURES'. Substances added to soils to increase their fertility. The food of vegetables, as far as their organic structure is concerned, consists entirely of inorganic compounds; and no organized body can serve for the nutrition of vegetables until it has been, by the process of decay, resolved into certain inorganic substances. These are carbonic acid, water, and ammonia, which are well known to be the final products of putrefaction. But even when these are applied to vegetables, their growth will not proceed unless certain mineral substances are likewise furnished in small quantities, either by the soil or the water used to moisten it. Almost every plant, when burned, leaves ashes, which commonly contain silica, potassa, and phosphate of lime; often, also, magnesia, soda, sulphates, and oxide of iron. These mineral bodies appear to be essential to the existence of the vegetable tissues; so that plants will not grow in soils destitute of them, however abundantly supplied with carbonic acid, ammonia, and water The carbon of plants is wholly derived from carbonic acid, which is either absorbed from the atmosphere, and from rain water, by the leaves, or from the moisture and air in the soil, by the roots. Its carbon is retained and assimilated with the body of the plant, while its oxygen is given out in the gaseous form; this decomposition being always effected under the influence of light at ordinary temperatures. The hydrogen and oxygen of vegetables, which, when combined with carbon, constitute the ligneous, starchy, gummy, saccharine, oily, and resinous matters of plants, are derived from water chiefly absorbed by the roots from the soil. The nitrogen of vegetables is derived chiefly, if not exclusively, from ammonia, which is supplied to them in rain, and in manures, and which remains in the soil till absorbed by the roots.

According to the celebrated 'mineral theory' of agriculture, advanced by Liebig, a soil is fertile or barren for any given plant according as it contains those mineral substances that enter into its composition. Thus, "the ashes of wheat-straw contain much silica and potassa, whilst the ashes of the seeds contain phosphate of magnesia. Hence, if a soil is deficient in any one of these, it will not yield wheat. On the other hand, a good crop of wheat will exhaust the soil of these substances, and it will not yield a second crop till they have been restored, either by manure or by the gradual action of the weather in disintegrating the subsoil. Hence the benefit derived from fallows and from the rotation of crops.

"When, by an extraordinary supply of any one mineral ingredient, or of ammonia, a large crop has been obtained, it is not to be expected that a repetition of the same individual manure next year will produce the same effect. It must be remembered that the usual crop has exhausted the soil probably of all the other mineral ingredients, and that these also must be restored before a second crop can be obtained.

"The salt most essential to the growth of the potato is the double phosphate of ammonia and magnesia; that chiefly required for barley is phosphate of lime; while for almost all plants potassa and ammonia are highly beneficial."

From these principles we "may deduce a few valuable conclusions in regard to the chemistry of agriculture. First, by examining the ashes of a thriving plant, we discover what mineral ingredients which must exist in a soil to render it fertile for that plant. Secondly, by examining a soil, we can say at once whether it is fertile in regard to any plants the ashes

of which have been examined. Thirdly, when we know the defects of a soil, the deficient matters may be easily obtained and added to it, unmixed with such as are not required. Fourthly, the straw, leaves, &c., of any plant, are the best manure for that plant, since every vegetable extracts from the soil such matters alone as are essential to it. This important principle has been amply verified by the success attending the use of wheat-straw, or its ashes, as manure for wheat, and of the chippings of the vines as a manure for the vineyard. When these are used (in the proper quantity), no other manure is required. Fifthly, in the rotation of crops, those should be made to follow which require different materials; or a crop which extracts little or no mineral matter, such as peas, should come after one which exhausts the soil of its phosphates and potassa." (Liebig.)

The experiments of Messrs. Lawes and Gilbert have forced upon them opinions differing from those of Baron Liebig on some important points in relation to his 'mineral theory,' which endeavours to prove that "the crops on a field diminish or increase in exact proportion to the diminution or increase of the mineral substances conveyed to it in manure." The results obtained by the English investigators appear to prove that it is impossible to get good crops by using mineral manures alone, and that nitrogenous manures (farm-yard manure, guano, ammoniacal salts, &c.) are fertilizing agents of the highest order.

Of the chemical manures now so much used, bone-dust is, perhaps, the most important, as it supplies the phosphates which have been extracted by successive crops of grass and corn, the whole of the bones of the cattle fed on these crops having been derived from the soil; its gelatin also yields ammonia by putrefaction. Guano acts as a source of ammonia, containing much oxalate and urate of ammonia, with some phosphates. Nightsoil and urine, especially the latter, are most valuable for the ammonia they yield, as well as for phosphates and potassa; but are very much neglected in this country, although their importance is fully appreciated in Belgium, France, and China. Nitrate of soda is valued as a source of nitrogen.

All organic substances may be employed as manures; preference being, however, given to those abounding in nitrogen, and which readily decay when mixed with the soil.

The analysis of manures, soils, and the ashes of plants, for the purpose of ascertaining their composition and comparative value, is not easily performed by inexperienced parties; but a rough approximation to their contents, sufficiently accurate for all practical purposes, may be generally made by such persons with proper care and attention. See AGRICULTURE, BONE-DUST, GUANO, &c.

Manures, Artificial. Various formulæ belonging to this head will be found dispersed, under their respective names, throughout this work. The following are additional ones:—

1. (Anderson.) Sulphate of ammonia, common salt, and oil of vitriol, of each, 10 parts; chloride of potassium, 15 parts; gypsum and sulphate of potassa, of each, 17 parts; saltpetre, 20 parts; crude Epsom salts, 25 parts; sulphate of soda, 33 parts. For clover.

2. (Huxtable.) Crude potash, 28 lbs.; common salt, 1 cwt.; bone-dust and gypsum, of each, 2 cwt.; wood-ashes, 15 bushels. For either corn, turnips, or grass.

3. (Johnstone.) Sulphate of soda (dry), 11 lbs.; wood-ashes, 28 lbs.; common salt, ¾ cwt.; crude sulphate of ammonia, 1 cwt.; bone-dust, 7 bushels. As a substitute for guano.

4. (Lawes' 'Superphosphate.') See COPROLITE.

5. (Fertilizing powder.) A mixture of very fine bone-dust, 18 parts; calcined gypsum and sulphate of ammonia, of each, 1 part. The seed is ordered to be steeped in the 'drainings' from a dunghill, and after being drained, but whilst still wet, to be sprinkled with the powder, and then dried. See FLOWERS, LIME (Superphosphate), &c.

MAPS. These, as well as architect's and engineer's designs, plans, sections, drawings, &c., may be tinted with any of the simple liquid colours mentioned under 'VELVET COLOURS,' preference being given to the most transparent ones, which will not obscure the lines beneath them. To prevent the colours from sinking and spreading, which they usually do on common paper, the latter should be wetted 2 or 3 times with a sponge dipped in alum water (3 or 4 oz. to the pint), or with a solution of white size, observing to dry it carefully after each coat. This tends to give lustre and beauty to the colours. The colours for this purpose should also be thickened with a little gum water. Before varnishing maps after colouring them, 2 or 3 coats of clean size should be applied with a soft brush—the first one to the back.

MARASCHI'NO (-kē'-no). *Syn.* MARASQUIN, Fr. A delicate liqueur spirit distilled from a peculiar cherry growing in Dalmatia, and afterwards sweetened with sugar. The best is from Zara, and is obtained from the marasca cherry only. An inferior quality is distilled from a mixture of cherries and the juice of liquorice root.

MAR'BLE. *Syn.* LIMESTONE, HARD CARBONATE OF LIME; MARMOR, CALCIS CARBONAS DURUS, M. ALBUM (B. P., Ph. E. & D.), L. Marbles are merely purer and more compact varieties of limestone, which admit of being sawn into slabs, and are susceptible of a fine polish. White marble is employed for the preparation of carbonic acid and some of the salts of lime. It contains about 65⅔ of lime. Sp. gr. 2·70 to 2·85. The tests of its purity are the same as those already noticed under CHALK.

Marble is best cleaned with a little soap-and-water, to which some ox-gall may be added. Acids should be avoided. Oil and grease may be generally removed by spreading a paste made of soft soap, caustic potash lye, and fuller's earth, over the part, and allowing it to remain there for a few days; after which it must be washed off with clean water. Or, equal parts of American potash (crude carbonate of potash) and whiting are made into a moderately stiff paste with a sufficiency of boiling water, and applied to the marble with a brush. At the end of two or three days the paste is removed and the marble washed with soap and water. Any defect of polish may be brought up with tripoli, followed by putty powder, both being used along with water.

Marble is mended with one or other of the compounds noticed under CEMENTS.

Marble may be stained or dyed of various colours by applying coloured solutions or tinctures to the stone made sufficiently hot to make the liquid just simmer on the surface. The following are the substances usually employed for this purpose:—

BLUE. Tincture or solution of litmus, or an alkaline solution of indigo.

BROWN. Tincture of logwood.

CRIMSON. A solution of alkanet root in oil of turpentine.

FLESH COLOUR. Wax tinged with alkanet root, and applied to the marble hot enough to melt it freely.

GOLD COLOUR. A mixture of equal parts of white vitriol, sal ammoniac, and verdigris, each in fine powder, and carefully applied.

GREEN. An alkaline solution or tincture of sap green, or wax strongly coloured with verdigris; or the stone is first stained blue, and then the materials for yellow stain are applied.

RED. Tincture of dragon's blood, alkanet root, or cochineal.

YELLOW. Tincture of gamboge, turmeric, or saffron; or wax coloured with annotta. Success in the application of these colours requires considerable experience. By their skilful use, however, a very pleasing effect, both of colour and grain, may be produced.

MAR'BLING (of Books, &c.). The edges and covers of books are 'marbled' by laying the colour on them with a brush, or by means of a wooden trough containing mucilage, as follows:—Provide a wooden trough, 2 inches deep, 6 inches wide, and the length of a super-royal sheet; boil in a brass or copper pan any quantity of linseed and water until a thick mucilage is formed; strain this into the trough, and let it cool; then grind on a marble slab any of the following colours in table beer. For—blue, Prussian blue or indigo;—red, rose-pink, vermilion, or drop lake;—yellow, king's yellow, yellow ochre, &c.;—white, flake white;—black, ivory black, or burnt lamp-black;—brown umber, burnt u., terra di sienna, burnt s.; black, mixed with yellow or red, also makes brown;—green, blue and yellow mixed;—purple, red and blue mixed. For each colour provide two cups—one for the ground colours, the other to mix them with the ox-gall, which must be used to thin them at discretion. If too much gall is used, the colours spread; when they keep their place on the surface of the trough, on being moved with a quill, they are fit for use. All things being in readiness, the prepared colours are successively sprinkled on the surface of the mucilage in the trough with a brush, and are waved or drawn about with a quill or a stick, according to taste. When the design is thus formed, the book, tied tightly between cutting boards of the same size, is lightly pressed with its edge on the surface of the liquid pattern, and then withdrawn and dried. The covers may be marbled in the same way, only the liquid colours must be allowed to run over them. The film of colour in the trough may be as thin as possible; and if any remains after the marbling, it may be taken off by applying paper to it before you prepare for marbling again. This process has been called FRENCH MARBLING.

To diversify the effect, a little sweet oil is often mixed with the colours before sprinkling them on, by which means a light halo or circle appears round each spot. In like manner, spirit of turpentine, sprinkled on the surface of the trough, produces white spots. By staining the covers with any of the liquid dyes, and then dropping on them, or running over them, drops of the ordinary liquid mordants, a very pleasing effect may be produced. Vinegar black, or a solution of green copperas, thus applied to common leather, produces black spots or streaks, and gives a similar effect with most of the light dyes. A solution of alum or of tin in like manner produces bright spots or streaks, and soda or potash water dark ones. This style has been called EGYPTIAN MARBLE.—SOAP MARBLING is done by throwing on the colours, ground with a little white soap to a proper consistence, by means of a brush. It is much used for book-edges, stationery, sheets of paper, ladies' fancy work, &c.—THREAD MARBLE is given by first covering the edge uniformly of one colour, then laying pieces of thick thread irregularly on different parts of it, and giving it a fine dark sprinkle. When well managed, the effect is very pleasing.—RICE MARBLE is given in a similar way to the last by using rice.—TREE MARBLE is done on leather book-covers, &c., by bending the board a little in the centre, and running the marbling liquid over it in the form of vegetation. The knots are given by rubbing the end of a candle on those parts of the cover.—WAX MARBLE is given in a similar way to thread marble, but using melted wax, which is removed after the book is sprinkled and dried; or a sponge charged with blue, green, or red, may be passed over. This, also, is much used for stationery work, especially for folios and quartos. The

'vinegar black' of the bookbinders is merely a solution of acetate of iron, made by steeping a few rusty nails or some iron filings in vinegar. All the ordinary liquid colours that do not contain strong acids or alkalies may be used either alone or thickened with a little gum, for marbling or sprinkling books.

SPRINKLING is performed by simply dipping a stiff-haired painter's brush into the colour, and suddenly striking it against a small stick held in the left hand over the work. By this means the colour is evenly scattered without producing 'blurs' or 'blots.'

PAPER, PASTEBOARD, &c., in sheets, are marbled and sprinkled in a similar manner to that above described, but in this case the gum trough must, of course, be longer.

MARGAR'IC ACID. This term was formerly applied to a mixture of palmitic and stearic acids, produced by decomposing the alkaline soaps of solid fats with an acid, but it is now given to a fatty acid which can only be obtained artificially.

MAR'GARIN. *Syn.* MARGARATE OF GLYCERYLE. A constituent formerly supposed to exist in solid fats, but now regarded as a mixture of stearin and palmitin.

MARINE' ACID. See HYDROCHLORIC ACID.

MARL. A natural mixture of clay and chalk, with sand. It is characterised by effervescing with acids. According to the predominance of one or other of its component parts, it is called argillaceous, calcareous, or sandy marl. It is very generally employed as a manure for sandy soils, more particularly in Norfolk. See SOILS.

MAR'MALADE. Originally, a conserve made of quinces and sugar; now commonly applied to the conserves of other fruit, more especially to those of oranges and lemons.

Prep. Marmalades are made either by pounding the pulped fruit in a mortar with an equal or a rather larger quantity of powdered white sugar, or by mixing them together by heat, passing them through a hair sieve whilst hot, and then putting them into pots or glasses. The fruit-pulps are obtained by rubbing the fruit through a fine hair sieve, either at once or after it has been softened by simmering it for a short time along with a little water. When heat is employed in mixing the ingredients, the evaporation should be continued until the marmalade 'jellies' on cooling. See CONSERVES, CONFECTIONS, ELECTUARIES, JAMS, JELLIES, and *below*.

Marmalade, Apricot. From equal parts of pulp and sugar.

Marmalade, Mixed. From plums, pears, and apples, variously flavoured to palate.

Marmalade, Orange. *Prep.* 1. From oranges (either Seville or St. Michael's, or a mixture of the two), by boiling the peels in syrup until soft, then pulping them through a sieve, adding as much white sugar, and boiling them with the former syrup and the juice of the fruit

2. By melting the confection of orange peel (Ph. L.), either with or without the addition of some orange or lemon juice, and then passing it through a sieve.

3. (CANDIED ORANGE MARMALADE.) From candied orange peel, boiled in an equal weight each of sugar and water, and then passed through a sieve.

4. (SCOTCH MARMALADE.)—*a*. Seville orange juice, 1 quart; yellow peel of the fruit, grated; honey, 2 lbs.; boil to a proper consistence.

b. Seville oranges, 8 lbs.; peel them as thinly as possible, then squeeze out the juice, boil it on the yellow peels for ¼ hour, strain, add white sugar, 7 lbs., and boil to a proper consistence.

Marmalade, Quince. *Syn.* DIACYDONIUM. From quince flesh or pulp and sugar, equal parts; or from the juice (miva cydoniorum, gelatina c.), by boiling it to ½, adding an equal quantity of white wine and ⅔rds of its weight of sugar, and gently evaporating the mixture.

Marmalade, Tomato. Like APRICOT MARMALADE, adding a few slices of onions and a little parsley.

MARMORA'TUM. Finely powdered marble and quicklime, well beaten together; used as a cement or mortar.

MAR'ROW (Beef). This is extensively employed by the perfumers in the preparation of various pommades and other cosmetics, on account of its furnishing an exceedingly bland fat, which is not so much disposed to rancidity as the other fats. It is prepared for use by soaking and working it for some time in lukewarm water, and afterwards melting it in a water bath, and straining it through a piece of muslin whilst hot. When scented, it is esteemed equal to bear's grease for promoting the growth of the hair.

MARSH GAS. Light carbonetted hydrogen.

MARSH'S TEST. See ARSENIOUS ACID.

MARSH-MALLOW. *Syn.* ALTHÆA (Ph. L. & E.), L. The root (leaves and root—Ph. E. of *Althæa officinalis*, Linn., or common marsh-mallow. (Ph. L.) It is emollient and demulcent; the decoction is useful in irritation of the respiratory and urinary organs, and of the alimentary canal. The flowers as well as the root are reputed pectoral.

MARTIN'S POWDER. A mixture of white arsenic and the powdered stems of *Orobanche virginiana* (Linn.), a plant common in Virginia An American quack remedy for cancer.

MASS. *Syn.* MASSA, L. This term is commonly applied in pharmacy and veterinary medicine to certain preparations which are not made up into their ultimate form. Thus, we have 'ball-masses,' 'pill-masses,' &c.; of which, for convenience, large quantities are prepared at a time, and are kept in pots or jars, ready to be divided into balls or pills, as the demands

MASSES (Veterinary).[1]

Massa Aloes. MASS OF ALOES. *Syn.* CATHARTIC MASS. *Prep.* Take of Barbadoes aloes, in small pieces, 8 parts; glycerin, 2 parts; ginger, in powder, 1 part; melt together in a water-bath, and thoroughly incorporate by frequent stirring.—*Use.* Cathartic for the horse.—*Dose.* From 6 to 8 drs.

Massa Aloes Composita. COMPOUND MASS OF ALOES. *Syn.* ALTERATIVE MASS. *Prep.* Take of Barbadoes aloes, in powder, 1 oz.; soft soap, 1 oz.; common mass, 6 oz.; thoroughly incorporate by beating in a mortar, so as to form a mass.—*Use.* Alterative for the horse.—*Dose.* 1 oz.

Massa Antimonii Tartarata Composita. COMPOUND MASS OF TARTARATED ANTIMONY. *Syn.* FEVER BALL. *Prep.* Take of tartarated antimony, in powder, ½ dr.; camphor, in powder, ½ dr.; nitrate of potash, in powder, 2 drs.; common mass, a sufficiency; mix so as to form a bolus.—*Use.* Febrifuge for the horse.—*Dose.* The above mixture constitutes 1 dose.

Massa Belladonnæ Composita. COMPOUND MASS OF BELLADONNA. *Syn.* COUGH BALL. *Prep.* Take of extract of belladonna, ½ to 1 dr.; Barbadoes aloes, in powder, 1 dr.; nitrate of potash, in powder, 2 drs.; common mass, a sufficiency; mix so as to form a bolus.—*Use.* For the horse in chronic cough.—*Dose.* The above mixture constitutes 1 dose.

Massa Catechu Composita. COMPOUND MASS OF CATECHU. *Syn.* ASTRINGENT MASS. *Prep.* Take of extract of catechu, in fine powder, 1 oz.; cinnamon bark, in fine powder, 1 oz.; common mass, 6 oz.; mix.—*Use.* Astringent for the horse.—*Dose.* 1 oz., in the form of bolus.

Massa Communis. COMMON MASS. *Prep.* Take of linseed, finely ground, and treacle, of each, equal parts; mix together so as to form a mass.—*Use.* An excipient for medicinal agents when they are to be administered in the form of bolus.

Massa Cupri Sulphatis. MASS OF SULPHATE OF COPPER. *Syn.* TONIC MASS. *Prep.* Take of sulphate of copper, finely powdered, 1 oz.; ginger, in powder, 1 oz.; common mass, 6 oz.; mix.—*Use.* Tonic for the horse.—*Dose.* 6 to 8 drs.

Massa Digitalis Composita. COMPOUND MASS OF DIGITALIS. *Syn.* COUGH BALL. *Prep.* Take of Barbadoes aloes, in powder, 2 oz.; digitalis, 1 oz.; common mass, 13 oz.; mix.—*Use.* For the horse in chronic cough.—*Dose.* 1 oz. once or twice a day.

Massa Ferri Sulphatis. MASS OF SULPHATE OF IRON. *Syn.* TONIC MASS. *Prep.* Take of sulphate of iron, in powder, 2 oz.; ginger, in powder, 1 oz.; common mass, 5 oz.; mix.—*Use.* Tonic for the horse.—*Dose.* 6 to 8 drs.

Massa Resinæ Composita. COMPOUND MASS OF RESIN. *Syn.* DIURETIC MASS. *Prep.* Take of resin, in powder, nitrate of potash, in powder, hard soap, of each, equal parts; mix.—*Use.* Diuretic for the horse.—*Dose.* 1 oz.

[1] Reprinted from Tuson's 'Veterinary Pharmacopœia.'

Massa Zingiberis Composita. COMPOUND MASS OF GINGER. *Syn.* CORDIAL MASS. *Prep.* Take of ginger, in powder, gentian root, in powder, treacle, of each, equal parts, a sufficiency; mix so as to form a mass.—*Use.* Stomachic for the horse.—*Dose.* 1 oz.

MAS'SICOT. *Syn.* MASTICOT, YELLOW PROTOXIDE OF LEAD; PLUMBI OXYDUM FLAVUM, CERUSSA CITRINA, L. The dross that forms on melted lead exposed to a current of air, roasted until it acquires a uniform yellow colour. Artists often apply the same name to white lead, roasted until it turns yellow. *Used* as a pigment.

MAS'TIC. *Syn.* MASTICH, GUM MASTIC; MASTICHE, L. The "resin flowing from the incised bark of *Pistacia Lentiscus*, var. *Chia*." (Ph. L.) It occurs in pale yellowish, transparent, rounded tears, which soften between the teeth when chewed, and giving out a bitter, aromatic taste. Sp. gr. 1·07. It is soluble in both rectified spirit and oil of turpentine, forming varnishes. It is chiefly used as a 'masticatory,' to strengthen and preserve the teeth, and perfume the breath.

Mastic. Fine mortar or cement used for plastering walls, in which the ingredients, in a pulverulent state, are mixed up, either entirely or with a considerable portion of linseed oil. It sets very hard, and is ready to receive paint in a few days. See CEMENTS.

MASTICA'TION. The act of chewing food, by which it not only becomes comminuted, but mixed with the saliva, and reduced to a form fit for deglutition. It has been justly regarded by the highest authorities as the first process of digestion, and one without which the powers of the stomach are overtasked, and often performed with difficulty. Hence the prevalence of dyspepsia and bowelly complaints among persons with bad teeth, or who 'bolt' their food without chewing it.

MAS'TICATORIES. *Syn.* MASTICATORIA, L. Substances taking by chewing them. They are employed as intoxicants, cosmetics, and medicinals; generally with the first intention. The principal masticatory used in this country is tobacco. In Turkey, and several other Eastern nations, opium is taken in a similar manner. In India, a mixture of areca nut, betel leaf, and lime, performs the same duties; whilst in some other parts of the world preparations of the cacao are employed. As cosmetics, orris root, cassia, cinnamon, and sandal wood, are frequently chewed to scent the breath. Among medicinals, mastic and myrrh are frequently chewed to strengthen the teeth and gums; pellitory, to relieve the toothache; and rhubarb, ginger, and gentian, to relieve dyspepsia and promote the appetite.

Prep. 1. (Augustin.) Mastic, pellitory (both in powder), and white wax, of each, 1 dr.; mixed by heat and divided into 6 balls. In toothache, loose teeth, &c.

2. (W. Cooley.) Mastic, myrrh, and white wax, of each, 1 part; rhubarb, ginger, and

extract of gentian, of each, 2 parts; beaten up with tincture of tolu, q. s., and divided into boluses or lozenges of 10 grs. each. One or two to be chewed an hour before dinner; in dyspepsia, defective appetite, &c.

3. (Quincy.) Mastic, 3 oz.; pellitory and stavesacre seed, of each, 2 drs.; cubebs and nutmegs, of each, 1 dr.; angelica root, ½ dr.; melted wax, q. s. to make it into small balls. As a stimulant to the gums, and in toothache.

4. Opium, ginger, rhubarb, mastic, pellitory of Spain, and orris root, of each, 1 dr.; melted spermaceti, q. s. to mix; for 6-gr. pills. As the last, and in toothache and painful gums.

MAS'TICOT. See MASSICOT.

MATCHES (Cooper's). *Syn.* SWEETENING MATCHES. These are made by dipping strips of coarse linen or canvas into melted brimstone. For use, the brimstone on one of them is set on fire, and the match is then at once suspended in the cask, and the bung loosely set in its place. After the lapse of 2 or 3 hours the match is removed, and the cask filled with liquor. Some persons pour a gallon or two of the liquor into the cask before 'matching' it. The object is to allay excessive fermentation. The operation is commonly adopted in the Western Counties for cider intended for shipment, or other long exposure during transport. It is also occasionally employed for inferior and 'doctored' wines.

MATCHES (Instantaneous Light). Of these there are several varieties, of which the one best known, and most extensively used, is the common phosphorus match, known as the 'congreve' or 'lucifer.'[1] We need not describe the 'chemical matches,' 'phosphorus bottles,' and 'prometheans,' in use during the early part of the present century, as these are quite obsolete. We will simply sketch the general process of manufacture now in use for phosphorus matches:

Manuf. The wooden splints are cut by steam machinery from the very best quality of pine planks, perfectly dried at a temperature of 400° Fahr. English splints are of two sizes—'large' and 'minnikins;' the former 2¼ inches longer, and the latter somewhat shorter. In the manufacture double-lengths are used, so that each splint may be coated with the igniting composition at both ends, and then cut asunder in the middle to form two matches. In England the splints are usually cut square in form, but in Germany they are cylindrical, being prepared by forcing the wood through circular holes in a steel plate. The ends of the double splints having being slightly charred by contact with a red-hot plate, are coated with sulphur by dipping them to the requisite depth in the melted material. In some cases the ends are saturated with melted wax or paraffin instead of sulphur. The splints are then arranged in a frame between grooved boards in such a manner that the prepared ends project on each side of the frame. These projecting ends are then tipped with the phosphorus composition, which is spread to a uniform depth of about ½ inch on a smooth slab of stone, kept warm by means of steam beneath. When partially dry, the tipped splints are taken from the frames, cut through the middle, and placed in heaps of 100, ready for 'boxing.'

The different compositions for tipping the matches in use in different countries and factories all consist essentially of emulsions of phosphorus in a solution of glue or gum, with or without other matters for increasing the combustibility, for colouring, &c. In England the composition contains a considerable quantity of chlorate of potassa, which imparts a snapping and flaming quality to the matches tipped with it, and but little phosphorus, on account of the moisture of the climate. In Germany the proportion of phosphorus used is much larger, and nitre, or some metallic peroxide, replaces chlorate of potassa. The German matches light quietly, with a mild lambent flame, and are injured quickly by damp. The following formulæ have been carefully selected:

1. (ENGLISH.) Fine glue, 2 parts, broken into small pieces, and soaked in water till quite soft, is added to water, 4 parts, and heated by means of a water bath until it is quite fluid, and at a temperature of 200° to 212° Fahr. The vessel is then removed from the fire, and phosphorus, 1½ to 2 parts, is gradually added, the mixture being agitated briskly and continually with a 'stirrer' having wooden pegs or bristles projecting at its lower end. When a uniform emulsion is obtained, chlorate of potassa, 4 to 5 parts, powdered glass, 3 to 4 parts, and red lead, smalt, or other colouring matter, a sufficient quantity (all in a state of very fine powder) are added, one at a time, to prevent accidents, and the stirring continued until the mixture is comparatively cool.

Obs. According to Mr. G. Gore, the above proportions are those of the best quality of English composition. The matches tipped with it deflagrate with a snapping noise. (See *above*.)

2. (GERMAN.)—*a.* (Böttger.) Dissolve gum arabic, 16 parts, in the least possible quantity of water, add of phosphorus (in powder), 9 parts, and mix by trituration; then add of nitre, 14 parts; vermilion or binoxide of manganese, 16 parts, and form the whole into a paste, as directed above; into this the matches are to be dipped, and then exposed to dry. As soon as the matches are quite dry, they are

[1] The original 'LUCIFERS,' or 'LIGHT-BEARING MATCHES,' invented in 1826, consisted of strips of pasteboard, or flat splints of wood, tipped first with sulphur, and then with a mixture of sulphide of antimony and chlorate of potassa, and were ignited by drawing them briskly through folded glass-paper. They required a considerable effort to ignite them, and the composition was apt to be torn off by the violence of the friction. The term 'lucifer' having become familiar, was applied to the simpler and more effective match afterwards introduced under the names of 'CONGREVE' and 'CONGREVE LIGHT.'

to be dipped into very dilute copal varnish or lac varnish, and again exposed to dry, by which means they are rendered waterproof, or at least less likely to suffer from exposure in damp weather.

b. (Bottger.) Glue, 6 parts, is soaked in a little cold water for 24 hours, after which it is liquefied by trituration in a heated mortar; phosphorus, 4 parts, is now added, and rubbed down at a heat not exceeding 150° Fahr.; nitre (in fine powder), 10 parts, is next mixed in, and afterwards red ochre, 5 parts, and smalt, 2 parts, are further added, and the whole formed into a uniform paste, into which the matches are dipped, as before. Cheaper than the last.

c. (Diesel.) Phosphorus, 17 parts; glue, 21 parts; red lead, 24 parts; nitre, 38 parts. Proceed as above.

Obs. Matches tipped with the above (*a*, *b*, and *c*) inflame without fulmination when rubbed against a rough surface, and are hence termed 'noiseless matches' by the makers.

3. (SAFETY MATCHES.) The latest improvement of note in the manufacture of matches is that of Landstrom, of Jonkoping, in Sweden, adopted by Messrs. Bryant and May (Patent). It consists in dividing the ingredient of the match-mixture into two separate compositions, one being placed on the ends of the splints, as usual, and the other, which contains the phosphorus, being spread in a thin layer upon the end or lid of the box. The following are the compositions used by the patentee:—*a.* (For the splints.) Chlorate of potassa, 6 parts; sulphuret of antimony, 2 to 3 parts; glue, 1 part. —*b.* (For the friction surface.) Amorphous phosphorus, 10 parts; sulphuret of antimony or peroxide of manganese, 8 parts; glue, 3 to 6 parts; spread thinly upon the surface, which has been previously made rough by a coating of glue and sand.

Obs. By thus dividing the composition, the danger of fires arising from ignition of the matches by accidental friction is avoided, as neither the portion on the splint nor that on the box can be ignited by rubbing against an unprepared surface. Again, by using the innocuous red or amorphous phosphorus, the danger of poisoning is entirely prevented.

MATE'RIA MED'ICA. A collective name of the various substances, natural and artificial, employed as medicines or in the cure of disease. In its more extended sense it includes the science which treats of their properties, classification, and applications. The *materia medica of the Pharmacopœia* is a mere list, with occasional notes, "embracing the animal, vegetable, and chemical substances, whether existing naturally, prepared in officinal chemical preparations, or sold in wholesale trade, which we (the College), direct to be used either in curing diseases or in preparing medicines." (Ph. L.)

MATICO. *Syn.* SOLDIER'S HERB; MATECO (B.P., Ph. D.); MATICA, HERBA MATICÆ, L. The dried leaves of a Peruvian plant, generally believed to be the *Artanthe elongata*, one of the *Piperaceæ*. The leaves have been employed with considerable success as a mechanical external styptic; applied to leech-bites, slight cuts, and other wounds, &c., and pressed on with the fingers, they seldom fail to arrest the bleeding. Matico has also been much lauded as an internal astringent and styptic, in hæmorrhages from the lungs, stomach, bowels, uterus, &c.; but as it is nearly destitute of astringent properties, its virtues in these cases must have been inferred from its external action. As an aromatic, bitter stimulant, closely resembling the peppers, it has been proposed as a substitute for cubebs and black pepper, in the treatment of diseases of the mucous membranes, piles, &c.—*Dose.* ½ to 2 drs.; in powder; or under the form of infusion, tincture, or boluses.

MATURA'TION. Growing ripe. Amongst surgeons, this term is applied to the process of suppuration, or that which succeeds inflammation, and by which pus or matter is collected in an abscess. Warmth, irritation, and a liberal diet, promote this change; cold, sedatives, and depletion, retard it. The maturation of fermented liquor is noticed under BREWING, MALT LIQUORS, WINES, &c.

MEAD. *Syn.* MELLINA, L. An old English liquor, made from the combs from which the honey has been drained, by boiling them in water, and fermenting the saccharine solution thus obtained. It is commonly confounded with metheglin. Some persons add 1 oz. of hops to each gallon; and, after fermentation, a little brandy. It is then called sack mead. See METHEGLIN.

MEAL. The substance of edible grain ground to powder, without being bolted or sifted. Barley meal and oat meal are the common substances of this class in England. In North America the term is commonly applied to ground Indian corn, whether bolted or not. (Goodrich.) The four resolvent meals of old pharmacy (*quatuor farinæ resolventes*) are those of barley, beans, linseed, and rye.

MEALS. The "periods of taking food, usually adopted, in conformity with convenience and the recurrence of hunger, are those which are best adapted to the purposes of health; namely, the morning meal, the midday meal, and the evening meal." "That these are the proper periods for meals is evident from the fact of their maintaining their place amid the changes which fashion is constantly introducing." "If we look at these periods in another point of view, we shall find an interval of four hours left between them for the act of digestion and subsequent rest of the stomach. Digestion will claim between two and three hours of the interval; the remaining hour is all that the stomach gets of rest, enough, perhaps, but not too much, nor to be justly infringed." (Eras. Wilson.)

MEA'SLES. *Syn.* RUBEOLA, MORBILLI, L.

This very common disease is characterised by feverishness, chilliness, shivering, head-pains, swelling and inflammation of the eyes, defluxion of sharp tears, with painful sensibility to light, oppressive cough, difficulty of breathing, and sometimes vomiting or diarrhœa. These are followed about the fourth day by a crimson rash upon the skin, in irregular crescents or circles, and by small red points or spots, which are perceptible to the touch, and which, after four or five days, go off with desquamation of the cuticle. The fever, cough, &c., often continue for some time; and unless there have been some considerable evacuations, either by perspiration or vomiting, they frequently return with increased violence, and occasion great distress and danger.

Treat. When there are no urgent local symptoms, mild aperients, antimonial diaphoretics, and diluents, should be had recourse to; but when the inflammatory symptoms are emergent, and the lungs are weak, especially in plethoric habits, blood may be taken. The cough may be relieved by expectorants, demulcents, and small doses of opium; and the diarrhœa by the administration of the compound powder of chalk and opium; the looseness of the bowels, however, had better not be interfered with, unless it be extreme.

Measles are most prevalent in the middle of winter, and though common to individuals of all ages, are most frequent amongst children. The plethoric, and those of a scrofulous habit, or one which has a syphilitic taint, suffer most from them.

Like the smallpox, the measles are contagious, and seldom attack the same person more than once during life. See RASH.

MEASURE. *Syn.* MENSURA, L. The unit or standard by which we estimate extension, whether of length, superficies, or volume. The following tables represent the values and proportions of the principal measures employed in commerce and the arts:—

TABLE I. *English Lineal Measures.*

Inches.	Feet.	Yards	Poles.	Furlongs.	Miles.
1·	·083	·028	·00505	·00012626	·0000157828
12·	1·	·333	·06060	·00151515	·00018939
36·	3·	1·	·1818	·004545	·00056818
198·	16·5	5·5	1·	·025	·003125
7920·	660·	220·	40·	1·	·125
63360·	5280·	1760·	320·	8·	1·

*** The unit of the above table is the yard, of which no legal standard has existed since that established by the statute of 1824 was destroyed by the fire which consumed the two Houses of Parliament, in 1834.

TABLE II. *English Measures of Superficies.*

Square Feet.	Square Yards.	Poles.	Roods.	Acres.
1·	·1111	·00367309	·000091827	·000022957
9·	1·	·0330579	·000826448	·000206612
272·25	30·25	1·	·025	·00625
10890·	1210·	40·	1·	·25
43560·	4840·	160·	4·	1·

TABLE III. *English Measure of Volume.—The* IMPERIAL STANDARD, *and the relative value of its divisions, including those used in Medicine, with their* EQUIVALENTS *in avoirdupois and troy weight.*

m Minims or drops.	f℥ Fluid Drachms.	f℥ Fluid Ounces.	O. Pints.	Oij. Quarts.	C. Gallons.	Pecks	Bushels.	Quarters.	Equivalents in *distilled water*, 62° Fahr., in Troy grains.	Avo weig
1·	·01666666	·00208333	·00010416	·00005208	·00001302	—	—	—	·91146·	
60·	1·	·125	·00625	·003125	·00078125	—	—	—	54·6875	lb.
480·	8·	1·	·05	025	·00625	—	—	—	437·5	
9600·	160·	20·	1·	·5	·125	·0625	·015625	001953125	8750·	1
19200·	320·	40·	2·	1·	·25	·125	·03125	00390625	17500·	2
76800·	1280·	160·	8·	4·	1·	·5	·125	015625	70000·	10
	2560·	320·	16·	8·	2·	1·	·25	·03125	—	20
		1280·	64·	32·	8·	4	1·	·125	—	80
			512·	256·	64·	32·	8·	1·	—	640

*** The standard unit of the above table is the gallon, which is declared, by statute, to be capable of "containing ten pounds avoirdupois weight of distilled water, weighed in the air at the temperature of 62° Fahr., the barometer being at 30 inches." The pound avoirdupois contains 7000 grains, and it is declared that a cubic inch of distilled water, under the above conditions, weighs 252·458 grains; hence the capacity of the imperial gallon and its divisions are as follows:—

Imperial gallon = 277·274 cubic inches.
„ quarts = 69·3185 „
„ pint = 34·65925 „
Fluid ounce = 1·73296 „
„ drachm = ·21662 „

†‡† The imperial gallon is 1-5th larger than the old wine gallon,—1-60th smaller than the old beer gallon, and—1-32nd larger than the old dry-measure gallon.

TABLE IV. *French Metrical or Decimal Measures of Length.*

Names.	Eq. in Mètres.	Equivalents in English Inches, at 32° Fahr.	English Long Measure, at 62° Fahr. Miles.	Fur.	Yds.	Feet.	Inch.
Millimètre . . .	·001	. . ·03937					
Centimètre . . .	·01	. . ·39371					
Décimètre . . .	·1	. . 3·93708					
Mètre	1·	. . 39·37079			1	0	3·37
Decamètre . . .	10·	. . 393·70790			10	2	9·7
Hectomètre . . .	100·	. . 3937·07900			109	1	1·078
Kilomètre . . .	1000·	. . 39370·79000		4	213	1	10·3
Myriamètre . . .	10000·	. 393707·90000	6	1	156	0	9·17

*** The standard unit of the above table is the mètre, which has been determined to be 39·37079 inches, at 32° Fahr. (Capt. Kater); the English foot is taken at 62° Fahr. The true length of the mètre, reduced to the latter temperature, is 39·370091 English inches; a number which varies from that in the table only at the fourth decimal figure. It will be perceived that the principle of nomenclature adopted in applying the names, was to prefix the Greek numerals to the decimal multiples, and the Latin numerals to the decimal subdivisions.

TABLE V. *French Metrical or Decimal Measures of Volume.*

Names.	Eq. in Litres.	Eq. in English Cubic Inches.	Equivalent in English Measures.				
			Gall.	*Pints.*	*Oz.*	*Dr.*	*Minims.*
Millilitre	·001	. . ·0610					16·9
Centilitre	·01	. . ·6103				2	49·
Decilitre	·1	. . 6·1028			3	4	10·36
Litre	1·	. . 61·028		1	15	1	43·69
Decalitre	10·	. . 610·28	2	1	12	1	16·9
Hectolitre	100·	. . 6102·8	22	0	1	4	49·
Kilolitre	1000·	. . 61028·	220	0	16	6	40·
Myrialitre	10000·	. . 610280·	2201 (= 275⅛ *bushels*).				

*** The standard unit in the above table is the litre, or the cube of the $\frac{1}{10}$ of a mètre. The French centiare contains 1 square mètre,—the are, 100 do.,—the hectare, 10,000 do. The old Paris pint is equal to 1·678 English imperial pint.

†‡† The capacity of solids and aëriform fluids is taken in cubic inches, or feet, in England. In France, the stere, or mètre cube, equal to 35·31658 English cube feet, is the standard unit.

TABLE VI. *Miscellaneous Measures, and their Equivalents:*

Tea or coffee spoonful	(average)	= 1 fl. dr.
Dessert „	„	= 2 „
Table „	„	= 4 „
Wine-glassful	„	= 2 fl. oz.
Tea-cupful	„	= 5 „
Breakfast-cupful	„	= 8 „
Tumblerful	„	= 8 „
Basinful	„	= 12 „
Thimbleful	„	= ¾ fl. dr.
Pinch (of leaves and flowers) . . .	„	= 1 dr.
Handful „ „ . . .	„	= 10 „
Cubic inch of water, at 62° Fahr. . . .		= 252·458 gr.
„ foot „ „		= 62·32106 lb.
Line		= $\frac{1}{12}$ inch.
Barleycorn		= $\frac{1}{3}$ „
Hand		= 4 „
Chain		= 4 poles or 22 yards.

MEAT BIS'CUITS. *Prep.* 1. The flour is mixed up with a rich fluid extract of meat, and the dough is cut into pieces and baked in the usual manner.

2. Wheaten flour (or preferably the whole meal), 3 parts; fresh lean beef or other flesh (minced and pulped), 2 parts; thoroughly incorporate the two by hand-kneading or machinery, and bake the pieces in a moderately heated oven. Both the above are very nutritious; the last, more especially so. 1 oz. makes a pint of good soup.

MEAT EXTRACTS. Some preparations of this nature have been already noticed under the heads ESSENCE and EXTRACT; the following are additional and highly valuable formulæ:—

Prep. 1. (Dr. Breslau.) Young ox-flesh (free from fat) is minced small, and well beaten in a marble mortar, at first alone, and afterwards with a little cold or lukewarm water; the whole is then submitted to the action of a press, and the solid residuum is treated in the same manner, with a little more cold water; the juice (reddish in colour) is now heated to coagulate the albumen, strained, and finally evaporated in a water bath to the consistence of an extract. As ordinary flesh contains only 1% of kreatine, while that of the heart, according to Dr. Gregory, contains from 1·37% to 1·41%, this is the part employed by Dr. Breslau. The product possesses an agreeable odour and taste; and is easily soluble in water.

2. (Falkland.) Fresh lean beef (or other flesh), recently killed, is minced very fine, and digested, with agitation, in cold water, 1 pint, to which hydrochloric acid, 6 drops, and common salt, 1 dr., have been added; after about an hour, the whole is thrown upon a fine hair sieve, and the liquid portion allowed to drain off without pressure, the first portions that pass through being returned until the fluid, at first turbid, becomes quite clear and trans-

parent; when all the liquid has passed through, cold water, ¼ pint, is gently poured on, in small portions at a time, and allowed to drain through into that previously collected. The product is about ¾ pint of cold extract of flesh, having a red colour, and a pleasant, soup-like taste, It is administered cold to the invalid—a teacupful at a time, and must on no account be warmed, as the application of even a very slight heat causes its decomposition and the separation of a solid mass of coagulated albumen. This cold exract of flesh is not only much more nutritious than ordinary beef tea, but also contains a certain quantity of the red colouring matter of blood, in which there is a much larger proportion of the iron requisite for the formation of blood-particles. The hydrochloric acid also greatly facilitates the process of digestion. This formula is a modification of the one recently recommended by Liebig for the preparation of a highly nutritive and restorative food for invalids.

3. (EXTRACTUM SANGUINIS BOVIS—Dr. Mauthner.) Pass fresh blood (caught from the slaughtered animal) through a sieve, evaporate it to dryness in a water bath, and when cold, rub it to powder.—*Dose.* 10 to 20 grs., or more, per diem, in a little water.

Obs. The above preparations are intended to supersede the inefficient compounds—beef tea, meat soups, &c., during sickness and convalescence. MM. Breslau and Mauthner describe their extracts of flesh and blood as being peculiarly advantageous in scrofulous exhaustion, exhaustion from anæmia, diarrhœa, &c. The extract of Falkland or Liebig is represented as having been employed both in the hospitals and in private practice at Munich, with the most extraordinary success. It is said to be capable of assimilation with the least possible expenditure of the vital force.

Meat, Fluid. This preparation consists of lean meat, in which the albumen has been changed so as to be non-coagulable by heat, and the fibrin and gelatin from their normal insoluble condition to one admitting of their being dissolved in water.

In this soluble condition, the first stage effected in stomach digestion, the several bodies are known as peptones or albuminose, and the proportion of their simple constituents remains the same as in ordinary fibrin, albumen, and gelatin.

The alteration is effected by finely mincing meat and digesting it with peptone hydrochloric acid and water at a temperature of about 100° Fahr. until dissolved.

The solution is then filtered, the bitter principle, formed during the digestion, removed by the addition of a little pancreatic emulsion, and the liquor which has been neutralized by the addition of carbonate of soda, evaporated to a thick syrup or extractive consistence.

Fluid meat is the only preparation which entirely represents, and yields the amount of nourishment afforded by, lean meat; it differs altogether from beef tea and extracts of meat, as all of these contain only a small portion of the different constituents of meat. A patent has been granted to its inventor, Mr. Darby.

MEAT PRESERVING. "The Belgian *Musée de l'Industrie* notes the following methods of preserving meats as the most deserving of attention amongst those communicated to the French Academy of Sciences, and published in the *Comptes Rendus*. 1. M. Bundet's method, by which the meat is kept in water acidulated with carbolic acid in the proportion of 1 to 5 parts of acid per 1000 of water. A series of experiments proved that all kinds of meat could thus be kept fresh, for lengthened periods, without acquiring any ill taste or odour.

"The meat may be placed in barrels or air-tight tin cases, filled with acidulated water of the strength above specified and headed up; or the pieces may be packed in barrels or cases in alternate layers with charcoal, pounded small, and saturated with water containing $\frac{5}{1000}$ of carbolic acid. The charcoal serves as a vehicle for the antiseptic fluid, and as an absorbent of any gaseous matters given off by the meat. The latter should be wrapped in thin linen covers to prevent the charcoal working its way into the tissues.

"This method, it is suggested, might be employed in curing pork in place of 'salting,' or of the more lengthy and costly process of 'smoking;' and also for the preservation of poultry, game, butter, eggs, &c.

"2. In the case of South American meat M. Baudet proposes the use of large sacks of caoutchouc. The meat should be packed in them, with alternate layers of charcoal as above described, and each sack, when filled, should be hermetically closed by drawing another empty caoutchouc sack, cap-wise, over it. The caoutchouc, it is supposed, would fetch enough in the market—its low price notwithstanding—to cover expenses of packing and freight, and so permit the meat to be sold in Europe at a very small advance on cost price. If intended for use a second time, the empty bags should be steeped in boiling water for a few minutes, to remove any organic impurities adhering to them.

"3. M. Gorge's method, which is in use in La Plata, consists in washing and drying the meat, and afterwards steeping in successive waters containing hydrochloric acid and sulphite of soda, and then packing it in air-tight cases holding 1, 5, or 10 kilog. each. Meat thus treated requires to be soaked in warm water for about half an hour before use.

"4. M. Leon Soubeiran has recommended braying and drying, in the fashion adopted by the Chinese and Mongols, as described by M. Simon, French Consul in China, in a communication made by him to the *Société d'Acclimatation*. The *pemmican* of our Arctic voyagers and the *charqui* of South America are familiar examples of meat preserved by analo-

METHEG'LIN. *Syn.* HYDROMELI, H. VINOSUM, MELLIS VINUM, L. *Prep.* From honey, 1 cwt.; warm water, 24 galls.; stir well until dissolved; the next day add of yeast, 1 pint, and hops, 1 lb., previously boiled in water, 1 gall.; along with water, q. s. to make the whole measure 1 barrel; mix well, and ferment the whole with the usual precautions adopted for other liquors. It contains on the average from 7% to 8% of alcohol. See MEAD.

ME'THYL. CH_3. The hypothetical radical of PYROXYLIC SPIRIT (WOOD-SPIRIT, METHYLIC ALCOHOL) and the methyl series. It forms a number of compounds analogous to those of ethyl.

METHYLATED SPIRIT. A mixture of 1 part of methylic alcohol (wood spirit) and 9 parts of ethylic alcohol (spirit of wine). See SPIRIT.

METHYLIC ALCOHOL. See WOOD SPIRIT.

MEZE'REON. *Syn.* GAROU; MEZEREON BARK, MEZEREI CORTEX (B. P.); MEZEREUM —Ph. L. E. & D. The dried bark of the *Daphne Mezereum*, mezereon; or *Daphne Laureola*, spurge, or wood-laurel. The "bark of the root of *Daphne Mezereum*," or spurge olive. (Ph. L.) A stimulant and diuretic. It is employed as a sudorific and alterative, in syphilis, rheumatism, scrofula, and chronic cutaneous diseases, usually in conjunction with sarsaparilla. It has also been used as a masticatory, in toothache, paralysis of the tongue, &c. On the Continent it is used as a vesicant. For this purpose it is softened by soaking it in hot vinegar, and is then bound on the part, and renewed after intervals of some hours, until vesication is produced.

MICE. See RATS.

MICROCOS'MIC SALT. $NaNH_4HPO_4$. *Syn.* TRIBASIC PHOSPHATE OF SODIUM AND AMMONIUM. *Prep.* 1. Phosphates of soda and ammonia, equal parts; water, q. s.; dissolve separately, mix the solutions, evaporate, and crystallize. A slight excess of phosphate of ammonia aids the crystallisation.

2. (Fownes.) Phosphate of sodium, 6 parts; water, 2 parts; liquefy by heat, and add of sal ammoniac (in powder), 1 part; common salt separates, and after its removal the liquid is concentrated so that crystals may form. *Used* as a flux in blowpipe assays.

MI'CROSCOPE. The value of the microscope in chemistry and the collateral sciences is now so generally acknowledged, that it would be folly to do more than merely to allude to the subject here.

In the COMPOUND MICROSCOPE. which has quite superseded the 'simple microscope' as an instrument of research, the object is magnified in the first instance by the object-glass, and then remagnified by the eye-piece. It follows, therefore, that the magnifying power of the instrument may be increased either by increasing the power of the object-glass or that of the eye-piece. It must be borne in mind, however, that in increasing the power of the eye-piece, we do not magnify the object itself in a greater degree, but simply increase the image of the object formed by the object-glass. Any imperfections which may exist in the latter are thus greatly increased. At first the great drawback to the use of the compound microscope was its deficiency in achromatism; but the researches of Mr. Lester and Dr. Goring led to the achromatising of the object-glass, which was the first of the rapid strides towards perfection made by this instrument during the last twenty years. The two most useful object-glasses are the 'quarter-inch,' which should magnify from 200 to 220 diameters, and the 'inch,' which should magnify from 30 to 40 diameters. The definition of these glasses should be good, and they should transmit plenty of light. Any lines in a structure examined by them should appear sharp and distinct, and there should be no coloured fringes around the object. It is of great importance that the object-glasses are kept perfectly free from dust. A few shreds of wash-leather of the finest quality should be kept in a pill-box for cleaning them. Before rubbing them with the leather they may be breathed upon, but no whiting or liquid of any kind should be used, as each object-glass, being achromatic, is a very delicate piece of workmanship, consisting of two lenses of flint- and crown-glass cemented together by Canada balsam. Compound microscopes are now sold by the best London makers at very low prices. A really good instrument, adapted to most of the wants of the chemical, pharmaceutical, or medical student, may be obtained for five guineas

MIL'DEW. *Syn.* RUST, BLIGHT. The mouldy appearance on the leaves of plants produced by innumerable microscopic fungi. The hop, wheat, and the choicest garden fruit trees, are those most commonly attacked. The causes are said to be excess of moisture, and absence of the free circulation of air and sunshine. On the small scale, finely powdered sulphur is occasionally dusted over the parts affected, as a remedy.

MIL'IARY FEVER. *Syn.* MILIARIA, L. Among the other symptoms are—anxiety and frequent sighing, the perspiration has a strong and peculiar smell, and there is a sensation of pricking on the neck and breast, followed by an eruption of small red pimples, which in two or three days become white vesicles, dry up, peel off, and are succeeded by others. The moist weather of spring and autumn are the period in which it is most prevalent; and delicate females, particularly in child-bed, are those most liable to its attacks. Sometimes it assumes a malignant character. The *treatment* of this affection consists chiefly in combating the depression of the system by a supporting diet; but everything that heats or stimulates the skin should be avoided. The apartment should be kept cool and well ventilated, and cooling saline laxatives and bitter

tonics, with cooling drinks, should also be had recourse to.

MILK. *Syn.* LAC, L. The value of milk as an article of food is clearly shown by the fact of it being sufficient to support, and to increase the growth of, the young of every species of the mammalia; at once supplying materials for the formation of the osseous, fleshy, and liquid portions of the body. "The substances present in milk are wonderfully adapted to its office of producing materials for the rapid growth and development of the animal frame. It contains an azotized matter, casein, nearly identical in composition with muscular flesh, fatty principles, and a peculiar sugar, and, lastly, various salts, among which may be mentioned phosphate of lime, held in complete solution in a slightly alkaline liquid.

"The white, and almost opaque, appearance of milk is an optical illusion. Examined by a microscope of even moderate power, it is seen to consist of a perfectly transparent fluid, in which float about numbers of minute transparent globules; these consist of fat surrounded by an albuminous envelope, which can be broken mechanically, as in the churning, or dissolved by the chemical action of caustic potassa, after which, by agitating the milk with ether, the fat can be dissolved." (Fownes.)

Comp. Cows' MILK, of average quality, contains from 10% to 12% of solid matter when evaporated to dryness by steam heat, and has the mean sp. gr. 1·030; while that of the skimmed milk is about 1·035; and of the cream, 1·0244. (Ure.) The average CREAM of cows' milk contains 4·5% of butter; 3·5% of curd, and 92% of whey. (Berzelius.) The SKIMMED MILK consists of water, 92·9%; curd, 2·8%; sugar of milk, 3·5%; lactic acid, lactate of potassa, and a trace of lactate of iron, ·6%; chloride of potassium, phosphate of potassa, and earthy phosphates (lime), ·2%. (Berzelius.)

The following analysis of fresh milk is by M. Haidlen:—

Water	873·00
Butter	30·00
Casein	48·20
Milk sugar	43·90
Phosphate of lime	2·31
" magnesia	·42
" iron	·07
Chloride of potassium	1·44
" sodium	·24
Soda in combination with casein	·42
	1000·

Prop. These are well known, Perfectly fresh milk is slightly alkaline, but soon becomes acid on exposure to the air, and after a time white coagula of casein (CURDS) separate from it. This change is immediately effected by the addition of rennet or an acid. That from the first, when dried and pressed, constitutes cheese.

Pur., tests, &c. The common frauds practised by the milk-dealers are the addition of water and the subtraction of part of the cream. Sometimes potato starch is added to the milk, to give it a creamy or rich appearance, and this addition is still more frequently made to cream, to increase its consistence and quantity. The method of detecting the first two of these frauds is noticed under 'LACTOMETER.' The presence of potato starch may be determined by boiling some of the milk with a little vinegar, and after separating the coagula by a strainer, and allowing the liquid to become cold, testing it with solution or tincture of iodine. If it turns blue, starch, flour, or some other amylaceous substance, has been used to adulterate it. In most cases it will be sufficient to apply the test to the unprepared suspected milk.

It has frequently been stated that chalk, plaster of Paris, gum, gelatin, sugar, flour, mucilage of hemp-seed, the brains of animals, and other similar substances, are often added to London milk, but there is no reason to suppose there is any truth in these assertions, as some of these articles are too costly to be used, and the presence of others would so alter the flavour or appearance of the milk, or would so soon exhibit themselves by subsidence, as to lead to their detection.

Pres. Milk may be preserved in stout bottles, well corked, and wired down, by heating them, in this state, to the boiling-point, in a water bath, by which means the oxygen of the small quantity of enclosed air becomes absorbed. It must be afterwards stored in a cool situation. By this method, which is also extensively adopted for the preservation of green gooseberries, green peas, &c., milk will retain its properties unaltered for years. A few grains of carbonate of magnesia, or, still better, of bicarbonate of potassa or soda, may be advantageously dissolved in each bottle before corking it.

Under Bethel's patent the milk or cream is scalded, and, when cold, strongly charged with carbonic acid gas, by means of a soda-water machine, and the corks are wired down in the usual manner. The bottles should be kept inverted, in a cool place.

An excellent method of preventing milk from turning sour, or coagulating, is to add to every pint of it about 10 or 12 grs. of carbonate or bicarbonate of soda. Milk thus prepared may be kept for eight or ten days in temperate weather. This addition is harmless, and, indeed, is advantageous to dyspeptic patients. According to D'Arcot, $\frac{1}{2000}$th part of the bicarbonate is sufficient for the purpose. An excess of alkali used in this manner may be detected by the milk turning turmeric paper brown, even after it has been kept

some hours, and by the ash obtained by evaporating a little to dryness, and then heating it to dull redness, effervescing with an acid. (See *below*.)

*** Milk should not be kept in lead or zinc vessels, as it speedily dissolves a portion of these metals, and becomes poisonous.

Concluding remarks. The principal difference between cows' milk and human milk consists in the former containing more casein and less sugar of milk than the latter. The remarkable indisposition to coagulate is another character which distinguishes human milk from cows' milk. Prof. Falkland, who has practically investigated the subject has prepared a nutritive fluid for infants from cows' milk, closely resembling that of the healthy adult woman. His process is, however, unnecessarily complicated, and, therefore, unsuited to those who would have to employ it in the nursery. To remove this objection we have adopted the following formula;—Sugar of milk, 2 oz.; hot water, ¼ pint; dissolve, and, when the liquor has become quite cold, add it to fresh cows' milk, ¾ pint, and stir them together. This quantity, prepared morning and evening, will constitute the proper food for an infant of from 5 to 8 months old. More may be allowed it if it 'craves' it; but there must be no 'cramming.' At first it will be advisable to remove a little of the cream from the milk before adding to it the saccharine solution; but after a few days this will be found to be unnecessary, and, indeed, injurious. One very important particular to be attended to is, the employment of pure cow's milk, obtained from a healthy grass-fed animal only. With this precaution, and the use of a good FEEDING-BOTTLE, the infant will thrive nearly as well as on the breast of any human female, excepting its mother's. (See *below*.)

ASSES' MILK closely resembles human milk in colour, smell, and consistence, but it contains rather less cream. (See *below*.)

EWES' MILK closely resembles cows' milk, than which, however, it is slightly richer in cream.

GOATS' MILK, for the most part, resembles cows' milk, but its consistence is much greater, and it contains much more solid matter. (See *below*.)

MARES' MILK, in consistence, is between that of cows' and human milk. Its cream is not converted into butter by agitation. See BUTTER, CHEESE, LACTIC ACID, &c.

Al'mond Milk. See EMULSION and MIXTURE.

Arrow-root Milk. *Prep.* From arrow-root, 1 table-spoonful, first wetted and stirred with a little cold water, afterwards adding, gradually, of boiling water, ¼ pint; and, lastly, of boiling milk, ½ pint; with sugar, spice, wine, &c., to palate. Very nutritious, and excellent in chronic diarrhœa. Some persons employ all milk.

Choc'olate Milk. *Prep.* Dissolve chocolate (scraped), 1 oz., in boiling new milk, 1 pint. Nutritious; but apt to offend delicate stomachs.

Cof'fee Milk. *Prep.* 1. Coffee, 1 oz.; boiling water, ¼ pint; infuse for 10 or 15 minutes in a warm situation, and add the strained liquid to boiling milk, ¾ pint.

2. Coffee, 1 oz.; tie it loosely in a piece of muslin, and simmer it for 15 minutes in milk, 1 pint. Both the above have been recommended for persons of spare habits, and for those disposed to affections of the lungs, more especially for the asthmatic.

Facti"tious Milk. *Syn.* ARTIFICIAL MILK. Of the numerous compounds which have been proposed as substitutes for natural milks, the following are examples:—

1. (FACTITIOUS ASSES' MILK; LAC ASININUM FACTITIUM, LAC A. ARTIFICIALE, L.)—*a.* Cows' milk, 1 quart; ground rice, 1 oz.; oringo root (bruised), 1 dr.; boil, strain, and add sugar candy (or white sugar), 1 oz.

b. Whites of 2 eggs; lump sugar, 1 oz.; cows' milk (new), ¾ pint; mix, then add syrup of tolu, ¾ oz.

c. Water, 1 pint; hartshorn shavings, 1 oz.; boil to a jelly; then add lump sugar, 2 oz.; cool, add new milk, 1 pint; syrup of tolu, ½ oz. *Used* as substitutes for asses' milk, taken freely as a beverage. A cupful, with or without a spoonful of rum, 3 or 4 times daily, is a popular remedy in consumption and debility.

2. (F. GOATS' MILK—A. T. Thomson.) Fresh mutton suet (minced), 1 oz.; tie it in a muslin bag, and boil it in cows' milk, 1 quart; lastly, add of sugar candy, 2 gr. In scrofulous emaciation, and in the latter stages of phthisis. The proportion of suet in the above may be advantageously increased a little. The LAC CUM SEBO of Guy's Hospital is a similar preparation.

3. (F. HUMAN MILK; LAC HUMANUM FACTITIUM, L.)—*a.* See *above*.

b. (Rosenstein.) Almonds (blanched), 2 in number; white sugar, 1 dr.; water, 4 fl. oz.; make an emulsion, strain, and add of fresh cows' milk, 6 fl. oz. As a substitute for the breast in nursing.

Preserved' Milk. *Syn.* MILK POWDER; LACTIS PULVIS, LAC PULVERATUM, L. *Prep.* 1. Fresh skimmed milk, 1 gall.; carbonate of soda (in very fine powder), 1½ dr.; mix, evaporate to 1-3rd by the heat of steam or a water bath, with constant agitation, then add of powdered white sugar, 3½ lbs., and complete the evaporation at a reduced temperature; reduce the dry mass to powder, add the cream (well drained) which was taken from the milk, and after thorough admixture put the whole into well-stoppered bottles or tins, which must be at once hermetically sealed.

2. (Legrip.) Carbonate of soda, ½ dr.; water, 1 fl. oz.; dissolve, add of fresh milk, 1 quart; sugar, 1 lb.; reduce it by heat to

the consistence of a syrup, and finish the evaporation on plates by exposure in an oven.

Obs. About an ounce of the powder agitated with a pint of water, forms an agreeable and nutritious drink, and a good substitute for milk at sea. It may also be used for tea or coffee in the solid form. This process, which is very old, has been recently patented. See MILK (*above*).

Milk of Roses. *Syn.* LAC ROSÆ, L. *Prep.* 1. (ENGLISH.)—*a.* Almonds (blanched), 1 oz.; oil of almonds and white soft soap, of each, 1 dr.; rose water, 1 pint; make an emulsion.

b. From liquor of potassa and oil of almonds, of each, 1 fl. oz.; hot water, 2 fl. oz.; agitate together until mixed, then add of rose water and distilled or filtered soft water, of each, ¼ pint, and again agitate well.

c. As the last, but using half a teaspoonful of salt of tartar for the liquor of potassa.

d. (Redwood.) Blanched almonds, 8 oz.; rose water, 3 pints; make an emulsion, add of white Windsor soap, white wax, and oil of almonds, of each, ½ oz.; previously melted together by a gentle heat; triturate until united, and strain; lastly, add a solution of oil of bergamot, ½ oz.; oil of lavender, 1 dr.; and attar of roses, ½ dr.; (dissolved in) rectified spirit, 12 oz.

2. (FRENCH.)—*a.* From rose water, 1 quart; tinctures of benzoin and styrax, of each, 1 fl. oz.; spirit of roses, ½ fl. oz.; rectified spirit, 2 fl. oz.; mix.

b. (Augustin.) Tincture of benzoin, ½ fl. oz.; liquor of carbonate of potassa, 2½ fl. dr.; rose water, ½ pint; agitate well together. As a lotion in acne.

c. (Gianinni.) Tincture of benzoin, 1 dr.; tincture of balsam of Peru, 20 drops; rose water, 1 pint; as the last.

d. (Schubarth.) Almond paste, 3 drs.; rose water, 1½ pint; tincture of benzoin, ½ fl. oz. As before. The addition to the last 3 of a little rectified spirit is an improvement.

3. (GERMAN.) From dilute solution of diacetate of lead (Goulard water), and spirit of lavender, of each, 1 fl. oz.; rose water, 6 fl. oz.; soft water, 1 pint.

Obs. All the above are used as cosmetic washes, and to remove scurf, pimples, and eruptions, in slight cases.

Sa'go Milk. *Syn.* LAC SAGO, L. *Prep.* (Dr. A. T. Thomson.) Sago, 1 oz.; cold water, 1 pint; macerate half an hour, pour off the water, add of milk, 1½ pint, and boil slowly until the sago is dissolved. Very nutritious; also in lieu of arrow-root milk.

Milk of Sulphur. See SULPHUR (Precipitated).

Vanil'la Milk. *Syn.* LAC VANILLÆ, L. *Prep.* 1. Essence of vanilla, 12 drops; lump sugar, 1 oz.; triturate, and add gradually, new milk, 1 pint.

2. (Beral.) Vanilla sugar, ½ oz.; milk, 16 oz.; dissolve.

MILK FEVER. *Syn.* FEBRIS LACTEA, L. A febrile condition of the system that sometimes occurs at the time the milk begins to be secreted after parturition. It often assumes a malignant character. See PUERPERAL FEVER.

MIL'LET. *Syn.* MILIUM, L. Several varieties of grain are known by this name. That commonly referred to under the name is the produce of *Panicum miliaceum* ('Indian millet'). The husked seeds (MILIUM MUNDATUM) are used to make gruel, and are ground for flour. 'Turkish millet,' or 'Guinea corn,' is produced by *Sorgham vulgare;* and the 'German' and 'Italian millet' by species of *Setaria.* In some parts of the world millet flour is used for bread, but it is chiefly cultivated as food for domestic animals.

MINCE MEAT. *Prep.* From stoned raisins, currants, sugar, and suet, of each, 2 lb.; sultana raisins and boiled beef (lean and tender), of each, 1 lb.; apples, 4 lbs.; juice of 2 lemons; the rind of 1 lemon, chopped very fine; mixed spice, ¼ lb.; candied citron and lemon peel, of each, 2 oz.; brandy, a glassful or two; the whole chopped very fine. It may be varied by adding other spice or flavouring, and by the addition of eggs, or the substitution of chopped fowl or veal for beef, according to the taste of the cuisinier.

MINDERE'RUS'S SPIRIT. See AMMONIA (Acetate of), and SOLUTION.

MIN'ERAL CHAME'LEON. *Prep.* From a mixture of binoxide of manganese and potassa and nitre, equal parts, heated to redness. It must be preserved in a well-corked bottle until required for use.

Prop., &c. When dissolved in water, its solution, at first green, passes spontaneously through all the coloured rays to the red, when, if potassa be added, the colour retrogrades until it reaches the original green. The addition of oil of vitriol, or of chlorine, renders the solution colourless. The addition of a weak acid, or even boiling or agitating the liquid, turns it from green to red. See MANGANIC ACID.

MIN'ERALIZERS. Substances which, by association with metallic bodies, deprive them of their usual properties, and impart to them the character of ores. Their removal belongs to metallurgy. The term MINERALIZED' has been applied to caoutchouc, gutta percha, bitumen, &c., which has been combined with sulphur, silica, or metallic matter.

MIN'IM. *Syn.* MINIMUM, L. A measured drop, of which 60 are equal to a fluid drachm. The size of drops vary so greatly with different liquids, and are also so much influenced by the size and shape of the vessels from which they are poured, that they afford no reliable measure of quantity for medicinal purposes. The poured drop has, in some cases, only ⅓rd the volume of the measured drop, or minim; whilst, in others, it is nearly 3 times as large. According to Mr. Durande, "liquids which contain a small proportion of water, afford a small

drop; while, on the contrary, liquids containing a large quantity of water furnish a large drop." "Among liquids containing a large proportion of water, those which are not charged with remedial substances, give a larger and heavier drop than the same liquids when containing extraneous bodies in solution." In all cases in which the word 'drop' is mentioned in this work a minim is intended, and the quantity should be determined by means of a graduated minim measure.

MIN'IUM. See RED PIGMENTS.

MINT. *Syn.* SPEARMINT, GREEN M.; MENTHA VIRIDIS (Ph. L.), L. "The recent and the dried flowering herb" of *Mentha viridis*. It is aromatic and carminative, but its flavour is less agreeable than that of peppermint. It is employed in flatulence, colic, nausea, diarrhœa, &c.; also to make sauce.

MIR'RORS. See AMALGAM (Silvering), SILVERING, SPECULUM METAL, &c.

MITES. See ACARI.

MITH'RIDATE. *Syn.* DAMOCRATES'S CONFECTION; MITHRIDATIUM, CONFECTIO DAMOCRATIS, L. "This composition originally consisted of but few ingredients; viz., 20 leaves of rue, 2 walnuts, 2 figs, and a little salt. Of this we are informed that Mithridates took a dose every morning, to guard himself against the effects of poison. It was afterwards altered, and the number of the ingredients increased to sixty-one. In this more complex form it contained opium, and was, in effect, an aromatic opiate, of which the confection of opium of the present day may be considered as a simplification. The 'mithridate' is still prepared in some shops, and is occasionally, though very rarely, prescribed." (Med. Lex.) "The formulæ for CONFECTION or ELECTUARY OF CATECHU may be considered as the representatives, in our modern Pharmacopœias, of the once celebrated recipes for CONFECTIO DAMOCRATIS and THERIACA ANDROMACHI." (Redwood.) Mithridate was formerly conceived to be good for nearly every disease, and an antidote for every known poison.

MIX'TURE. *Syn.* MISTURA, L. A compound liquid medicine, taken in divided doses.

Mixtures are usually extemporaneous preparations, and in prescribing them care should be taken not to bring together substances that decompose each other, nor to order heavy powders, that speedily separate from the body of the liquid, by subsidence. EMULSIONS, JULEPS, and MUCILAGES, are included in the 'MISTURÆ' of the London Pharmacopœia.

Mixtures are usually dispensed in flat octagonal 6 or 8-oz. bottles, with long necks; or in regular 'octagons,' with short necks, having the doses marked on the glass, to which the strength of the medicine is made to correspond.

Our remarks respecting 'DRAUGHTS' equally apply here. By putting the active ingredients of six draughts into a 6-oz. mixture bottle, and filling it up with distilled water, a mixture will be made of corresponding properties, of which the dose will be 2 table-spoonfuls. When the formula for the draughts includes a decoction or infusion as the vehicle, instead of water, four of them only must be taken, which will then fill the 6-oz. bottle, and the proper *dose* will be 3 table-spoonfuls, or a small wineglassful.

The following formulæ embrace the whole of the 'MISTURÆ' of the British Pharmacopœias, as well as a few others in general use. These will serve as examples for the like preparations of medicinals which are not included in the list. (See also DRAUGHT, EMULSION, JULEP, WATER, &c.)

Mixture, Absor'bent. See ANTACID MIXTURE.

Mixture, Aca'cia. See GUM MIXTURE.

Mixture, Ace'tate of Ammo"nia. *Syn.* MINDERERUS'S MIXTURE; MISTURA AMMONIÆ ACETATIS, L. *Prep.* From solution of acetate of ammonia, 1½ fl. oz.; nitre, 40 grs.; camphor mixture, 6 fl. oz.; rose syrup, ½ fl. oz.—*Dose.* 1 to 3 table-spoonfuls, every third or fourth hour, as a diaphoretic in inflammatory fevers, &c.

Mixture, Al'kaline. See ANTACID MIXTURE.

Mixture, Al'mond. *Syn.* EMULSION OF ALMONDS, MILK OF A.; MISTURA AMYGDALÆ (B. P., Ph. L. E. & D.), LAC AMYGDALÆ, L. *Prep.* 1. (Ph. L.) Confection of almonds, 2½ oz.; distilled water, 1 pint; gradually add the water to the confection while triturating, until they are mixed; then strain the liquid through linen.

2. (Ph. E.) From almond confection, 2 oz., and water, 1 quart; as the last. Or, from sweet almonds (blanched), 10 drs.; white sugar, 5 drs.; mucilage, ½ fl. oz. (or powdered gum, 3 drs.); made into an emulsion with water, 1 quart.

3. (Ph. D.) Sweet almonds (blanched), 5 drs.; refined sugar, 2 drs.; powdered gum, 1 dr.; distilled water, 8 fl. oz.; as the last.

4. (B. P.) Compound powder of almonds (sweet), 1; water, 8; triturate and strain.

Obs. The last formula produces the article usually employed in dispensing in the shops. The addition of a little more sugar renders it more pleasant; and 2 or 3 bitter almonds, as in the formula of the Ph. D. 1826, or 1 or 2 fl. drs. of rose or orange-flower water, may occasionally be added, to diversify the flavour.—*Dose.* 2 or 3 table-spoonfuls, *ad libitum*, as a demulcent and emollient in coughs and colds, or as a vehicle for more active medicines.

Mixture, Ammoni'acum. *Syn.* EMULSION OF AMMONIACUM, MILK OF A.; MISTURA AMMONIACI (B. P., Ph. L. & D.), LAC AMMONIACI, L. *Prep.* 1. (Ph. L.) Prepared ammoniacum, 5 drs.; distilled water, 1 pint; rub the ammoniacum with the water, gradually added, until they are perfectly mixed.

2. (Ph. D.) Ammoniacum, ¼ oz.; water, 8 fl. oz.; as the last, but straining through muslin.

3. (B. P.) Ammoniacum, ¼ oz.; rubbed down with water, 8 oz., and strain.—*Dose.* ½ to 1 gr.

Obs. The last formula produces the best and most effective mixture, owing to the use of the raw instead of the strained drug.—*Dose.* 1 to 2 table-spoonfuls, either alone or combined with squills or ipecacuanha; as an expectorant and demulcent in chronic coughs, humoral asthma, &c.

Mixture, A'nodyne. *Syn.* MISTURA ANODYNA, JULEPUM CALMANS, L. *Prep.* 1. Prepared chalk, 2 drs.; syrup of poppies, 1 oz.; fetid spirit of ammonia, 1½ dr.; oils of dill and aniseed, of each, 3 drops; water, 4½ fl. oz.—*Dose.* A teaspoonful 3 or 4 times a day; in the diarrhœa and colic of infancy.

2. (P. Cod.) Syrup of opium, 2 drs.; syrup of orange flowers, 6 drs.; lettuce water, 4 fl. oz. To allay pain, induce sleep, &c. *Dose.* 1 table-spoonful.

3. (Vicat.) Ammoniated alcohol, ⅔ fl. oz.; powdered opium, 1 dr.; powdered camphor, ½ dr.; proof spirit, 1½ fl. oz.; digest, with agitation, for 3 or 4 days, and filter. In toothache arising from caries, and as a lotion to the temples in headache.

Mixture, Anti-emet'ic. *Syn.* MISTURA ANTIEMETICA, L. *Prep.* 1. Creasote, 12 drops; acetate of morphia, 1½ gr.; camphor, 10 grs.; rectified spirit, ½ fl. oz.; syrup of orange peel, 1½ fl. oz.; distilled vinegar, 4 fl. oz In seasickness, &c.—*Dose.* 1 table-spoonful on the approach of vomiting, and repeated at intervals of ½ an hour until the vomiting ceases.

2. (Dr. Barker.) Compound tincture of camphor, 1 fl. dr.; burnt brandy, 1 fl. oz.; sugar, ½ oz.; infusion of mint, 6 fl. oz.—*Dose.* ½ to 1 table-spoonful, every ½ hour, until the vomiting ceases.

Mixture, Antac'id. *Syn.* ABSORBENT MIXTURE, ALKALINE M.; MISTURA ALKALINA, M. ANTACIDA, L. *Prep.* 1. Liquor of potassa and spirit of nutmeg, of each, 2 fl. drs.; tincture of rhubarb, 3 fl. drs.; tincture of opium, 1 fl. dr.; water, 5 fl. oz. In dyspepsia, heartburn, &c., accompanied with flatulence.

2. Spirit of sal volatile and orange-flower water, of each, 1 fl. oz.; simple syrup, 1½ fl. oz.; water, 2½ fl. oz. In acidity, &c., accompanied with languor and low spirits.

3. Sesquicarbonate of ammonia, 2 drs.; syrup of orange peel and tincture of gentian, of each, 1 fl. oz.; water, 4 fl. oz. In dyspepsia, heartburn, &c., arising from excessive indulgence in spirituous or fermented liquors. It also possesses considerable stimulating properties, and will partially remove the fit of drunkenness.

4. (Collier.) Prepared chalk, 2 drs.; tincture of ginger, 2 fl. drs.; compound tincture of cardamoms, 1½ fl. oz.; pimento water, 6 fl. oz. In diarrhœa accompanied with acidity.

5. (Collier.) Chalk mixture, 5 fl. oz. tinctures of catechu and cinnamon, of each, ½ fl. oz. In chronic diarrhœa.

6. (Ryan.) Liquor of potassa, 2 fl. dr.; tincture of opium, 1 fl. dr.; calcined magnesia, 1 dr.; oil of peppermint, 5 drops; lime water, 8 fl. oz. In dyspepsia accompanied with acidity, flatulence, and constipation.

Mixture, Anticroup'al. *Syn.* MISTURA SENEGÆ, L. *Prep.* (Jadelot.) Infusion of senega, 4 oz.; syrup of ipecacuanha, 1 oz.; oxymel of squills, 3 drs.; tartarized antimony 1½ gr.; mix. By spoonfuls, in croup.

Mixture, Anti-epilep'tic. *Syn.* MISTURA ANTI-EPILEPTICA, L. *Prep.* (M. Lemoine.) Liquor of ammonia, 12 drops; syrup of orange flowers, 1 oz.; distilled water of linden flowers, 2 oz.; do. of cherry laurel, ½ oz.; mix. According to M. Lemoine, this is a specific in epilepsy.—*Dose.* 1 table-spoonful, or more.

Mixture, Antihyster'ic. *Syn.* MISTURA ANTIHYSTERICA, L.; POTION ANTIHYSTERIQUE, Fr. *Prep.* (Dr. Josat.) Cyanide of potassium, 1⅔ gr.; distilled lettuce water, 4½ fl. oz.; syrup of orange flowers, 1½ fl. oz.—*Dose.* 1 or 2 teaspoonfuls every ten minutes, when the fit is expected; during the fit it may be given in double doses. Dr. Josat declares its efficacy to have been indisputably proved, in upwards of 55 cases.

2. (Magendie.) Cyanide of potassium, 2 grs.; lettuce water (distilled), 4 oz.; syrup of marshmallow, 2 oz. Resembles the last.

3. (Dr. Paris.) Assafœtida, 1 dr.; peppermint water, 5 fl. oz.; make an emulsion, and add of ammoniated tincture of valerian, 2 fl. drs.; tincture of castor, 3 fl. drs.; sulphuric ether, 1½ fl. dr.—*Dose.* 1 table-spoonful, 3 or 4 times a day, or oftener.

4. (P. Cod.) Syrup of wormwood, 1 oz.; tincture of castor, ½ dr.; valerian water and orange-flower water, of each, 2 oz.; ether, 1 dr. As the last.

Mixture, Antimo"nial. See CONTRA-STIMULANT MIXTURE.

Mixture, Antipertus'sic. *Syn.* MISTURA ANTIPERTUSSIENS, L. *Prep.* 1. COCHINEAL (powdered), 2 drs.; carbonate of potassa, 1 dr.; boiling water, 8 fl. oz.; infuse for 1 hour, strain, and add of lump sugar, 1½ oz.

2. (Dr. Bird.) Extract of hemlock, 12 grs.; alum, 25 grs.; syrup of red poppies, 2 fl. drs.; dill water, 3 fl. oz.

3. (Dr. Reece.) Tincture of assafœtida, 1 fl. dr.; tincture of opium, 10 or 12 drops; powdered ipecacuanha, 10 grs.; water, 2 fl. oz.—*Dose.* A teaspoonful every 3 hours, in hooping cough, for a child 2 or 3 years old, and other ages in proportion.

Mixture, Antiscrof'ulous. *Syn.* MISTURA ANTISCROFULOSA, L. *Prep.* From tincture of bichloride of gold, 30 drops; tincture of iodine, 40 drops; tincture of gentian, 1 fl. dr.; simple syrup, 7 fl. drs.; rose water, 5 fl. oz.—*Dose.* A dessert-spoonful, 3 or 4 times daily, in a wineglassful of water; observing to shake the bottle before pouring out the liquid. Mr. Cooley states that he has seen repeated instances of the excellent effects of this medicine

in scrofula, syphilis, and various glandular diseases, even under all the disadvantages of a salt-meat diet and confinement on shipboard.

Mixture, Antispasmod'ic. *Syn.* MISTURA ANTISPASMODICA, L. *Prep.* 1. Tincture of castor, 6 fl. drs.; sulphuric ether and laudanum, of each, 1 fl. dr.; syrup of saffron, 1 fl. oz.; cinnamon water, 4 fl. oz.

2. (Dr. Collier.) Assafœtida and camphor mixtures, of each, 2½ fl. oz.; tincture of valerian, 1 fl. oz.

3. (P. Cod.) Lime or linden-flower water and orange-flower water, of each, 2 oz.; syrup of orange flowers, 1 oz.; ether, ½ dr.—*Dose.* (Of each of the above) 1 to 2 table-spoonfuls.

Mixture, Ape"rient. *Syn.* MISTURA APERIENS, L. *Prep.* 1. (Abernethy.) Sulphate of magnesia, 1 oz.; manna, ½ oz.; infusion of senna, 1½ fl. oz.; tincture of senna, ½ fl. oz.; mint water, 2 fl. oz.; distilled water, 4 fl. oz.; mix. This is the true 'ABERNETHY BLACK DRAUGHT.'

2. (Dr. Christison.) Sulphate of magnesia, 1½ oz.; water, 4 fl. oz.; dissolve, and add, of tincture of senna, 1 fl. oz.; infusion of roses, 4 fl. oz.—*Dose.* A wine-glassful hourly, until it begins to operate.

3. (Dr. Collier.) Sulphate of iron, 20 grs.; Epsom salt, 1 oz.; pennyroyal water, 1 pint; dissolve.—*Dose.* A wine-glassful twice a day, in atonic amenorrhœa.

Mixture, Aromat'ic. *Syn.* MISTURA AROMATICA, L. *Prep.* 1. (P. Cod.) Syrup of clove gillyflowers, 1 oz.; spirit of cinnamon, ½ oz.; confection of hyacinth, 2 drs.; peppermint water and orange-flower water, of each, 2 oz.

2. (Guy's Hosp.) Aromatic confection (Ph. L., in powder), 3 drs.; peppermint water, 9 fl. oz. Sometimes a little tincture of calumba is added.

3. (St. B. Hosp.) Aromatic confection, 2½ drs.; water, 5 fl. oz.; pimento water, 3 fl. oz.; mix. The last two are excellent aromatic absorbents in diarrhœa, heartburn, flatulence, acidity, &c.—*Dose.* 1 or 2 table-spoonfuls every 2 or 3 hours, or as required.

Mixture, Aromatic Iron. Pale bark, in powder, 4; calumba, in powder, 2; cloves, bruised, 1; iron wire, 2; compound tincture of cardamoms, 12; tincture of orange peel, 2; peppermint water, 50; macerate the first four ingredients in the last one for three days, agitating occasionally, filter, add the tinctures, and make up to 50. *Used* as a tonic.—*Dose.* 1 to 2 oz.

Mixture, Arsen'ical. *Syn.* MISTURA ARSENICALIS, L. *Prep.* From liquor of arsenite of potassa—Ph. L., 2 fl. drs.; compound tincture of cardamoms, 4 fl. drs.; cinnamon water, 2 fl. oz.; pure water, 3 fl. oz.; mix.—*Dose.* A small table-spoonful, twice a day, after a full meal; in agues, periodic headaches, lepra, psoriasis, chronic rheumatism, &c. It should be exhibited with caution, and its effects watched; and after 5 or 6 days the dose should be reduced to half the quantity.

Mixture, Astrin'gent. *Syn.* MISTURA ASTRINGENS, L. *Prep.* 1. (Pradel.) Tannin, 12 grs.; tincture of rhatany, 1 dr.; simple syrup, 7 drs.; mucilage, 1 oz.; camphor mixture, 4 oz.

2. (A. T. Thomson.) Extract of catechu, 2 drs. (or tincture, 1 oz.); cinnamon water, 8 oz.; dissolve.—*Dose.* 1 to 3 table-spoonfuls, after every liquid dejection, in diarrhœa and dysentery.

Mixture, Atroph'ic. *Syn.* MISTURA ATROPHICA, L.; POTION ATROPHIQUE, Fr. *Prep.* (Magendie.) Iodide of potassium, 4 drs.; lettuce water, 8 oz.; peppermint water, 2 drs.; syrup of marsh-mallow, 1 oz.—*Dose.* 1 table-spoonful, twice a day; in hypertrophy (enlargement) of the heart. Sometimes 1 to 2 drs. of tincture of foxglove is added to the mixture.

Mixture, Bar'ley. *Syn.* MISTURA HORDEI, L. See DECOCTION.

Mixture, Brandy. *Syn.* MIXTURE OF SPIRIT OF FRENCH WINE, EGG FLIP‡; MISTURA SPIRITUS VINI GALLICI (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) Brandy and cinnamon water, of each, 4 fl. oz.; yolks of 2 eggs; white sugar, ½ oz; oil of cinnamon, 2 drops; mix. A valuable stimulant and restorative, in low fevers, and in extreme exhaustion from hæmorrhages, &c.; but scarcely a fitting subject for the labours of the College of Physicians, since almost every cook and housewife could produce a better compound than the product of the College formula.

2. (B. P.) Brandy, 4 grs.; cinnamon water, 4 oz.; the yolks of 2 eggs; sugar, ½ oz.; mix.—*Dose.* ½ to 1½ oz., in prostration and last stages of fever.

Mixture, Cam'phor. *Syn.* CAMPHOR JULEP, CAMPHOR WATER; MISTURA CAMPHORÆ (Ph. L. & D.), EMULSIO CAMPHORÆ (Ph. E.), MISTURA CAMPHORATA, L. *Prep.* 1. (Ph. L.) Camphor, ½ dr.; rectified spirit, 10 drops; triturate together, gradually adding of water, 1 pint; and strain through linen.

2. (Ph. D.) Tincture of camphor, 1 fl. oz.; distilled water, 3 pints; agitate well together, and after 24 hours filter through paper.

3. (Ph. E.) See EMULSION.

Uses, &c. Camphor julep is chiefly used as a vehicle for other medicines.—*Dose,* ½ to 1 wine-glassful.

4. (With MAGNESIA: MISTURA CAMPHORÆ CUM MAGNESIA—Ph. E. & D., AQUA CAMPHORÆ—Ph. U. S.)—*a.* (Ph. E.) Camphor, 10 grs., carbonate of magnesia, 25 grs.; triturate together, then gradually add of water, 6 fl. oz., still continuing the trituration.

b. (Ph. D.) Camphor, 12 grs.; carbonate of magnesia, ½ dr.; water, 6 fl. oz.; as last.

c. (Ph. U. S.) Camphor, 2 drs.; rectified spirit, 40 drops; triturate, add of carbonate of magnesia, 4 drs., and again triturate, adding, gradually, of water, 32 fl. oz. Antacid, antispasmodic, and anodyne.—*Dose.* 1 to 2 table-spoonfuls. Used without straining. It is stronger than the simple mixture.

Mixture, Carmin'ative. *Syn.* MISTURA CARMINATIVA, L. *Prep.* (Dr. Paris.) Calcined magnesia, ½ dr.; peppermint water, 2½ fl. dr.; compound tincture of lavender, ½ fl. dr.; spirit of caraway, 4 fl. drs.; syrup of ginger, 2 fl. drs.; mix. Antacid and carminative. For 1 or 2 doses.

Mixture, Cathar'tic. See APERIENT MIXTURE, SENNA M., &c.

Mixture, Chalk. *Syn.* CRETACEOUS MIXTURE; MISTURA CRETÆ (B. P.); MISTURA CRETA (Ph. L. E. & D.); M. CRETACEA, L. *Prep.* 1. (Ph. L.) Prepared chalk, ½ oz.; sugar, 3 drs.; mixture of acacia (mucilage), 1½ fl. oz.. triturate together, then add of cinnamon water, 18 fl. oz.

2. (Ph. E.) Prepared chalk, 10 drs.; white sugar, 5 drs.; mucilage, 3 fl. oz.; spirit of cinnamon, 2 fl. oz.; water, 1 quart; as the last.

3. (Ph. D.) Prepared chalk, 2 drs.; syrup and mucilage, of each, ½ oz.; cinnamon water, 7 fl. oz.

4. (B. P.) Prepared chalk, 1; gum arabic, in powder, 1 ; syrup, 2; cinnamon water, 30; mix by trituration.—*Dose.* 1 to 2 grs., with astringent tinctures and opium.

Obs. The above are antacid and absorbent. —*Dose.* 1 to 3 table-spoonfuls, either alone or combined with aromatic confection; in heartburn, and in diarrhœa after every liquid motion. In the latter affection, a little tincture of catechu or laudanum is often added; and when there is vomiting or nausea, either peppermint or spearmint water is generally substituted for the whole or a part of the simple water ordered in the above formulæ.

Mixture, Cincho'na. *Syn.* BARK MIXTURE; MISTURA CINCHONÆ, L. *Prep.* (Copland.) Confection of roses, ½ oz.; boiling decoction of bark, 1 fl. oz.; triturate, in 10 minutes strain, and add diluted sulphuric acid, 1½ fl. dr.; spirit of nutmeg, 4 fl. drs. Febrifuge, tonic, and stomachic. *Dose.* 1 to 3 table-spoonfuls, 2 or 3 times a day.

Mixture, Col'chicum. *Syn.* GOUT MIXTURE; MISTURA ANTARTHRITICA, M. COLCHICI, L. *Prep.* (Sir C. Scudamore.) Magnesia, 1½ dr.; vinegar of colchicum and syrup of orange peel, of each, 4 fl. drs.; peppermint water, 3 fl. oz. A table-spoonful every 3 or 4 hours during the fit of gout.

Mixture, Contra-stim'ulant. *Syn.* MISTURA CONTRA-STIMULANS, JULEPUM C., M. ANTIMONII POTASSIO-TARTRATIS, L. *Prep.* (Laennec.) Tartar emetic, 3 grs.; infusion of orange leaves, 8 fl. oz.; syrup of do., 1 fl. oz.—*Dose.* A wine-glassful, or more, every 2 hours; in inflammation of the lungs, hooping cough, &c.

Mixture, Cough. *Syn.* MISTURA BECHICA, L. *Prep.* 1. Almond mixture, 4 fl. oz.; oxymel of squills, 1 fl. oz.; ipecacuanha wine and syrup of tolu, of each, ½ fl. oz.

2. Tincture of tolu, ½ fl. oz.; paregoric elixir and tincture of squills, of each, 1 fl. oz.; syrup of poppies, 2 fl. oz.; water, 3½ fl. oz.

3. Mixture of ammoniacum, 4 fl. oz.; syrup of squills, 2 fl. oz. In the coughs of old persons.

4. Antimonial wine, 3 fl. drs.; syrup of poppies, 1½ fl. oz.; water, 4 fl. oz. In dry, husky coughs.—*Dose.* (of each of the above), 1 table-spoonful, 2 or 3 times a day, or oftener.

5. (Dr. Monro. Paregoric, ½ fl. oz.; sulphuric ether and tincture of tolu, of each, ½ oz. —*Dose.* A teaspoonful, in water, night and morning, or when the cough is troublesome.

6. (Dr. Radcliff.) Syrup of poppies, syrup of squills, and paregoric, equal parts.—*Dose.* As the last. In all cases the bowels should be kept gently moved by some mild aperient.

Mixture, Cre'asote. *Syn.* MISTURA CREASOTI, M. CREAZOTI (B. P., Ph. E.), L. *Prep.* 1. (Ph. E.) Creasote and acetic acid, of each, 16 drops; mix, then add of compound spirit of juniper and syrup, of each, 1 fl. oz.; water, 14 fl. oz.; and agitate well together.—*Dose.* ½ to 1 wine-glassful, in nausea and vomiting, especially to prevent or relieve sea-sickness.

2. (B. P.) Creasote, 16 minims; glacial acetic acid, 16 minims; spirit of juniper, ½ dr.; syrup, 1 oz.; distilled water, 15 oz.; mix.—1 to 2 oz.

Mixture, Demul'cent. *Syn.* MISTURA DEMULCENS, L. See ALMOND MIXTURE, GUM M., &c.

Mixture, Diaphoret'ic. *Syn.* MISTURA DIAPHORETICA, L. *Prep.* 1. Solution of acetate of ammonia, 3 fl. oz.; antimonial wine, 2 fl. drs.; tincture of henbane, 1½ fl. dr.; camphor mixture, 3 fl. oz.—*Dose.* 1 table-spoonful every 3 or 4 hours; in fevers, &c.

2. To the last add of sweet spirit of nitre, ½ fl. oz. As above.

Mixture, Diarrhœ'a. See CHALK MIXTURE, &c.

Mixture, Diuret'ic. *Syn.* MISTURA DIURETICA, L. *Prep.* 1. Nitrate of potassa, 2 drs.; sweet spirit of nitre, 3 fl. dr.; syrup of squills, 1½ fl. oz.; peppermint water, 4 fl. oz.

2. (A. T. Thomson.) Infusion of foxglove, 5½ fl. oz.; tincture of foxglove, ½ fl. dr.; acetate of potassa, 2 drs.; spirit of juniper, ½ fl. oz.; tincture of opium, ½ fl. dr. In dropsy. *Dose.* 1 to 2 table-spoonfuls, every 2 or 3 hours. The last must be used with caution.

Mixture, Emet'ic. *Syn.* MISTURA EMETICA, L. *Prep.* 1. (Copland.) Sulphate of zinc, 40 grs., ipecacuanha wine and tincture of serpentary, of each, 4 fl. drs.; tincture of capsicum, 40 drops; oil of chamomile, 12 drops; peppermint water, 4½ fl. oz. As an excitant emetic; in cases of poisoning by narcotics, &c.

2. (Magendie.) Coloured emetine, 4 grs. (or white emetine, 1 gr.); acetic acid, 8 drops; mix, and add of infusion of orange leaves or lime flowers, 3½ fl. oz.; syrup of marsh-mallows, 1 fl. oz.

3. (A. T. Thomson.) Ipecacuanha, ½ dr.; tartar emetic, 1 gr.; tincture of squills, 1 fl.

dr.; water, 6 fl. oz. *Dose.* 1 to 2 table-spoonfuls, followed by half the quantity every 10 or 15 minutes, until vomiting is produced; at the same time assisting the action of the medicine by drinking copiously of warm water.

Mixture, Emmen'agogue. See STEEL MIXTURE, &c.

Mixture, Expec'torant. *Syn.* MISTURA EXPECTORANS, L. *Prep.* 1. (Collier.) Oxymel of squills and mucilage, of each, 1 oz.; syrup of marsh-mallows, 2 oz.; camphor julep, 3 fl. oz. —*Dose.* 1 to 2 table-spoonfuls, 2 or 3 times a day; in coughs, hoarseness, asthma, &c.

2. (A. T. Thomson.) Almond mixture, 5 fl. oz.; ipecacuanha wine and tincture of squills, of each, 1 fl. dr.; syrup of tolu, 6 fl. drs.—*Dose.* 1 table-spoonful; in humoral asthma, catarrh, &c., when the cough is urgent.

Mixture, Feb'rifuge. *Syn.* MISTURA FEBRIFUGA, L. See ACETATE OF AMMONIA MIXTURE, DIAPHORETIC M., &c.

Mixture, Gentian (Compound). Gentian, bruised, 1½; bitter orange peel, bruised, ⅔; cardamom seeds, bruised, ¼; proof spirit, 20: macerate for forty-eight hours with 15 of the spirit, agitating occasionally, pack in a percolator, let it drain, and then pour on the remaining spirit; when it ceases to drop, wash the marc with spirit to make up 20.—*Dose.* 1 to 2 drachms.

Mixture, Gregory's. See POWDERS.

Mixture, Griffith's. See STEEL MIXTURE.

Mixture, Guai'acum. *Syn.* EMULSION OF GUAIACUM, MILK OF G.; MISTURA GUAIACI (B. P.), (Ph. L. & E.), LAC G., L. *Prep.* (Ph. L.) Gum guaiacum, 3 drs.; white sugar, ½ oz.; gum acacia, 2 drs. (all in powder); triturate together, and to these, whilst rubbing, gradually add of cinnamon water, 1 pint.

2. (Ph. E.) Guaiacum, 3 drs.; sugar, ½ oz.; mucilage, ½ fl. oz.; cinnamon water, 19½ fl. oz.; as before.—*Dose.* 1 to 3 table-spoonfuls, 2 or 3 times a day; in chronic rheumatism, gout, &c.

3. (B. P.) Guaiac resin, in powder, 2; sugar, 2; gum arabic, in powder, 1; cinnamon water, 80; triturate, adding the cinnamon water gradually.—*Dose.* ½ to 2 oz.

Mixture, Gum. *Syn.* MUCILAGE; MISTURA ACACIÆ (Ph. L.), MUCILAGO (Ph. E.), MUCILAGO ACACIÆ (Ph. D.), MUCILAGO ARABICI GUMMI, L. *Prep.* 1. (Ph. L.) Gum acacia (in powder), 13 oz.; boiling distilled water, 1 pint; rub the gum with the water, gradually poured in, until solution is complete.

2. (Ph. E.) Gum, 9 oz.; cold water, 1 pint; macerate, with occasional stirring, until dissolved, then strain through linen or calico.

3. (Ph. D.) Gum (coarsely powdered), 4 oz.; water (cold), 6 fl. oz.; dissolve, and strain through flannel.

Uses, &c. Mucilage of gum acacia is chiefly employed to render oily and resinous substances miscible with water. "Oils require about ⅔ their weight; balsams and spermaceti, equal parts; resins, 2 parts; and musk, 5 times its weight," for this purpose. (Montgomery.) The GUM MIXTURE, Ph. E., will be found under 'EMULSION.'

Mixture, Hydrocyan'ic. *Syn.* MIXTURE OF PRUSSIC ACID; MISTURA ACIDI HYDROCYANICI, L. *Prep.* From medicinal prussic acid, 15 drops; simple syrup (pure), 1 fl. oz.; distilled water, 5 fl. oz.—*Dose.* 1 table-spoonful, 2 or 3 times daily. Each dose contains 1¼ drop of medicinal prussic acid. The bottle should be shaken before pouring out the dose. Magendie's formulæ for this mixture are omitted, because the acid which he orders is not kept in the shops in England.

Mixture, I'ron. See STEEL MIXTURE.

Mixture, I'ron (Compound). See STEEL MIXTURE.

Mixture, Marsh-mallow. *Syn.* MISTURA ALTHÆÆ (Ph. E.), L. *Prep.* (Ph. E.) Marsh-mallow root (dried), 4 oz.; stoned raisins, 2 oz.; water, 5 pints; boil to 3 pints, strain through linen, and after the sediment has subsided, decant the clear portion.

2. (Ph. D.) See DECOCTION. Demulcent.—*Dose.* A few spoonfuls *ad libitum*, so as to take 1 to 3 pints in the 24 hours; in strangury, calculus, coughs, fevers, &c.

Mixture, Myrrh. *Syn.* EMULSION OF MYRRH; MISTURA MYRRHÆ, L. *Prep.* (Copland.) Myrrh, 1½ dr.; add to it gradually, triturating all the time, decoction of liquorice, 6 fl. oz., and strain.—*Dose.* 1 to 2 table-spoonfuls, twice or thrice a day, combined with carbonate of soda, dilute hydrochloric acid, or paregoric; in debility, and diseases of the digestive organs.

Mixture, Narcot'ic. *Syn.* MISTURA NARCOTICA, M. FEBRIFUGA, L. *Prep.* 1. Tincture of henbane, 2 fl. drs.; solution of acetate of ammonia, 3 fl. oz.; water, 2½ fl. oz.; mix.—*Dose.* 1 to 2 table-spoonfuls, to relieve pain, procure sleep in fevers, &c.

2. (W. Cooley.) Laudanum, 1½ fl. dr.; syrup of poppies, sulphuric ether, and spirit of cinnamon, of each, 1 oz.; tincture of henbane, 2½ fl. dr.; tincture of capsicum, 4 fl. drs.; water, 2 fl. oz.—*Dose.* 1 to 2 table-spoonfuls, at the commencement of the hot fit of ague.

Mixture, Oleo-balsam'ic. *Syn.* MISTURA OLEO-BALSAMICA, L. *Prep.* (Hamb. Cod.) Oils of cedrat, cinnamon, cloves, lavender, mace, and marjoram, of each, 20 drops; oil of rue, 10 drops; balsam of Peru, ½ dr.; rectified spirit, 10 oz.; digest and filter.

Mixture, Pur'gative. *Syn.* MISTURA CATHARTICA, M. LAXATIVA, M. PURGANS, L. *Prep.* 1. From any of the purging salts (Epsom, Glauber, tasteless, &c.), 2 oz.; infusion of senna, 5 fl. oz.; syrup of orange peel, 1 fl. oz.; tincture of ginger, ½ fl. oz.; spirit of pimento, 2 fl. drs.; mix.—*Dose.* 1 to 3 table-spoonfuls, early in the morning; as an aperient in stomach complaints, &c.

2. (Dr. Copland.) Manna, 1½ oz.; cream of tartar, ½ oz.; whey, 1 quart. By wine-glassfuls, as an aperient drink, in fevers, &c.

3. (Corvisart.) Borotartrate of potassa (soluble tartar), 1 oz.; tartar emetic, ½ gr.; sugar, 2 oz.; water, 1½ pint; dissolve. By wine-glassfuls, until it begins to operate. This has been called 'NAPOLEON'S MEDICINE,' from its having been frequently taken by Napoleon I. See MIXTURES OF SCAMMONY, SENNA, &c.

Mixture, Saline. *Syn.* MISTURA SALINA, L. See DRAUGHT and LEMONADE.

Mixture, Scam'mony. *Syn.* SCAMMONY MILK; MISTURA SCAMMONII (B. P.), L. *Prep.* 1. (Ph. E.) Resin of scammony, 7 grs.; unskimmed milk, 3 fl. oz.; gradually mix, triturating all the time, so as to form an emulsion. Purgative.—*Dose.* One half.

2. (Planche's PURGATIVE POTION.) To the last add of white sugar, ¼ oz.; cherry-laurel (or bitter-almond) water, 4 or 5 drops. The above are the most tasteless and pleasant purgatives of an active character known.

3. (B. P.) Resin of scammony, 4 grs.; fresh milk, 2 oz.; triturate and form an emulsion. —*Dose.* The quantity of the formula for an adult, half for a child.

Mixture, Sen'na (Compound). *Syn.* BLACK DRAUGHT, ABERNETHY'S D., CATHARTIC MIXTURE; MISTURA SENNÆ COMPOSITA (B. P.), L. *Prep.* 1. Infusion of senna, ¾ pint; tincture of senna, 1½ fl. oz.; Epsom salts, 4 oz.; carbonate of ammonia, ½ dr.; sugar, 3 oz. agitate until the solids are dissolved.

2. Senna, 13 oz.; boiling water, 2 quarts; digest for 4 hours in a hot place, then press out the liquor in a tincture press, and add, of compound tincture of senna, ¾ pint; Epsom salts, 1 lb.

3. East India senna, 2 lb.; boiling water, 9 quarts; tincture of senna and Epsom salt, of each, 3¼ lb.; as the last.

4. Senna, 8 lbs.; boiling water, 9 galls.; Epsom salt, 16 lbs.; tincture of senna, 1½ galls.; treacle and colouring, of each, 1 quart.

5. (Guy's Hosp.) Senna and mint, of each, 1¼ oz. (say, 1½ oz.); boiling water, 1 quart; Epsom salt, 7½ oz. (say, ½ lb.).

6. (Redwood.) Infusion of senna, 18 oz.; tincture of senna, 3 oz.; sulphate of magnesia, 6 oz.; extract of liquorice and spirit of sal volatile, of each, ¾ oz.; oil of cloves, 6 drops.

7. (B. P.) Infusion of senna, 14; sulphate of magnesia, 4; extract of liquorice, ½; tincture of senna, 2½; compound tincture of cardamoms, 1¼: dissolve and mix.—*Dose.* 1 to 1½ oz.

Obs. As the above mixture contains very little spirit, and from its great consumption, being made in large quantities at a time, it frequently spoils before the whole is sold, especially in hot weather. To avoid this, 1½ dr. of cloves and 3 drs. of mustard seed, both bruised, may be added to every gall. of the strained liquor at the same time with the salts, spirit, and colouring, after which it must be shaken up repeatedly for a few days, and then allowed to repose for a few days more, when it will become quite clear. It may be filtered through a flannel bag, but there is much loss and delay, owing to the consistence of the liquid. It is purgative in doses of 1 to 1½ fl. oz.

It is a singular circumstance, that although an enormous quantity of this preparation is consumed in these countries, there is no standard formula for it in the British Pharmacopœias. See APERIENT MIXTURE, &c.

Mixture, Steel. *Syn.* MISTURA FERRI COMPOSITA (B. P.), MISTURA CHALYBEATA, L. Two compounds of this class are officinal:—

1. (GRIFFITH'S MIXTURE, COMPOUND IRON M.; MISTURA FERRI, M. F. PROTOXYDI, M. F. COMPOSITA—Ph. L. E. & D.) *Prep.—a.* (Ph. L. & E.) Carbonate of potassa, 1 dr.; powdered myrrh, 2 drs.; spirit of nutmeg, 1 fl. oz.; triturate together, and whilst rubbing, add gradually, of sugar, 2 drs.; rose water, 18 fl. oz.; mix well; then add of sulphate of iron (powdered), 50 grs., and place it at once in a bottle, which must be kept closely corked.

b. (Ph. D.) Powdered myrrh and sugar, each, 1 dr.; carbonate of potassa, ½ dr.; essence of nutmeg, 1 fl. dr.; rose water, 7 fl. oz.; sulphate of iron, ½ dr.; (dissolved in) rose water, 1 fl. oz.—*Dose.* 1 to 2 oz., 3 or 4 times a day, as a mild and genial chalybeate tonic and stimulant; in amenorrhœa, chlorosis, debility, &c., when there is no determination of blood to the head.

2. (HEBERDEN'S MIXTURE, H.'S INK; ATRAMENTUM HEBERDII; MISTURA FERRI AROMATICA—Ph. D.) Pale cinchona bark, 1 oz.; calumba root, 3 drs.; (both in coarse powder;) cloves (bruised), 2 drs.; iron filings, ½ oz.; peppermint water, 16 fl. oz.; digest in a close vessel for 3 days, agitating frequently, then strain, and add of tincture of cardamoms (comp.), 3 fl. oz.; tincture of orange peel, 3 fl. dr. Bitter, stomachic, and aromatic.—*Dose.* 1 or 2 table-spoonfuls, or more, 3 or 4 times a day. It is very slightly chalybeated. See also AROMATIC IRON MIXTURE.

3. Sulphate of iron, 25 grs.; carbonate of potash, 30 grs.; myrrh, 60 grs.; sugar, 60 grs.; spirit of nutmegs, 4 drs.; rose water, 9½ oz. Reduce the myrrh to powder, add the carbonate of potash of sugar, and triturate them with a small quantity of rose water so as to form a thin paste, then gradually add more rose water, and the spirit of nutmegs, continuing the trituration and further addition of rose water until about eight fluid ounces of milky liquid is formed, then add the sulphate of iron previously dissolved in the remainder of the rose water and cork the bottle immediately.—*Dose.* 1 to 2 oz. as a stimulating tonic.

Mixture, Ton'ic. *Syn.* STRENGTHENING MIXTURE; MISTURA TONICA, L. *Prep.* 1. Infusion of cascarilla, 5 fl. oz.; tincture of orange peel, 7 fl. drs.; aromatic sulphuric acid, 2 fl. drs.

2. (Collier.) Decoction of bark, 5½ fl. oz.;

minute pores of the fibres, and rendering them insoluble in the alkaline, soapy, and other liquids, to the action of which they will subsequently be exposed. When an infusion of some dye-stuff, as cochineal or madder, for example, is mixed with alum or acetate of alumina, and a little alkali, a precipitate immediately forms, consisting of alumina in combination with colouring matter, constituting a LAKE. It is by a similar reaction occurring within the fibres that the permanent dyeing of the cloth is effected. Here the colouring matter of the dyeing materials not only passes from the soluble to the insoluble form, but it enters into chemical combination with other substances, and in the new compounds it assumes greater brilliancy and permanency than it previously possessed. Annotta and safflower afford instances of the second mode of action above referred to, by which substances operate as mordants. The colouring matter of these dye-stuffs is soluble in alkaline lyes, and into a solution of this kind the cloth is dipped. It has now received an extremely fugitive colour only; but by passing it through acidulated water the alkaline solvent is abstracted, and the tinctorial matter is precipitated in an insoluble and minutely divided state within its pores, and it becomes permanently dyed. A similar reaction takes place in dyeing with the 'indigo vat,' in which atmospheric oxygen performs the part of a mordant. It is believed that even in these cases the colouring principle, during its transition from the liquid to the solid form, enters into combination with the fibres of the organic substance, and that, in proportion to the affinity existing between the two, is the integrity and excellence of the dye. In wool and silk, the affinity between their filaments and the tinctorial particles of the dye-bath is, in general, so considerable, that a permanent stain is very easily communicated to them; but with cotton and flax, the materials of which calico and linen goods are made, the reverse is the case, and the intervention of a third material, in the shape of a mordant, is absolutely necessary to dye them of a permanent colour.

"Experience has proved that, of all the bases, those which succeed best as mordants are alumina, tin, and oxide of iron; the first two of which, being naturally white, are the only ones which can be employed for preserving to the colour its original tint, at least without much variation. But whenever the mordant itself is coloured, it will cause the dye to take a compound colour quite different from its own. If, as is usually said, the mordant enters into a real chemical union with the stuff to be dyed, the application of the mordant should obviously be made in such circumstances as are known to be most favorable to the combination taking place; and this is the principle of every day's practice in the dye-house.

"In order that a combination may result between two bodies, they must not only be in contact, but they must be reduced to their ultimate molecules. The mordants to be united with stuffs are, as we have seen, insoluble in themselves, for which reason their particles must be divided by solution in an appropriate vehicle. Now, this solvent or menstruum will exert in its own favour an affinity for the mordant, which will prove to that extent an obstacle to its attraction for the stuff. Hence we must select such solvents as have a weaker affinity for the mordants than the mordants have for the stuffs. Of all acids which can be employed to dissolve alumina, for example, vinegar (acetic acid) is the one which will retain it with the least energy, for which reason the acetate of alumina is now generally substituted for alum, because the acetic acid gives up the alumina with such readiness, that mere elevation of temperature is sufficient to effect the separation of these two substances. Before the substitution of the acetate, alum alone was employed; but without knowing the true reason, all the French dyers preferred the alum of Rome, simply regarding it to be the purest; it is only within these few years that they have understood the real grounds of this preference.

"The two principal conditions, namely, extreme tenuity of particles and liberty of action, being found in a mordant, its operation is certain. But as the combination to be effected is merely the result of the play of affinity between the solvent and the stuff to be dyed, a sort of partition must take place, proportioned to the mass of the solvent, as well as to its attractive force. Hence the stuff will retain more of the mordant when its solution is more concentrated, that is, when the base diffused through it is not so much protected by a large mass of menstruum; a fact applied to very valuable uses by the practical man. On impregnating, in calico printing, for example, different spots of the same web with the same mordant in different degrees of concentration, there is obtained in the dye-bath a depth of colour upon these spots intense in proportion to the strength of their various mordants. Thus, with solution of acetate of alumina in different grades of density, and with madder, every shade can be produced from the fullest red to the lightest pink and with acetate of iron and maddder, every shade from black to pale violet." (Ure.)

In the employment of mordants in the ordinary processes of dyeing, the goods are passed through the solution for a period varying, under different circumstances, according to the object in view. The cloth is subsequently aired, dried, and well rinsed, before immersing it in the colouring bath. In *calico printing* the mordant is applied partially or topically to the cloth by means of wooden blocks, or some similar contrivance; or certain parts of the cloth are stopped out by a suitable preparation, or 'resist,' by which means a pattern is

produced, as the colouring matter of the dye-bath is removed from the other portions by the washing or scouring to which it is subsequently subjected. The substances used to thicken the mordant by the calico printers, to prevent them spreading, are starch and British gum. The first is prepared for neutral solutions; the last, for acidulous ones. The removal of the undecomposed particles of the mordant, so as to preserve the other portion of the cloth from their action, is effected by the process of DUNGING (which *see*).

The process of GALLING or ROOTING, commonly employed as a preparation of cotton and linen for fast dyes, consist in working the stuff for some time, at a good hand heat, in a decoction of galls or an infusion of sumach. In this case the astringent matter plays the part of a mordant. About 2½ oz. of galls, or 5 oz. of sumach, and 3 or 4 pints of water, are commonly taken for every lb. of cotton. See CALICO PRINTING, DYEING, and the respective dye-stuffs and mordants.

Mordant. In *gilding*, any sticky matter by which gold-leaf is made to adhere. *Prep.* 1. Water or beer, rendered adhesive by the addition of a little gum, sugar, or honey, and tinged with a little gamboge or carmine, to mark the parts to which it is applied. *Used* to attach gold leaf to paper, taffety, vellum, &c.

2. (Mixtion.) From asphaltum, 1 part; mastic, 4 parts; amber, 12 parts; fused together, and then mixed with hot boiled oil, 1 pint. *Used* for gilding wood, &c. See GOLD SIZE.

MORPHIA. $C_{17}H_{19}NO_3$. *Syn.* MORPHINE (Ph. D.), MORPHINA, MORPHIUM, L. The chief active principle of opium. Morphia was discovered by Ludwig in 1688, but it was first obtained pure, and its precise nature pointed out by Sertuerner, in 1804. It is peculiar to the *Papaveraceæ*, or poppy family.

Prep. 1. (Ph. D.) Turkey opium (cut into thin slices), 1 lb., is macerated for 24 hours in water, 1 quart, and the liquid portion decanted; the residuum is macerated for 12 hours with a second quart of water, and the process is repeated with a third quart of water, after which the insoluble portion is subjected to strong pressure; the mixed liquids are evaporated by water or steam heat to a pint, and filtered through calico; to the filtrate is added a solution formed of chloride of calcium, 6 drs., dissolved in distilled water, 4 fl. oz., and the liquid is further evaporated until it is so far concentrated that nearly the whole of it becomes solid on cooling; this is enveloped in a couple of folds of strong calico, and subjected to powerful pressure, the dark liquid which exudes being preserved for subsequent use; the squeezed cake is next treated with about ½ pint of boiling water, and the undissolved portion is washed on a paper filter; the filtered solution is again evaporated, and the solid portion thus obtained submitted to pressure, as before; if the product is not quite white, this process is repeated a third time; the squeezed cake is now dissolved in boiling water, 6 fl. oz., and the solution filtered through animal charcoal (if necessary); to the clear solution is added ammonia, in slight excess; the crystalline precipitate which forms as the liquid cools, is collected on a paper filter, washed with cold distilled water, and lastly, the filter is transferred to a porous brick, in order that the morphia which it contains may become dry. (From the liquids reserved from the expressions more morphia may be obtained by dilution with water, precipitation with ammonia, resolution in boiling water, and treatment with a little animal charcoal, &c., as before.)

2. (Ph. L. 1836.) Hydrochlorate of morphia, 1 oz., is dissolved in distilled water, 1 pint; and ammonia, 5 fl. drs. (or q. s.), previously diluted with water, 1 fl. oz., is added, with agitation; the precipitate is well washed in distilled water, and dried by a gentle heat. By a similar process morphia may be obtained from its other salts.

3. (Merck.) A cold aqueous infusion of opium is precipitated with carbonate of sodium, in excess; the precipitate washed, first with cold water, and then with cold alcohol of sp. gr. 85; the residuum is dissolved in weak acetic acid, the solution filtered through animal charcoal, and precipitated with ammonia; the precipitate is again washed with cold water, dissolved in alcohol, and crystallized. A good process where spirit is cheap.

4. (Mohr.) Opium, 4 parts, is made into a strong infusion with water, q. s.; lime, 1 part, reduced to the state of milk with water, is then added; the mixture is next heated to boiling, at once filtered through linen, and treated, whilst still hot, with chloride of ammonium, in fine powder, in slight excess (about 1 oz. to each lb. of opium); the morphia is deposited as the liquid cools, and may be purified by a second solution in lime and precipitation by chloride of ammonium. This process is remarkably simple, and in many points is preferable to any other, either on the small or large scale.

5. (PURE.) A filtered solution of opium in tepid water is mixed with acetate of lead in excess; the precipitate (meconate of lead) is separated by a filter, and a stream of sulphuretted hydrogen is passed through the nearly colourless filtrate; the latter is warmed, to expel excess of the gas, once more filtered, and then mixed with a slight excess of ammonia, which throws down narcotine and morphia; these are separated by boiling ether, in which the former is soluble.

Prop. The morphia of commerce is a white crystalline powder; but when crystallized from alcohol, it forms brilliant prismatic crystals of adamantine lustre, and the formula $C_{17}H_{19}NO_3 . H_2O$. It exerts an alkaline reaction on test paper; imparts a perceptible bitter taste to water; requires 1160 parts of cold

water, and 94 parts of boiling water, for its solution; insoluble in ether; dissolves in 90 parts of cold and about 30 parts of boiling alcohol; it also dissolves in the fixed and volatile oils, and in solutions of the alkalies; heated in close vessels, it forms a yellow liquid, like melted sulphur, which becomes white and crystalline on cooling; heated in the air, it melts, inflames like a resin, and leaves a small quantity of charcoal behind. With the acids it forms salts, which are mostly soluble and crystallisable. These may all be made by the direct solution of the alkaloid in the dilute acid. The only ones of importance are the acetate, hydrochlorate, and sulphate.

Pur. Commercial morphia and its preparations are often contaminated with codeine, narcotine, and colouring matter. The proportion of the first two may be estimated by the loss of weight which the sample suffers when digested in ether; or by dissolving out the morphine by digestion in weak liquor of potassa. Pure morphia "is scarcely soluble in cold water, sparingly so in boiling water, and readily so in alcohol. This solution is alkaline to test paper, and by evaporation leaves crystals, which are wholly dissipated by heat. It is soluble in pure potassa." (Ph. L. 1836.)

Tests. 1. Potassium hydrate and ammonia precipitate morphia from solution of its salts, under the form of a white crystalline powder, which is very soluble in excess of hydrate of potassium, and, with somewhat more difficulty, in excess of ammonia. The solution formed by excess of the first is precipitated on the addition of bicarbonate of potassium. The precipitate in either case is soluble in a solution of chloride of ammonium, and in dilute acetic acid, and is insoluble in ether. A careful inspection of the precipitate through a lens of small power shows it to consist of minute circular crystals; and seen through a glass which magnifies 100 times, these crystals present the form of right rhombic prisms.—2. The carbonates of potassium and sodium produce the same precipitate as hydrate of potassium, and which is insoluble in excess of the precipitant.—3. The bicarbonates of potassium and sodium also give similar precipitates from neutral solutions, insoluble in excess. In each of the above cases stirring with a glass rod and friction on the sides of the vessel promote the separation of the precipitate.—4. If to a mixture of morphia and oil of vitriol a minute fragment of bichromate of potassium be added, oxide of chromium is set free, and a fine green colour developed.—5. A drop or two of solution of terchloride of gold added to a weak solution of morphia gives a yellow precipitate, which is mostly redissolved on agitating the liquid, which then assumes various hues (green, blue, violet, purple) on the addition of a drop of liquor of potassa.—6. A minute fragment of chloride of gold and of hydrate of potassium very gently dropped into the liquid, occasion purple clouds or streaks in dilute solutions, followed by a precipitate, which is violet, purple, or blue-black, according to the strength of the liquid.

The above are the most reliable precipitates for morphia; the first two may, indeed, be regarded as characteristic, and the remainder as almost so. The following are often referred to by medical writers, but are less exclusive and trustworthy:—Morphia and its salts are —7. Reddened by nitric acid, and form orange-red solutions, darkened by ammonia in excess, and ultimately turning yellow, with the production of oxalic acid.—8. They are turned blue by ferric chloride, either at once or on the addition of an alkali, and this colour is destroyed by water and by alkalies, or acids in excess.—9. Iodic acid added to their solutions turns them yellowish-brown, by setting iodine free, and the liquid forms a blue compound with starch.

Uses. Morphia and its salts are exhibited either in substance, made into pills, or in solution, generally the latter; or externally, in fine powder, applied to the dermis denuded of the cuticle. They are principally employed as anodynes and hypnotics in cases in which opium is inadmissible, and are justly regarded as the most valuable medicines of their class. "In cases wherein both opium and the morphine salts are equally admissible, I prefer the former, its effects being better known and regulated; moreover, opium is to be preferred as a stimulant and sudorific, and for suppressing excessive mucous discharges." (Pereira.)—*Dose.* Of pure morphia, $\frac{1}{12}$ to $\frac{1}{6}$ gr.; of its salts, $\frac{1}{8}$ to $\frac{1}{4}$ gr.; externally, $\frac{1}{2}$ to $1\frac{1}{2}$ gr. Morphine is chiefly used for the preparation of the acetate, and some of its other salts.

Good opium yields from $10\frac{0}{0}$ to $13\frac{0}{0}$ of morphia. See OPIUM.

Morphia, Ac'etate of. $C_{17}H_{20}NO_3C_2H_3O_2$. *Syn.* MORPHIÆ ACETAS (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L. 1836.) Morphia, 6 drs.; acetic acid (Ph. L.), 3 fl. drs.; distilled water, 4 fl. oz.; dissolve, gently evaporate, and crystallise.

2. (Ph. E.) Hydrochlorate of morphia, 1 part, is dissolved in warm water, 14 parts; and the solution, when cold, is precipitated with ammonia, in slight excess, the precipitate is washed in cold water, and dissolved, by means of acetic acid, in excess, in warm water, 12 parts; from the solution crystals are obtained as before.

3. (Ph. D.) Morphia (in fine powder), 1 oz.; rectified spirit, 8 fl. oz.; mix, apply a gentle heat, and add of acetic acid (sp. gr. 1·044), $4\frac{1}{2}$ fl. drs. or q. s., until a neutral or slightly acid solution is obtained; evaporate this to the consistence of a syrup by steam or water heat, and set aside the residuum for a few days until it solidifies.

Pur. "Soluble in water and in rectified spirit" (less so in the former than the latter); "and when the spirit is distilled from the solution, it yields crystals which are totally destroyed by heat." (Ph. L.) "100 measures of a solu-

tion of 10 grs. in ½ fl. oz. of water, and 5 minims of acetic acid, heated to 212° and decomposed by a very slight excess of ammonia, yield by agitation a precipitate which, in 24 hours, occupies 15½ measures of the liquid." (Ph. E.)

Obs. The acetate of morphia of commerce is usually in the form of a whitish powder, and is prepared by the mere evaporation of the solution to dryness by a gentle heat. During the process a portion of the acetic acid is dissipated, and hence this preparation is seldom perfectly soluble in water, unless it has been slightly acidulated with acetic acid. In the Ph. L. 1851 this salt (in crystals) is included in the materia medica. See MORPHIA (*above*).

Morphia, Hydri'odate of. $C_{17}H_{19}NO_3,HI$. *Syn.* MORPHIÆ HYDRYIODAS, L. *Prep.* (A. T. Thomson). Hydrochlorate of morphia, 2 parts; iodide of potassium, 1 part; dissolve each separately in a little water, mix the solutions, wash the precipitate in a little very cold water, press it in bibulous paper, redissolve it in hot water, and crystallise.

Morphia, Hydrochlo"rate of. $C_{17}H_{19}NO_3,HI$. *Syn.* MURIATE OF MORPHIA; MORPHIÆ HYDROCHLORAS (Ph. L.), MORPHIÆ MURIAS (Ph. E. D. & U. S.), L. *Prep.* 1. (Ph. L. 1836.) Macerate sliced opium, 1 lb., in water, 4 pints, for 30 hours; then bruise it, digest it for 20 hours more, and press it; macerate what remains a second and a third time in water until exhausted, and as often bruise and press it; mix the liquors, and evaporate at 140° Fahr. to the consistence of a syrup; add of water, 3 pints, and after defecation decant the clear portion; gradually add to this liquid crystallised chloride of lead, 2 oz. (or q. s.), dissolved in boiling water, 4 pints, until it ceases to produce a precipitate; decant the clear liquid, wash the residuum with water, and evaporate the mixed liquids, as before that crystals may form; press these in a cloth, then dissolve them in distilled water, 1 pint, add freshly burnt animal charcoal, 1½ oz., digest at 120°, and filter; finally, the charcoal being washed, cautiously evaporate the mixed liquors, that pure crystals of hydrochlorate of morphia may form. To the decanted liquor from which the crystals were first separated, add of water, 1 pint, and drop in liquor of ammonia, frequently shaking, until all the morphine is precipitated; wash this precipitate with cold distilled water, saturate it with hydrochloric acid, digest with animal charcoal, 2 oz.; filter, wash the filter as before, and evaporate the mixed liquors, cautiously, as above, that pure crystals may be obtained.

2. (Ph. E.) Opium, 20 oz., is exhausted with water, 1 gal., in the quantity of a quart at a time, and the mixed liquors are evaporated to a pint; chloride of calcium, 1 oz., dissolved in water, 4 fl. oz., is added, and, after agitation, the liquid is placed aside to settle; the clear decanted liquid, and the washings of the sediment, are next evaporated, so that they may solidify on cooling; the cooled mass, after very strong pressure in a cloth, is redissolved in warm water, a little powdered white marble added, and the whole filtered; the filtrate is acidulated with hydrochloric acid, the solution again concentrated for crystallisation, and the crystals submitted to powerful pressure, as before; the process of solution, clarification, with powdered marble and hydrochloric acid, and crystallisation, is repeated until a snow-white mass is obtained. This is the process of Gregory and Robertson, and is one of the easiest and most productive on the large scale. To procure the salt quite white, 2 to 4 crystallisations are required, according to the power of the press employed. The Edinburgh College recommends, on the small scale, the solution, after two crystallisations, to be decoloured by means of animal charcoal; but, on the large scale, to purify the salt by repeated crystallisations alone.

3. (Mohr.) By dissolving the precipitate of morphia (see MORPHIA, *prep.* 4) in dilute hydrochloric acid, and by crystallisation, as before.

Pur., &c. It "is completely soluble in rectified spirit, and in water. What is precipitated from the aqueous solution by nitrate of silver is not entirely dissolved, either by ammonia, unless added in excess, or by hydrochloric or nitric acid." (Ph. L.) "Snowy white; entirely soluble; solution colourless; loss of weight at 212° Fahr. not above 13½; 100 measures of a solution of 10 grs., in water, ½ fl. oz., heated to 212°, and decomposed with agitation by a faint excess of ammonia, yield a precipitate which, in 24 hours, occupies 12½ measures of the liquid." (Ph. E.) It takes 20 parts of cold and about its own weight of boiling water to dissolve it. The hydrochlorate of morphia of the shops is usually, like the acetate, under the form of a white crystalline powder.

Obs. Of all the salts of morphia, this one appears to be that most suitable for medical purposes, from its free solubility, and from its solution not being liable to spontaneous decomposition, at least under ordinary circumstances. "The opium which yields the largest quantity of precipitate by carbonate of sodium yields muriate of morphia, not only in the greatest proportion, but also with the fewest crystallisations." (Ph. E.) Smyrna opium contains the most morphine.

Morphia and Codei'a (Hydrochlorate of). *Syn.* GREGORY'S SALT; MORPHIÆ ET CODEIÆ HYDROCHLORAS, L.; SEL DE GREGORY, Fr. This is commercial HYDROCHLORATE OF MORPHINE prepared according to Dr. Gregory's process.

Mec'onates of Morphia. $(C_{19}H_{20}NO_3)_2C_7H_2O_7$. *Prep.* 1. (NEUTRAL MECONATE OF MORPHINE; MORPHIÆ MECONAS, L.) By saturating an aqueous solution of meconic acid with morphia, and evaporating the solution by a gentle heat, so that crystals may be obtained.

2. (BIMECONATE OF MORPHINE; MORPHIÆ BIMECONAS, L.) $C_{17}H_{19}NO_3HC_7H_3O_7$. Meconic acid, 11 parts; morphia, 14 parts; dissolve each separately, in hot water, q. s.; mix the solutions, and either gently evaporate and crystallize, or at once evaporate to dryness.

Obs. Morphia exists in opium under the form of bimeconate, and hence this preparation of that drug has been preferred by some practitioners. A solution of this salt for medical purposes may be directly prepared from opium, by treating its solution in cold water with a little animal charcoal, filtering, gently evaporating to dryness, redissolving the residuum in cold water, filtering, and repeating the treatment with animal charcoal. The dose of the dry bimeconate is ½ gr., or more; and of the meconate rather less. "A powder is also sold, called 'bimeconate of morphia,' which is of the same strength as powdered opium, and is given in similar doses. It is obviously incorrect to apply this name to a powder which consists principally of foreign matter. It is to be hoped that physicians will not prescribe this powder under the above name, as such a practice might lead to fatal results, if the prescription should be prepared with the substance which the name strictly indicates." (Redwood.)

Sul'phate of Morphia. *Syn.* MORPHIÆ SULPHAS, L. *Prep.* Saturate very dilute sulphuric acid with morphia, evaporate to one half, add a little animal charcoal, continue the evaporation for a short time longer at a gentle heat, filter whilst hot, and abandon it to spontaneous evaporation. It is decomposed by driving off the water of crystallization. Sulphate of morphia is included in the Ph. U. S. According to Magendie, this salt sometimes agrees with patients who cannot bear the acetate.

MORPHIOM'ETRY. A name given to the process of determining the richness of opium in morphia. See OPIUM.

MORISON'S PILLS. See PATENT MEDICINES.

MORSU'LI. An old name applied to lozenges and masticatories. It is still retained in some foreign Pharmacopœias.

MOR'TAR is the well-known cement, made of lime, sand, and water, employed to bind bricks and stones together in the construction of walls, buildings, &c.

In the composition of mortar, stone lime is preferred to that obtained from chalk, and river sand to pit or road sand. Sea sand is unfitted for mortar until it it has been well soaked and washed in fresh water. Sifted coal ashes are frequently substituted for the whole or a part of the sand.

HYDRAULIC MORTARS OR CEMENTS are those which, like Roman cement, are employed for works which are either constantly submerged or are frequently exposed to the action of water. The poorer sorts of limestone are chosen for this purpose, or those which contain from 8% to 25% of alumina, magnesia, and silica. Such limestones, though calcined, do not slake when moistened; but if pulverized, they absorb water without swelling up or heating, like fat lime, and affords a paste which hardens in a few days under water, but in the air they never acquire much solidity.

"The essential constituents of every good hydraulic mortar are caustic lime and silica; and the hardening of this composition under water consists mainly in a chemical combination of these two ingredients through the agency of the water, producing a hydrated silicate of lime. But such mortars may contain other ingredients besides lime, as, for example, clay and magnesia, when double silicates of great solidity are formed; on which account dolomite is a good ingredient in these mortars. But the silica must be in a peculiar state for these purposes, namely, capable of affording a gelatinous paste with acids; and if not so already, it must be brought into this condition, by calcining it along with an alkali or an alkaline earth, at a bright red heat, when it will dissolve and gelatinize in acids. Quartzose sand, however fine its powder may be, will form no water mortar with lime; but if the powder be ignited with the lime, it then becomes fit for hydraulic cement. Ground felspar or clay forms with slaked lime no water cement; but when they are previously calcined along with the lime, the mixture becomes capable of hardening under water."

"All sorts of lime are made hydraulic, in the humid way, by mixing the slaked lime with solutions of common alum or sulphate of alumina; but the best method consists in employing a solution of the silicate of potash, called liquor of flints or soluble glass, to mix in with the slaked lime or lime and clay. An hydraulic cement may also be made which will serve for the manufacture of architectural ornaments, by making a paste of pulverized chalk, with a solution of the silicate of potash. The said liquor of flints likewise gives chalk and plaster a stony hardness, by merely soaking them in it after they are cut or moulded to a proper shape. On exposure to the air, they get progressively indurated. Superficial hardness may be readily procured by washing over the surface of chalk, &c., with liquor of flints, by means of a brush. This method affords an easy and elegant method of giving a stony crust to the plastered walls and ceilings of apartments; as also to statues and busts, cast in gypsum mixed with chalk."

Under Prof. Kuhlman's patent, dated April, 1841, "instead of calcining the limestone with clay and sand alone, as has been hitherto commonly practised, this inventor introduces a small quantity of soda, or, preferably, potash, in the state of sulphate, carbonate, or muriate; salts susceptible of forming silicates when the earthy mixture is calcined. The alkaline salt, equal in weight to about 1-5th that of the

lime, is introduced in solution among the earths." (Ure).

The hardening of the common mortars and cements is in a great measure due to the gradual absorption of carbonic acid; but even after a very great length of time, this conversion into carbonate is not complete. Good mortar, under favorable circumstances, acquires extreme hardness by age.

Attempts have been made at various times to introduce the use of bituminous cements into this country, and thus to restore both to land and submarine architecture a valuable material which has now lain neglected for a period of fully 30 centuries; but, unfortunately, owing to the interest of our great building and engineering firms lying in another direction, these attempts have been hitherto unsuccessful. See ASPHALTUM, CEMENT, LIME, &c.

MORTIFICA'TION. *Syn.* GANGRENE; GANGRENA, MORTIFICATION, L. Local death; the loss of vitality in one part of the animal body, whilst the rest continues living. "The terms gangrene and mortification are often used synonymously; but gangrene properly signifies the state which immediately precedes mortification, while the complete mortification, or absolute death of a part, is called sphacelus. A part which has passed into the state of sphacelus is called a slough.

MOSA'IC GOLD. See BRASS, GOLD, &c.

MOS'SES. *Syn.* MUSCI, L. Several vegetables of the natural orders *Algæ, Fungi, Lichenes,* and *Musci,* commonly pass under this name with the vulgar. Of these the following are the principal.—

BOG MOSS (*Sphagnum palustre*). Very retentive of moisture. *Used* to pack up plants for exportation.

CEYLON MOSS (*Gracilaria candida*). Very nutritive; made into a decoction or jelly, which is highly esteemed as an article of diet for invalids and children, more especially for those suffering under affections of the mucous membranes or phthisis.

CLUB MOSS (*Lycopodium clavatum*). See LYCOPODIUM.

CORSICAN MOSS, C. WORM M. (*Gracilaria Helminthocorton*). *Dose.* ½ to 2 drs., in powder, mixed up with sugar; as a vermifuge.

CUP MOSS, C. LICHEN (*Cladonia pyxidata*). Astringent and febrifuge. A cupful of the decoction, taken warm, generally proves gently emetic. *Used* in hooping-cough, &c.

FIR CLUB MOSS (*Lycopodium Selago.*) Violently emetic and purgative. It is also irritant and narcotic.

ICELAND MOSS (*Cetraria Islandica*). Highly nutritious and easy of digestion. The decoction is a favourite alimentary substance in affections of the lungs and digestive organs. In Iceland, after the bitter has been removed by soaking it in hot water, it is made into jelly, or dried, ground to flour, and made into bread.

IRISH MOSS, PEARL M., CARRAGEEN M. (*Chondrus crispus*). Very nutritious. The decoction or jelly is a useful and popular demulcent and emollient in pulmonary affections, dysentery, scrofula, rickets, &c. It is often employed by cooks and confectioners instead of isinglass, and by painters to make their size.

REIN-DEER MOSS (*Cladonia rangiferina*). Esculent, very nutritious.

MOTHER OF PEARL. See PEARL.

MOTH'ER WATER. See CRYSTALLIZATION.

MOULDS. Numerous materials and compositions are employed for the purpose of taking moulds, among which are the following:—

1. (COMPO'.)—*a.* From spermaceti, stearine or hard tallow, and white wax, equal parts, melted together. For fine work, as medals, small casts, &c.

b. From black resin, ¾ lb.; hard tallow, ½ lb.; bees' wax, 6 oz.; as the last. For coarse work, as architectural ornaments, &c. The above are poured on the objects to be copied (previously oiled) whilst in the melted state. Articles in plaster of Paris are first soaked in water, observing that none of it remains on the surface so as to interfere with the design.

2. (ELASTIC.)—*a.* Flexible or elastic moulds may be made of gutta percha softened in boiling water, and after being freed from moisture, pressed strongly against the object to be copied, by means of a screw press. A ring or support should be employed to prevent undue lateral spreading.

b. By the use of gelatin or glue, elastic moulds are formed capable of reproducing, with accuracy, and in a single piece the most elaborately sculptured objects, of exquisite finish and delicacy. Casts from these are now common in the streets. The credit of the application of this substance to this purpose is due to M. H. Vincent. The process of casting consists in simply dissolving a certain quantity of gelatin in hot water until it is reduced to the state of liquid paste, when it is run over the object, previously oiled, intended to be reproduced. As it cools, the gelatin assumes a consistency offering a considerable degree of resistance, and is highly elastic, which latter quality enables it to be easily detached from the work on which it has been fitted. In the hollow formed by the gelatin, the finest plaster, mixed to a thick cream with water, is next run; and when the plaster has acquired the requisite hardness, the gelatin mould is detached in the same manner as from the original. From this apparently fragile mould as many as six copies may be taken, all reproducing the original with unerring fidelity.

3. (METALLIC.)—*a.* From fusible metal.[1]

b. (CLICHÉE MOULDS.) From a fusible alloy formed of bismuth, 8 parts; lead, 5 parts; tin, 4 parts; antimony, 1 part; repeatedly melted together. The above are poured out in the

[1] See FUSIBLE ALLOYS.

melted state on a plate or slab, and after being stirred until in a pasty state, the object to be copied is strongly pressed on the alloy at the moment it begins to solidify. They are chiefly *used* for medals and other like objects.

c. (Chameroy's Patent.) By melting together one part of some easily fusible metal in a crucible, and then mixing with it four parts of a metal far less readily fusible, steeped in ammonia and reduced to powder. Such a compound is stated to be of great solidity, hardness, facility of soldering, melts at a low temperature, and has great tractability in moulding to any form; and in casting takes the sharpest impressions, whilst in its nature it is peculiarly unchangeable. See ELECTROTYPE.

MOUTH COSMET'ICS. See BREATH, TEETH, LOZENGE, PASTE, POWDER, WASHES, &c.

MOX'AS. Substances burnt upon the body, for the purpose of acting as counter-irritants, and allaying deep-seated pains and inflammation. They have been used in gout, rheumatism, &c. The small cone constituting the moxa is placed upon a part, lighted, and allowed to burn to its base. The CHINESE and JAPANESE moxas are made of the downy portion of the leaves of a species of wormwood (*Artemisia sinensis*); but various other substances, as the pith of the sunflower, cotton, or paper, soaked in a weak solution of nitrate, chlorate, or chromate of potassium, answer as well. The actual cautery is said to be preferable to any of them.

MU'CILAGE. *Syn.* MUCILAGO, L. An aqueous solution of gum, or other like substance, that gives a considerable consistency to water. See DECOCTION, MIXTURE, &c.

Trag'acanth, Mucilage. *Syn.* MUCILAGO TRAGACANTHÆ (B. P., Ph. E., and Ph. D. 1826), L. *Prep.* 1. (Ph. E.) Tragacanth, 2 drs; boiling water, 9 fl. oz. (8 fl. oz.—Ph. D.); macerate for 24 hours, triturate, and press through linen.

2. (B. P.) Tragacanth, in powder, 60 grs.; distilled water, 10 oz. To the water contained in a pint bottle add the tragacanth, agitate briskly for a few minutes, and again at short intervals, until the tragacanth is perfectly diffused, and has finally formed a mucilage.—*Dose.* 1 oz. (Should be made as required. One part of tragacanth gives more viscosity to water than twenty-five parts of gum arabic.—Squire.) *Used* in medicine as a demulcent, and as an application to burns, &c., and in pharmacy in making up pills, and to suspend heavy powders in liquids.

MUDAR'IN. *Syn.* MADARINE. A peculiar substance, possessing powerful emetic properties, extracted from the root bark of *Calotropis gigantea*, in which it exists to the extent of 11%. (Duncan.) It is soluble in water and in alcohol, and its aqueous solution, unlike that of most other substances, gelatinises by heat, and becomes fluid again on cooling.

MUF'FINS. *Prep.* Take of fine flour, ¼ peck; warm milk-and-water, 1 quart; yeast, a wine-glassful; salt, 2 oz.; mix for 15 minutes, then further add of flour, ¼ peck, make a dough, let it rise 1 hour, roll it up, pull it into pieces, make them into balls, put them in a warm place, and when the whole dough is made into balls, shape them into muffins, and bake them on tins; turn them when half done, dip them into warm milk, and bake them to a pale brown.

MUF'FLE. See ASSAYING.

MUL'BERRY. *Syn.* MORUM, L. Mulberries (MORA, MORI BACCÆ) are the fruit of *Morus nigra*, or black mulberry tree. They are cooling and laxative; but when eaten too freely, are apt to disorder the stomach and bowels. Mulberry juice (*mori succus*) is officinal in the Ph. L. A syrup (SYRUPUS MORI) is made of it. It is also, occasionally, made into wine.

MUL'TUM. A mixture of extract of quassia and liquorice, used by fraudulent brewers instead of malt and hops.

MUM. A beverage prepared from wheat malt, in a similar way to ordinary beer from barley malt. A little oat and bean meal is frequently added. It was formerly much drunk in England; but its use at the present day is chiefly confined to Germany, and to Brunswick more particularly.

MUMPS. *Syn.* PAROTITIS, L. Inflammation of the parotid gland, which is situated under the ear. There is little constitutional derangement, but the cheeks become swollen and painful, and there is some difficulty in opening the mouth, and in swallowing. The treatment consists in simply keeping the part warm with flannel, and the use of warm fomentations, at the same time that the bowels are kept freely open with some mild laxative.

The mumps are said to be contagious, as, when the affection appears in a school, it generally goes through every member of it. Low, damp situations are those most favorable to this affection.

Prop., &c. It is only very slightly soluble in cold water; freely soluble in solutions of ammonia and the fixed alkalies; the first, by exposure to the air, becomes purple, and deposits brilliant crystals of murexide. These compounds are the purpurates of Dr. Prout.

MUREX'IDE. $C_8N_6H_8O_6$. *Syn.* PURPURATE OF AMMONIUM.

Prep. (Gregory.) Alloxan, 7 parts; alloxantin, 4 parts; boiling water, 240 parts; dissolve, and add the solution to a cold and strong solution of carbonate of ammonia, 80 parts; crystals of murexide will separate as the liquid cools.

Obs. Murexide can be obtained directly from uric acid by the action of nitric acid and subsequent treatment with ammonia. This process is, however, very precarious, and often fails altogether.

Prop., &c. It forms iridescent crystals, having a metallic lustre, of a magnificent

green colour by reflected light, and an equally beautiful reddish-purple by transmitted light. It is soluble in boiling water, only very slightly soluble in cold water, and insoluble in alcohol and ether. A few years ago murexide was extensively used in dyeing; it is now almost superseded by rosaniline or magenta. An analogous substance, formed as above, by treating amalic acid with ammonia, is called 'caffein-murexide.'

MU″RIATE. An old name for hydrochlorate and chloride.

MURIATIC ACID. *Syn.* HYDROCHLORIC ACID, which see.

MURIDE. The name originally given to bromine, by M. Balard.

MUR'RAIN. *Syn.* BLACK-LEG, BLACK-QUARTER. A disease affecting neat cattle, more especially young animals, in the spring and autumn. The common symptoms are tumefaction and discoloration of one of the hind quarters of the animal, with consequent lameness and inability to move; a peculiar emphysema and intumescence of various parts of the body, particularly over the region of the spine, accompanied with all the common indications of putrid fever. In severe cases, gangrene soon follows, and death frequently ensues in from 12 to 24 hours.

The rapid progress of this disease admits of little being done in the way of cure. Extensive scarifications of the affected part, charcoal or hot yeast poultices, or fomentations, and active purgatives, appear to constitute the most useful treatment. The following drenches have been recommended for this affection:—

1. (Blaine.) Sweet spirit of nitre, ½ fl. oz.; powdered cascarilla, 2 oz.; solution of acetate of ammonia, 4 fl. oz.; yeast, 8 fl. oz.; given every 3 or 4 hours.

2. (Clater.) Laudanum and sweet spirit of nitre, of each, ½ fl. oz.; solution of chloride of lime, ¼ fl. oz.; prepared chalk, 1 oz.; warm gruel, 1 pint.

The apparent incurability of this disease renders it of the utmost importance to the farmer to adopt preventive measures. These should consist of the supply of wholesome food and pure water, the adoption of extreme cleanliness, and the free access of pure air to all the stalls, sheds, and other buildings in which the cattle may be sheltered. As the disease is regarded as contagious by many persons, it is prudent to separate, as speedily as possible, the healthy animals from those affected. The free use of chloride of lime, as a disinfectant, is also advisable.

Other and more immediate preventives consist of the occasional exhibition of a saline aperient, and the introduction of a seton into the dewlap.

MUSH'ROOMS. Edible fungi. The species commonly eaten in England are the *Agaricus campestris*, or common field or garden mushroom, used to make ketchup, and eaten either raw, stewed, or broiled;—the *Morchella esculenta*, or morel, used to flavour soups and gravies;—and the *Tuber cibarium*, or common truffle, also used as a seasoning.

Several fungi, which to the inexperienced closely resemble the common edible mushroom, possess poisonous narcotic properties, and their use has not unfrequently been productive of serious, and, in some cases, fatal results. Unfortunately, no simple tests exist by which the edible and poisonous varieties can be distinguished from each other. So strongly was the late Professor L. C. Richards, the eminent botanist, impressed with this feeling, that though no one was better acquainted with the distinctions of fungi than he was, yet he would never eat any except such as had been raised in gardens, in mushroom beds. Certainly all mushrooms may be regarded as suspicious which are either not so raised, or not collected from a known pasture or meadow by a competent judge.

The following general characters given by Professor Bentley enable us, in most cases, to distinguish the edible species:—

EDIBLE MUSHROOMS.

1. Grow in dry, airy places.
2. Generally white or brownish.
3. Have a compact, brittle flesh.
4. Do not change colour when cut by the action of the air.
5. Juice watery.
6. Odour agreeable.
7. Taste not bitter, acrid, or astringent.

POISONOUS MUSHROOMS.

1. Grow in clusters, in woods, and dark, damp places.
2. Usually with bright colours.
3. Flesh tough, soft, and watery.
4. Acquire a brown, green, or blue tint, when cut and exposed to the air.
5. Juice often milky.
6. Odour commonly powerful and disagreeable.
7. Have an acrid, astringent, acid, salt, or bitter taste.

In cases of poisoning by fungi, vomiting should be immediately induced by an emetic and tickling the fauces with the finger or a feather; after which a purgative clyster or a strong cathartic should be administered, with ½ to 1 fl. dr. of ether in a glassful of water or weak brandy. As an antidote, a solution of tannin, ½ dr., in water, 1½ pint, or a decoction of ½ oz. of powdered galls, or of 1 oz. of powdered cinchona bark, in a like quantity of water, has been strongly recommended by M. Chansarel.

Alexis Soyer recommended the excellent method of cooking mushrooms by baking them under a glass or basin on toast, along with scalded or clotted cream, or a little melted butter, with one clove, and salt, pepper, &c., to taste. They take about ½ of an hour in a gentle oven or before the fire. When they are

taken up, do not remove the glass for a few minutes, by which time the vapour will have become condensed and gone into the bread; but when it is, the aroma, which is the essence of the mushroom, is so powerful as to pervade the whole apartment.

MUSK. *Syn.* MOSCHUS. (B. P., Ph. L. E. & D.), L. "A secretion deposited in a follicle of the prepuce of *Moschus moschiferus*, Linn." Ph. L.), an animal inhabiting the mountains of Eastern Asia. It is imported from Bengal, China, and Russia; and, latterly, from the United States of America. That known as TONQUIN MUSK is the most esteemed for its odour; but that from Russia is the only kind which reaches us in perfect bags, or which has not been tampered with. POD MUSK (MOSCHUS IN VESICIS) is the bag in its natural state, containing the musk. The average weight of one of the pods is about 6 drs.; that of the grain musk which it contains, about 2½ drs.

Pur., &c. The musk of the shops is generally adulterated. Dried bullock's blood or chocolate is commonly employed for this purpose, along with a little bone-black. The extent of these additions varies from 25% to 75% of the gross weight of the mixture. The blood is dried by the heat of steam or a water bath, then reduced to coarse powder, and triturated with the genuine musk in a mortar along with a few drops of liquor of ammonia. It is then either replaced in the empty pods, or it is put into bottles, and sold as grain musk. There are only three certain ways of detecting this fraud, viz.—by the inferiority of the odour, by an assay for the iron contained in the blood, or—by the microscope. Genuine musk often becomes nearly inodorous by keeping, but recovers its smell on being exposed to the vapour of ammonia, or by being moistened with ammonia water. The perfumers sometimes expose it to the fetid ammoniacal effluvia of privies for the same purpose.

Pure musk, by trituration or digestion with boiling water, loses about 75% of its weight, and the boiling solution, after precipitation with nitric acid, is nearly colourless. A solution of acetate of lead, and a cold decoction of galls, also precipitate the solution; but one of corrosive sublimate does not disturb it. The ashes left after the incineration of pure musk are neither red nor yellow, but gray, and should not exceed 5 to 6%. The Chinese appear to be the most skilful and successful adulterators of musk. One of the best solvents for musk is ether.

Uses, &c. Musk is chiefly employed for its odour. As a *medicine*, it is a powerful stimulant and antispasmodic, and is a valuable remedy in various diseases of a spasmodic or hysterical character, or attended with low fever. *Dose.* 5 to 10 grs., made into an emulsion.

Musk, Factitious. *Syn.* RESIN OF AMBER; RESINA SUCCINI, MOSCHUS ARTIFICIALIS, M. FACTITIUS, L. *Prep.* 1. Oil of amber, 1 fl. dr.; nitric acid, 3½ fl. drs.; digest in a cold tumbler, and, after 24 hours, wash in cold water the orange-yellow resinous matter which has formed, and carefully dry it.

2. (Elsner.) From oil of amber, 1 part; fuming nitric acid, 3 parts; as the last, but employing artificial cold to prevent any portion of the oil being carbonised.

Obs. Resin of amber smells strongly of musk, and is said to be antispasmodic and nervine. A tincture (TINCTURA RESINÆ SUCCINI) is made by dissolving 1 dr. of it in rectified spirit, 10 fl. drs., of which the *dose* is 1 fl. dr.; in hooping-cough, low fevers, &c.

Dr. Collier mentions an artificial musk, prepared by digesting for 10 days nitric acid, ½ oz., on fetid animal oil, obtained by distillation, 1 oz.; then, adding of rectified spirit, 1 pint, and digesting the whole for a month.

MUSK SEED. *Syn.* GRAINS D'AMBRETTE. The seed of *Abelmoschus moschatus*, or musk-mallow. They are chiefly *used* for their odour, in perfumery, hair powder, coffee, &c.

MUS'SEL, See SHELL-FISH.

MUST. *Syn.* MUSTUM, L. The expressed juice of ripe grapes, before fermentation. When boiled to 2-3 drs, it is called CARENUM; when boiled to ½, it is called SAPA. On further concentration, it yields a species of granular sugar (grape sugar).

Must, Facti"tious. *Syn.* MUSTUM FACTITIUM, L. *Prep.* Dissolve cream of tartar, ¾ oz., in boiling water, 7 pints; when cold, add of lump sugar, 2½ lbs.; raisins (chopped small, ½ lb.; digest for 3 or 4 hours, strain through flannel as quickly as possible, and add of lemon juice, ½ pint.

MUS'TARD. *Syn.* SINAPIS, L. "The seed of *Sinapis nigra* and *S. alba*." (Ph. L.) "Flour of the seeds of *Sinapis nigra*, generally mixed with those of *Sinapis alba*, and deprived of fixed oil by expression." (Ph. E.) "The flour of the seeds." (Ph. D.) "The seeds of the *Sinapis nigra* and *S. alba* reduced to powder and mixed." (B. P.) That of the shops is very frequently adulterated with wheat flour. When this is the case it does not readily make a smooth paste with water, but exhibits considerable toughness, and somewhat of a stringy appearance, especially when little water and much heat is employed. The common proportions taken by some grocers are—dried common salt, wheat flour, and superfine mustard, equal parts; with turmeric, to colour, and cayenne, q. s. to give it piquancy and fire.

Uses, &c. Pure flour of mustard is used in medicine, to make stimulating poultices, pediluvia, &c. As a condiment, it is useful in torpor and coldness of the digestive organs. A few years since the use of mustard seed, by spoonfuls, *ad libitum*, was a common and fashionable remedy in torpor or atony of the digestive organs. The practice was a revival of that recommended by Dr. Cullen; but it has now again sunk into disuse. Sir John Sinclair also approved of the use of mustard

seed in this way, especially for the preservation of the health of the aged. ('Lancet,' Jan., 1834.) See POULTICES, &c.

Mustard for the Table. The common practice of preparing mustard for the table with vinegar, or still more, with boiling water, materially checks the development of those peculiar principles on which its pungency or strength almost entirely depends. To economise this substance, we should use lukewarm water only; and when flavouring matter is to be added to it, this is better deferred until after the paste is made. The following forms for 'made mustard' are much esteemed for their flavour:—

Prep. 1. Mustard (ground), 3½ lbs.; water, q. s. to form a stiff paste; in ½ hour, add of common salt (rubbed very fine), 1 lb.; with vinegar, grape juice, lemon juice, or white wine, q. s. to reduce it to a proper consistence.

2. To the last add a little soluble cayenne pepper or essence of cayenne.

3. (Lenormand.) Best flour of mustard, 2 lbs.; fresh parsley, chevril, celery, and tarragon, of each, ½ oz.; garlic, 1 clove; 12 salt anchovies; (all well chopped;) grind well together, add of salt, 1 oz.; grape juice or sugar, q. s. to sweeten; with sufficient water to form the mass into a thinnish paste by trituration in a mortar. When put into pots, a red-hot poker is to be thrust into each, and a little vinegar afterwards poured upon the surface.

4. (MOUTARDE A L'ESTRAGON.) From black mustard seed (gently dried until friable, and then finely powdered), 1 lb.; salt, 2 oz.; tarragon vinegar, q. s. to mix. In a similar way the French prepare several other 'mustards,' by employing vinegars flavoured with the respective substances, or walnut or mushroom ketchup, or the liquors of the richer pickles.

5. (MOUTARDE SUPERBE.) Salt, 1½ lb.; scraped horseradish, 1 lb.; garlic, 2 cloves; boiling vinegar, 2 galls.; macerate in a covered vessel for 24 hours, strain, and add of flour of mustard, q. s.

6. (Patent.) Black ginger (bruised), 12 lbs; common salt, 18 lbs.; water, 15 galls.; boil, strain, and add to each gallon, flour of mustard, 5 lbs.

MUSTARD LEAVES (Rigollot's) are made by spreading moistened mustard on paper, and drying.

MUS'TINESS. See MALT LIQUORS and WINES.

MU'TAGE. The term applied to the 'matching' of grape must to arrest the progress of fermentation. See ANTIFERMENT, MATCHES, &c.

MUT'TON. The flesh of sheep. That of the first quality is "between four and five years old; but at present it is rarely got above three, and often under two. The flesh ought to be of a darkish, clear, red colour, the fat firm and white, the meat short and tender when pinched, and it ought not to be too fat." The flesh of the 'Southdown wether' is esteemed the finest flavoured. Mutton is one of the most wholesome of the 'red meats,' and in commercial importance is second only to beef.

MY'COSE. A peculiar variety of sugar, extracted by alcohol from ergot of rye. It crystallises in colourless prisms, and is distinguished from cane sugar by not reducing the acetate of copper, when boiled with a solution of that salt.

MYRICIN. The portion of bees' wax which is least soluble in alcohol, and saponified with difficulty.

MYRISTIC ACID. $HC_{14}H_{27}O_2$. A monobasic fatty acid, obtained by the saponification of myristin. It melts at 120° Fahr.

MYRIS'TIN. $C_{45}H_{86}O_6$. *Syn.* SERICINE. The white, solid portion of the expressed oil of nutmegs, which is insoluble in cold alcohol. See MYRISTIC ACID.

MYROLES. In French pharmacy, solutions of oleaginous or resinous substances in the volatile oils.

MYRON'IC ACID. $HC_{10}H_{18}NS_2O_{10}$. Bussy has given this name to an inodorous, bitter, non-crystallisable acid, obtained by him from black mustard, in which it exists as myronate of potassium. It is soluble in water and alcohol.

MYROSIN. *Syn.* EMULSIN OF BLACK MUSTARD. A name given by Bussy to a peculiar substance, soluble in water, and which possesses the power of converting myronic acid, in the presence of water, into the volatile oil of mustard seed.

MYROSPERMIN. The name given by Richter to the portion of the oil of balsam of Peru, which is soluble in alcohol.

MYROX'ILIN. The name given by Richter to the portion of the oil of balsam of Peru which is insoluble in alcohol. By oxygenation, it forms myroxilic acid.

MYRRH. *Syn.* MYRRHA (B. P., Ph. L. E. & D.), L. "Gum resin exuded from the bark of *Balsamodendron myrrha*." (B. P., Ph. L.)

Pur.—1. Triturate a small quantity of the powder of the suspected myrrh with an equal amount of chloride of ammonium, adding, water, gradually; if the whole is readily dissolved, the myrrh is genuine; otherwise it is sophisticated with some inferior substance. (Righini.)—2. When incinerated, it should not leave more than 3½ to 4% of ashes.

Uses, &c. Myrrh is a stimulating aromatic bitter and tonic, and is given in several diseases accompanied by relaxation and debility; especially in excessive secretions from the mucous membranes, and in disorders of the digestive organs. *Externally*, as an ingredient in dentrifices and rashes, in caries of the teeth, spongy and ulcerated gums, &c. *Dose.* 10 to 30 grs.; either alone or combined with aloes or chalybeates.

NAILS (The) should be kept clean by the daily use of the nail-brush and soap-and-water. After wiping the hands, but whilst they are still soft from the action of the water, the

skin, which is apt to grow over the nails, should be gently loosened and pressed back, which will not only preserve them neatly rounded, but will prevent the skin cracking around their roots (agnails, nail-springs), and becoming sore. The free ends or points of the nails should be pared about once a week; and biting them should be particularly avoided, as being at once destructive to their beauty and usefulness. "The (free) edge of the scarf-skin should never be pared, the surface of the nail never scaped, or the nails cleaned with any instrument whatever, saving the nail-brush." (Eras. Wilson.)

The consequences of wearing a shoe that is obviously too short for the foot are thus described by the above authority. "In this case Nature gives us warning, by means of her agent, pain, that such a proceeding is contrary to her laws. We stop our ears, and get accustomed to the pain, which, perhaps, is not severe, and soon goes off; the shoes get a scolding for their malice, and we forget all about it for a time. But does Nature check her course to suit the convenience of thoughtless man? No, no. In a short time we find that the nail, intercepted in its forward course, has become unusually thick and hard, and has spread out so much upon the sides, that it is now growing into the flesh, and so makes a case for the doctor. Or, perhaps, the continuance of pressure may have inflamed the sensitive skin at the root, and caused a sore and painful place there. And instances are by no means infrequent in which the power of production of the nail at the root becomes entirely abrogated, and then it grows in thickness only."

When the nails are stained or discoloured, a little lemon juice, or vinegar-and-water, is the best application. Occasionally a litle pumice-stone, in impalpable powder, or a little 'putty powder,' may be used along with water and a piece of soft leather or flannel for the same purpose. The frequent employment of these substances is, however, injurious to the healthy growth of the nail.

and bowELEN'. The coloured cotton cloth especially i rr this name was originally brought nclom Na.kin, the ancient capital of China, and was pr pared from a native cotton, of a brownish-yellow hue. It is now successfully imitated in England, and at the present time the English manufacturers supply the Canton market. In this country the colour is generally given to the cloth by successive baths of sulphate of iron and crude carbonate of soda or lime water.

NANKEEN DYE. The liquid sold under this name in the shops is a solution of annotta. It is employed to dye white calicoes of a nankeen colour; but chiefly to restore the colour of faded nankeen clothing.

NAPH'THA. *Syn.* MINERAL NAPHTHA; NAPHTHA, L. A name given to the limpid and purer varieties of PETROLEUM (which *see*), or ROCK OIL, which exudes from the surface of the earth in various parts of the world.

Prop. Naphtha possesses a penetrating odour and a yellow colour, but may be rendered colourless by distillation; it usually begins to boil at a temperature of about 180° Fahr.; bnt, being a mixture of several different hydrocarbons, it has no fixed boiling-point; it is very inflammable; it does not mix with water, but imparts to that fluid its peculiar taste and smell; mixes with alcohol and oils, and dissolves sulphur, phosphorus, camphor, iodine, most of the resins, wax, fats, and spermaceti; and forms with caoutchouc a gelatinous varnish, which dries with very great difficulty.

Pur. Mineral naphtha is very frequentl adulterated with oil of turpentine, a fraud which may be detected by—1. The addition of some oil of vitriol, which will, in that case, thicken and darken it.—2. Hydrochloric acid gas passed through the liquid for an hour will occasion the formation of hydrochlorate of camphine, either at once or after a few hours' repose, even if only 5% of oil of turpentine is present. (Dr. Bolley.)—3. If a few grains of iodide of potassium and a little water are rubbed with tha suspected sample, the colour of the water should continue unchanged; the presence of $\frac{1}{1000}$th part of oil of turpentine will cause it to assume a red or orange colour. (Saladin.)

Uses. Naphtha is chiefly employed for the purposes of illumination, as a solvent for India rubber, and in the preparation of a very superior black pigment. It has been highly spoken of as a remedy for cholera, by Dr. Andreosky, a Russian physician. See PETROLEUM, and *below*.

Naphtha, Coal-tar. *Syn.* NAPHTHA, COAL N. A mixture of volatile hydrocarbons, obtained by distilling coal-tar. It is one of the first products which comes over, and flows from the still as crude coal naphtha. To obtain rectified coal naphtha, this crude liquid is distilled, and the product agitated with 10% of concentrated sulphuric acid; when cold, the mixture is treated with 5% of peroxide of manganese, and the upper portion is submitted to further distillation. The specific gravity of this purified product is ·850. It is extentively used as a solvent of caoutchouc, and other allied substances, also of resins for the preparation of varnishes. By repeated purification and fractional distillation, benzol, the chief and most important constituent of coal naphtha, is obtained. See BENZOLE.

Naphtha, Wood. See PYROXYLIC SPIRIT.

NAPH'THALIN. $C_{10}H_8$. *Syn.* NAPHTHALINE, NAPHTHALENE. A white crystallizable, odorous, volatile substance, obtained from coal-tar.

Prep. The last portion of the volatile oily product is collected separately, and allowed to repose, when crude naphthalin separates in the solid state. By pushing the distillation

until the residuum in the still begins to char, a further portion of dark-coloured naphthalin may be obtained. It is purified by resublimation a second, or even a third time.

Prop., &c. Soluble in alcohol and ether; slightly soluble in boiling water; melts at 176° Fahr.; boils at 413°; highly inflammable, burning with a red and smoky flame; with sulphuric acid, it unites to form sulphonaphthalic acid. By the action of nitric acid upon naphthalin, numerous substances may be formed, the most interesting being nitronaphthalin. Naphthalin has lately been extensively employed as a stimulating expectorant. *Dose.* 5 to 20 grs.; or, preferably, ½ gr., frequently. *Externally*, made into an ointment, in dry tetters, psoriasis, &c.

NA'PLES YEL'LOW. See YELLOW PIGMENTS.

NAR'CEIA. $C_{23}H_{20}NO_9$. *Syn.* NARCEINA, NARCEIA. A peculiar substance discovered by Pelletier in opium. It is obtained from the aqueous solution of opium, after it has been freed from morphia, and narcotina by ammonia, by adding to it hydrate of lime, or preferably, baryta. On boiling the filtered solution to expel the ammonia, and evaporating the liquid, crystals of narceine are gradually deposited. It may be purified by solution in hot alcohol and recrystallisation.

Prop., &c. White, silky, acicular prisms; neutral; inodorous; bitter; pungent; soluble in 375 parts of water at 60°, and in 230 parts at 212° Fahr.; insoluble in ether; does not neutralize the acids, and is destitute of basic properties. It is distinguished from morphia by its easier fusibility (198°), and by forming a blue liquid with the dilute mineral acids, which on gradual dilution changes to violet and rose red, and ultimately becomes colourless. It does not strike a blue colour with ferric chloride, like morphia, but forms a blue compound with iodine which is decomposed by boiling water. It appears to be inert, and has not been applied to any useful purpose.

NAR'COTICS. *Syn.* STUPEFACIENTS; NARCOTICA, STUPEFACIENTIA, L. Medicines which produce drowsiness, sleep, and stupor. In small doses, narcotics mostly act as stimulants, but in larger ones they produce calmness of mind, drowsiness, and torpor; and in poisonous doses, delirium, coma, and death. The general objects in the administration of these agents are the production of sleep and the alleviation of pain. Their action is modified to a greater degree by idiosyncracy and habit than that of, perhaps, any other class of medicines. Hence the care necessary in their administration. Alcohol, camphor, chloroform, chloral hydrate, ether, foxglove, hemlock, henbane, morphia, opium, and tobacco, are narcotics.

NAR'COTINA. $C_{22}H_{23}NO_7$. *Syn.* NARCOTINE, L.; SEL D'OPIUM, MATIERE DE DEROSNE, Fr. A peculiar crystalline substance, found by Derosne in opium, and on which its stimulant property was at first supposed to depend.

Prep. 1. From opium exhausted of soluble matter by cold water, by treating it with water acidulated with acetic or hydrochloric acid, filtering, neutralizing with ammonia, and dissolving the washed precipitate in boiling alcohol; the narcotine is deposited as the liquid cools, and may be purified by solution in ether.

2. By acting on opium, previously exhausted by cold water, with ether.

Prop., &c. White, inodorous, fluted or striated prisms; neutral to test paper; insoluble in cold water; sparingly soluble in boiling water; freely soluble in boiling alcohol and in ether. It is only feebly basic.

Narcotine is distinguished from morphia by its insipidity, solubility in ether, insolubility in alkalies, giving an orange tint to nitric acid, and a greasy stain to paper when heated on it over a candle. Another test for narcotina, said by Orfila to be characteristic, is to add to a little of the suspected substance a drop or two of oil of vitriol, and then to add a very small fragment of nitrate of potassium; the liquid speedily acquires a deep blood-red colour if nicotina is present. Morphia treated in the same way strikes a brown or olive-green colour.

Obs. The physiological action of narcotina is differently stated by different authorities. 1 gr. of it, dissolved in olive oil, killed a dog in 24 hours; but 24 grs. dissolved in acetic acid were given with impunity. (Magendie.) In the solid state it is inert; 129 grs. at a dose scarcely produce any obvious effects. (Bally.) Scruple doses have been given without injury. (Dr. Roots.) It has been recently proposed as a substitute for quinine in the cure of agues. For this purpose the sulphate or hydrochlorate is preferable. 200 cases of intermittent and remittent fevers have been thus successfully treated in India. (Dr. O'Shaughnessy.)—*Dose.* 3 to 10 grs., as an antiperiodic sedative, &c.

Turkey opium contains about 1%, and East Indian opium, about 3%, of narcotine.

NA'TRIUM. See SODIUM.

NA'TRON. Native carbonate of so[illegible]

NAU'SEA. See SICKNESS.

NAU'SEANTS. *Syn.* NAUSEANTIA, L. Substances which induce an inclination to vomit, without effecting it. See EMETICS.

NEC'TAR. The fabled drink of the mythological deities. The name was formerly given to wine dulcified with honey; it is now occasionally applied to other sweet and pleasant beverages of a stimulating character. The following LIQUEURS are so called:—

Prep. 1. Chopped raisins, 2 lbs.; loaf sugar, 4 lbs.; boiling water, 2 galls.; mix, and stir frequently until cold, then add 2 lemons, sliced; proof spirit (brandy or rum), 3 pints; macerate in a covered vessel for 6 or 7 days, occasionally shaking, next strain with pressure, and let the strained liquid stand in a cold

place for a week to clear; lastly, decant the clear portion, and bottle it.

2. Red ratifia, 3 galls.; oils of cassia and carraway, of each, 25 drops; (dissolved in) brandy, ½ pint; orange wine, 1 gall.; sliced oranges, 6 in no.; lump sugar, 2 lbs.; macerate for a week, decant and bottle. See ARRACK (Factitious).

NE'GUS. A well-known beverage, so named after its originator and patron, Colonel Negus. It is made of either port or sherry wine, mixed with about twice its bulk of hot water, sweetened with lump sugar, and flavoured with a little lemon juice and grated nutmeg, and a small fragment only of the yellow peel of the lemon. The addition of about 1 drop of essence of ambergris, or 8 or 10 drops of essence of vanilla, distributed between about a dozen glasses, improves it.

NEPEN'THE. A drink calculated to banish the remembrance of grief. In the "Odyssey" Homer describes Helen as administering it to Telemachus. Nothing is known respecting the composition of the ancient nepenthe. The name is applied to a preparation of opium by many old writers, and is now employed by a Bristol firm to designate a preparation resembling in all essential points Battley's 'LIQUOR OPII SEDATIVUS.'

NER'VOUSNESS. The indescribable derangement of health, and the complication of disagreeable sensations which are popularly described under this name, quite as much deserve the serious attention of both patient and physician as any other affection to which the human frame is liable. Although, in itself, not a definite disease, it is indicative of the vital system being out of order, that its energies are failing or overtasked, and that the functions of some of its organs are languidly or imperfectly performed. This condition, if not removed, may gradually lead to the development of actual disease, and imperil life if the conditions whereon it is dependent be not detected and subdued.

The *treatment* of nervousness consists mainly in restoring the healthy action of the stomach and bowels, and in the use of proper exercise, especially in the open air. The stomach should not be overloaded with indigestible food, and the bowels should be occasionally relieved by the use of some mild aperient. Mental as well as bodily relaxation should be sought, and the pleasures, without the vices of society, should be indulged in as discretion and inclination may direct. Abernethy's injunction to a nervous and dyspeptic lady, "Dismiss your servants, madam, and make your own beds," should be recollected by all, and may be taken as a proof of the importance that eminent surgeon attached to exercise; his advice to the indolent and nervous dyspeptic should not be forgotten, "Live on sixpence a day—and earn it." See EXERCISE, FLATULENCE, HYPOCHONDRIASIS, HYSTERICS, INDIGESTION, &c.

NESSLER'S TEST for ammonia, &c. This, the most delicate test for ammonia, was devised by Nessler. It is prepared by saturating a solution of iodide of potassium with the biniodide of mercury, and then adding a weak solution of hydrate of sodium. The addition of a few drops of this solution, to one containing ammonia, produces a yellowish tint when only a trace of ammonia is present, but a dark brown precipitate when the ammonia is present in larger quantity. The composition of the precipitate may be represented thus: NHg_2I. A modification of this test is applied to the detection of wood spirit in common alcohol. A dilute solution of the iodides in question in pure alcohol is formed, in the proportion of 2 or 3 grs. of the salts to 100 c.c. of alcohol. About 4 c.c. of the suspected alcohol are taken, to which are added 2 or 3 drops of the best solution, a few drops of alcoholic ammonia, and lastly, a little alcoholic potash; if wood spirit be present, the solution will remain clear, but if the alcohol be pure, the characteristic reddish brown precipitate will appear. The precipitate is soluble in acetone, which is always present in wood spirit.

NET'TLE RASH. See RASHES.

NEURAL'GIA. Literally, pain in a nerve. "Various parts of the body are liable to be affected with excruciating pain, which is quite independent of any inflammation of the part, and which may often be traced in the course of the nerves." These affections constitute neuralgia. One of the most distressing forms of this disease is FACIAL NEURALGIA or TIC DOULOUREUX (NEURALGIA FACIALIS), which, when it assumes a marked intermittent character, is popularly known as 'FACE AGUE.' Sometimes it attacks the nerves of the female breast; or those of the hand, feet, hip, or loins, in which cases it is often confounded with acute rheumatism of those parts, occurring towards the inner extremity of the eyebrow and extending over the forehead, it is known as "Brow-ague."

The treatment, when neuralgia is symptomatic of any other affection, must be directed to the primary disease. When it is idiopathic, or an independent affection, powerful tonic medicines and powerful local counter-irritation are generally found the most successful remedies. Of tonics, carbonate of iron and bark (both in very large doses) are generally preferred; the last, more particularly when the affection is of an intermittent kind. As a counter-irritant, caustic ammonia has been much relied on. When all other means fail, a current of mild streaming electricity through the part will often give immediate relief. In the present day quinine in large doses is much depended on, although the affection should not present the intermittent type.

NEUTRALIZA'TION. The admixture of an alkali or base with an acid in such proportions that neither shall predominate. A neutral compound neither turns red litmus paper blue, nor blue litmus paper red.

NICK'EL. Ni. *Syn.* NICKELIUM, L. A metal obtained from kupfernickel, a native arsenide of nickel found in Westphalia; also from nickel-speiss, an impure arsenio-sulphide of nickel left after the manufacture of cobalt blue from its ores.

Prep. The powdered ore is roasted first by itself, and next with charcoal powder, until all the arsenic is expelled, and a garlic odour ceases to be evolved; the residuum is mixed with sulphur, 3 parts, and potassium hydrate, 1 part, and the compound is melted in a crucible with a gentle heat; the fused mass, when cold, is reduced to powder, edulcorated with water, dissolved in sulphuric acid mixed with a little nitric acid, and precipitated with potassium carbonate; the precipitate (nickelous carbonate) is washed, dried, mixed with powdered charcoal, and, lastly, reduced by the heat of a powerful furnace.

When nickel predominates in the ore, after the arsenic, iron, and copper have been separated, ammonia is digested in the mixed nickelous and cobaltous oxides, and the resulting blue solution, after dilution with boiled pure water, is treated with potassium hydrate until the colour disappears, when the whole is put into an air-tight vessel, and set it aside for some time. The powder (nickelous hydrate) which subsides, after edulcoration, is mixed with charcoal, and reduced by fusion in a crucible containing some crown glass.

On the small scale, for chemical purposes, pure nickel is best obtained by moderately heating nickelous oxalate in a covered crucible lined with charcoal.

Prop. White; hard; malleable; magnetic; capable of receiving the lustre of silver; sp. gr., when hammered, about 8·82; fusibility between that of manganese and iron; it is not oxidized in the air; and is little attacked by dilute acids unless when nitric acid is present; this last acid dissolves it freely. With the acids, &c., it forms numerous compounds, most of which may be prepared by the direct solution of the carbonate. A specimen of the metal reduced from the pure oxide in a current of hydrogen was beautifully white and silvery; its sp. gr. was 8·575, and it was almost as soft as copper.

Tests. The salts of nickel in the anhydrous state are for the most part yellow; when hydrated, green,—and furnish solutions possessing a pale-green colour. Solutions of its salts exhibit the following reactions:—Alkaline hydrates give a pale apple-green precipitate, insoluble in excess, but soluble in a solution of carbonate of ammonium, yielding a greenish-blue liquid. Ammonia gives a similar precipitate, soluble in excess, yielding a deep purplish-blue solution. The presence of ammonium salts or free acids interferes with this reaction. Cyanide of potassium produces a green precipitate, soluble in excess, forming an amber-coloured liquid, which is reprecipitated by hydrochloric acid. This last precipitate is scarcely soluble in excess of the acid in the cold, but readily so upon boiling the liquid. Ferrocyanide of potassium gives a greenish-white precipitate. Sulphuretted hydrogen occasions no change in solutions of nickel containing free mineral acid; but in alkaline solutions gives a black precipitate. Sulphide of ammonium in neutral solutions gives a black precipitate, soluble with difficulty in hydrochloric acid; but freely soluble in aqua regia.

Estim. Nickel may be thrown down from its ore in the form of either carbonate or hydrate, and after ignition may be weighed as oxide, each grain of which is equal to $\frac{7}{8}$ gr. of pure nickel; or, more accurately, ·7871 gr.

According to Rose, nickel may be separated from cobalt as follows:—The mixed metals are dissolved in considerable excess of hydrochloric acids, and the solution is diluted with a very large quantity of water; a current of chlorine is then passed through the liquor for several hours, and the upper part of the flask is left filled with the gas after the current has ceased; barium carbonate is next added, in excess, the whole digested together, with frequent agitation for 15 or 18 hours, and then thrown on a filter. The filtrate yields pure nickelous oxide by precipitation with hydrate o potassium; whilst the residuum on the filter after being washed in water, dissolved in hc hydrochloric acid, and the barium precip tated with sulphuric acid, furnishes, wit hydrate of potassium, a precipitate of cobaltou hydrate, free from nickel, which, when washe and dried, is reduced in a platinum or porcelai crucible by hydrogen gas.

Uses. Nickel is chiefly employed in th manufacture of German silver. Some of i salts have been recently introduced into medic practice, and appear likely to prove most valuab additions to the materia medica. It has als been recently used for deposition by electrolysi on other metals, forming a hard, brilliant, non tarnishing coating.

Nick'elous Ac'etate. $Ni(C_2H_3O_2)_2$. *Syn.* NICKELII ACETAS, L. *Prep.* By neutralizing acetic acid with nickelous carbonate, and gently concentrating by evaporation, so that crystals may form. Small green crystals soluble in 6 parts of water.

Nickelous Car'bonate. $NiCO_3$. *Syn.* NICKELII CARBONAS, L. *Prep.* This salt may be obtained in the manner described above in connection with the preparation of metallic nickel, or by simply adding carbonate of sodium to a solution of nickelous chloride or sulphate, but in this case some hydrate is precipitated along with it. The following is another formula which produces a nearly pure carbonate, but one which may still contain a little cobalt, the entire separation of which is a matter of extreme difficulty, and can best be effected in the manner recommended by Rose, described above:—

The mineral (crude speiss or kupfernickel) is broken into small fragments, mixed with

from one fourth to one half its weight of iron filings, and the whole dissolved in aqua regia; the solution is gently evaporated to dryness, the residue treated with boiling water, and the insoluble ferrous arseniate removed by filtration; the liquid is next acidulated with hydrochloric acid, treated with sulphuretted hydrogen, in excess, to precipitate the copper, and, after filtration, is boiled with a little nitric acid, to bring back the iron into ferric salts; to the cold and largely diluted liquid a solution of bicarbonate of sodium is gradually added, and the ferric oxide separated by filtration; lastly, the filtered solution is boiled with carbonate of sodium in excess, and the pale green precipitate of carbonate collected, washed, and dried.

Uses, &c. It is freely soluble in the acids, and is chiefly employed to prepare the salts and other compounds of nickel.

Nickelous Chlo″ride. $NiCl_2$. *Syn.* NICKELII CHLORIDUM, L. *Prep.* From nickelous carbonate and hydrochloric acid, as the acetate. Small green crystals, of the formula $NiCl_2,9Aq.$, which are rendered yellow and anhydrous by heat, unless they contain cobalt, when the salt retains a tint of green.

DOUBLE CHLORIDES. Nickelous chloride unites with the chlorides of ammonium, potassium, and sodium, to form pale green crystalizable salts, which have been used for depositing nickel in iron, lead, copper, &c.

Nickelous Hy′drate. $Ni(HO)_2$. By precipitating a soluble salt of nickel with caustic potassa. Hydrated. An ash-gray powder, freely soluble in acids, forming the ordinary salts of nickel.

Nickelous Ox′alate. NiC_2O_4. *Syn.* NICKELII OXALAS, L. *Prep.* By adding a strong solution of oxalic acid to a like solution of nickelous sulphate, and collecting the pale bluish-green precipitate which forms after a time. *Used* to prepare both metallic nickel and its oxide.

Nickelous Oxide. NiO. *Syn.* PROTOXIDE OF NICKEL. *Prep.* 1. By heating the nitrate, carbonate, or oxalate, to redness in open vessels. Anhydrous.

Nickelic Oxide. Ni_2O_3. *Syn.* SESQUIOXIDE OF NICKEL, PEROXIDE OF NICKEL. *Prep.* By passing chlorine through water holding the hydrate in suspension; or by mixing a salt of nickel with bleaching powder. An insoluble, black powder, which is decomposed by heat.

Nickelous Sulphate. $NiSO_4$. *Syn.* SULPHATE OF NICKEL. *Prep.* Dissolve nickelous carbonate or oxide in dilute sulphuric acid, evaporate down, and crystallize. Pale green prismatic crystals, and of the formula $NiSO_4$, 7Aq., or small pale green octrahedrous, when crystallized at a higher temperature, containing $NiSO_4,6Aq.$

Nickelous and Potassium Sulphate. $NiSO_4$ $K_2SO_4,6Aq.$ *Syn.* DOUBLE SULPHATE OF NICKEL AND POTASSIUM. *Prep.* By crystallizing a mixture of nickelous and potassium sulphates. Pale green crystals, readily soluble in water. Sodium and ammonium sulphates form similar compounds with nickelous sulphate.

NICK′EL SIL′VER. See GERMAN SILVER.

NIC′OTINE, Nicotina. $C_{10}H_{14}N_2$. *Syn.* NICOTIA, L. A volatile base, discovered by Reiman and Posselt in tobacco.

Prep. (Ortigosa.) Infuse tobacco leaves for 24 hours in water acidulated with sulphuric acid, strain, evaporate to a syrup, add ½ of its volume of a strong solution of potassa, and distil in an oil bath at 288°, occasionally adding a little water to assist the process, and prevent the too great concentration of the solution of potassa in the retort; next saturate the distilled product with oxalic acid, evaporate to dryness, digest in boiling absolute alcohol, evaporate the resulting tincture to a syrup, and decompose the oxalate of nicotine thus obtained by adding potassa to it in a close vessel, and agitate the mass with ether, repeating the process with more ether until all the nicotine is dissolved out; lastly, distil the mixed ethereal solution in an oil bath. At first ether comes over, then water, and, lastly, nicotina, which, towards the end of the process, assumes a yellowish tint.

2. (Schloesing.) This chiefly differs from the preceding by directing the concluding distillation to be conducted in a retort, by the heat of an oil bath, at the temperature of 284° Fahr., in a current of hydrogen, for 12 hours; after which, by raising the heat to 356° Fahr., the nicotine distils over pure, drop by drop.

Prop., &c. Nicotina is a colourless, volatile liquid; highly acrid and pungent; smelling strongly of tobacco; boiling at 375° Fahr. (482°—Pereira); soluble in water, ether, alcohol, and oils; and combining with the acids, forming salts, many of which are crystallizable. It is a frightful poison; ¼ of a drop will kill a rabbit; a single drop will kill a large dog. Nicotina is the substance which was employed by the Count Bocarmé for the purpose of poisoning his brother-in-law, Gustave Fougnies, the particulars of which were developed in the celebrated trial, in Belgium, of that nobleman, in 1851. Good Virginia and Kentucky tobacco, dried at 212° Fahr., contain from 6% to 7% of nicotina; Havannah tobacco (*cigars*) less than 2%. (Schloesing.)

NIGHT′MARE. *Syn.* INCUBUS, EPHIALTES, L. The common causes of nightmare are indigestion and the use of narcotic and intoxicating substances. Its prevention consists in the selection of proper food, and in duly attending to the state of the stomach and bowels. Heavy and late suppers should be particularly avoided, as well as all articles of diet that are of difficult digestion, or apt to induce flatulency. When it arises from strong drink, tobacco, or opium, these should be abandoned, or employed in smaller quantities. A teaspoonful of aromatic spirits of ammonia, magnesia, or bicarbonate of soda, taken in a glass of cold water on going to bed, is a good and simple

preventive. In cases accompanied by restlessness, a few drops of laudanum or tincture of henbane may be added. An occasional aperient is also excellent. See CHAMOMILE.

NIGHT'SHADE (Deadly). *Syn.* BELLADONNA (B. P., Ph. L. E. & D.). "The leaf, fresh and dried (leaves and root—Ph. D.), of *Atropa belladonna*, Linn." "The fresh leaves and branches to which they are attached; also the leaves separate from the branches, carefully dried, of *Atropa belladonna*, gathered, when the fruit has begun to form, from wild or cultivated plants in Britain" (B. P.). "Oval, acute, very perfect, glabrous, when bruised exhaling a disagreeable odour. The herb which grows spontaneously in hedges and uncultivated places is to be preferred to that which is cultivated in gardens." (Ph. L.)

Belladonna is a powerful narcotic, and is used as an anodyne, antispasmodic, and discutient, in a variety of diseases,—neuralgia, arthritic pains, migratory rheumatic pains, spasmodic rigidity and strictures, angina pectoris, hooping-cough, fevers, phthisis, &c.; also as a prophylactic of scarlet fever, as a resolvent in enlarged and indurated glands, to produce dilatation of the pupil, &c., &c.—*Dose.* Of the powder, commencing with 1 gr., gradually and cautiously increased until dryness of the throat or dilation of the pupil occurs, or the head is affected. See ATROPIA.

NIGHTSHADE (Woody). *Syn.* BITTERSWEET; DULCAMARA (B. P., Ph. L. E. & D.), L. The "new shoots (caules) of *Solanum Dulcamara*, Linn." "The dried young branches of the *Solanum Dulcamara* (Bittersweet), from indigenous plants which have shed their leaves" (B. P.). "It is to be collected in autumn, after the leaves have fallen." (Ph. L.) Diaphoretic, diuretic, and (in large doses) narcotic. See INFUSION OF DULCAMARA.

NIO'BIUM. See TANTALUM.

NIP'PLES (Sore). The most common form of this affection is that termed "chapped nipples," by nurses. As a preventive measure, the part may be moistened morning and evening, for some weeks before the period of lactation, with a little rum or brandy, which is more effective if slightly acidulated with a few drops of dilute sulphuric acid. Some persons employ tincture of tolu, or compound tincture of benzoin (Friar's balsam) for this purpose.

When chaps, cracks, or like sores, arising from lactation, are once developed, one of the safest and most effective remedies is tincture of catechu, applied 3 or 4 times a day, by means of a camel-hair pencil.

The celebrated nostrum of Liebert for cracked nipples, "Cosmétique infaillible et prompt contre les gerçures ou crevasses aux seins et autres," is a lotion formed of 10 grs. of nitrate of lead dissolved in 4 fl. oz. of rose water, and tinged with a little cochineal. The parts are moistened with the liquid, and are then covered with fine leaden nipple-shields, two of which are provided for the purpose. This is repeated soon after each time the child leaves the breast; and the nipple is carefully washed with a soft sponge and lukewarm water, and gently dabbed dry with a very soft towel, before the infant is again applied to it. This remedy is very successful, and has acquired great popularity and patronage in Brussels, Paris, Frankfort, and other parts. It must be recollected, however, that all applications of an active or poisonous nature should be employed with the greatest possible caution, as, unless unusual care is taken, a portion of the remedy may remain concealed within the delicate pores of the skin, and be sucked off by the infant, to the serious disturbance of its health.

NITRAN'ILINE. This substance is obtained by acting on nitrobenzol with a mixture of fuming nitric acid and oil of vitriol; Dinitrobenzol is formed, which is dissolved in alcohol, and the resulting solution subjected to the reducing action of ammonia and sulphuretted hydrogen, as described under aniline. Nitraniline forms yellow, acicular crystals, little soluble in cold water, but freely soluble in alcohol and ether. Its salts are crystallizable.

NI'TRATE. *Syn.* NITRAS, L. A salt of nitric acid (*e. g.* Aq.NO_3, nitrate of silver). The nitrates are very easily prepared by the direct solution of the metal, or its oxide, or carbonate, in nitric acid, which, in most cases, should be previously diluted with water. By evaporation, with the usual precautions, they may be obtained either in the pulverulent or crystalline form.

The nitrates are characterised by deflagrating when thrown on red-hot coal, or when heated in contact with inflammable substances. See NITRIC ACID, and the respective metals.

NI'TRE. Nitrate of Potassa. See POTASSA.

NI'TRIC ACID. HNO_3. *Syn.* AZOTIC ACID; ACIDUM NITRICUM (B. P., Ph. L. E. & D.); AQUAFORTIS.

Prep. 1. (Ph. E., and Ph. L. 1836.) Purified nitre (dried) and sulphuric acid, equal parts; mix in a glass retort, and distil with a moderate heat, from a sand bath (or naked gas-flame—Ph. E.) into a cool receiver, as long as the fused materials continue to evolve vapours. "The pale yellow acid thus obtained may be rendered nearly colourless (if desired) by gently heating it in a retort." (Ph. E.) Sp. gr. 1·500. In the present Ph. L. this acid is included in the materia medica. (See *below*.)

2. (Ph. D.) The nitrate of potassa is dissolved in water, the solution treated with a little nitrate of silver, filtered, evaporated to dryness, weighed, and then treated as above.

3. Nitrate of soda (cubic nitre, Chili saltpetre) is introduced, in quantities varying between 4 and 10 lbs., into a cylindrical iron retort, which it will only half fill, and after the lid is luted on and the connection made with the condensers, an equivalent of oil of vitriol is poured in through an aperture provided for

the purpose, and the charge is worked off with a gradually increased heat. The condensing apparatus consists of a series of 5 or 6 salt-glazed stoneware receivers, about $\frac{1}{6}$th part filled with cold water. The product of this process is the strongest brown and fuming 'NITROUS ACID' of commerce (AQUAFORTIS, FUMING NITRIC ACID; ACIDUM NITROSUM, ACIDUM NITRICUM FUMANS), and has usually the sp. gr. 1·45. It is rendered colourless by gently heating it in a glass retort, when it forms COMMERCIAL NITRIC ACID (sp. gr. 1·37 to 1·4.)

4. (PURE MONOHYDRATED NITRIC ACID.) By mixing the strongest commercial acid with about an equal quantity of oil of vitriol; redistilling; collecting apart the first portion which comes over, and exposing it, in a vessel slightly warmed and sheltered from the light, to a current of dry air made to bubble through it until the nitrous acid is completely removed.

Prop. Pure liquid nitric acid is colourless, highly corrosive, and possesses powerful acid and oxygenizing properties. The sp. gr. of the strongest liquid acid (monohydrated nitric acid) has the sp. gr. 1·517 at 60° Fahr. "On boiling nitric acid of different degrees of concentration at the ordinary atmospheric pressure, a residue is left boiling at 249° Fahr., and 29 in. barometer, having a sp. gr. 1·414 at 60° Fahr." (Fownes.) Acid of less density than 1·414 parts with water, and gradually becomes stronger by boiling; but acid of sp. gr. than 1·414 is weakened by exposure to heat. When exposed to intense cold, liquid nitric acid freezes. It is rapidly decomposed, with loss of oxygen, by contact with most organic and many metallic and non-metallic bodies. In many cases these reactions occur with considerable violence, and the production of light and heat.

Pur. The nitric acid of commerce is generally contaminated by hydrochloric acid, nitrous acid, sulphuric acid, or chlorine, or by their soda or potassa salts, and, occasionally, iodine, together with an excess of water. The last is readily detected by the sp. gr., and the others by the appropriate tests. "Colourless. Contains 70$\frac{2}{9}$ of HNO_3. Sp. gr. 1·42. 90 grs. by weight, mixed with $\frac{1}{2}$ oz. of distilled water, require for neutralisation 1000 grain measures of the volumetric solution of soda. Evaporated, it leaves no residue. Diluted with six volumes of distilled water, it gives no precipitate with chloride of barium or nitrate of silver—indicating absence of sulphuric and hydrochloric acids." (B. P.) 5 measures of acid, sp. gr. 1·5 mixed with 2 of water, condensed into 6$\frac{1}{2}$ measures, and makes the sp. gr. 1·42. "Free from colour. Sp. gr. 1·42. Exposed to the air, it emits very acrid vapours. Totally volatilized by heat. Diluted with 3 times its volume of water, it gives no precipitate with either nitrate of silver or chloride of barium. 100 gr. of this acid (sp. gr. 1·42) are saturated by 161 gr. of crystallized carbonate of soda." (Ph. L.) The Ph. E. states the density of commercial nitric acid is 1·380 to 1·390. "If diluted with distilled water, it precipitates but slightly, or not at all, with solution of nitrate of baryta or nitrate of silver." The best 'double aquafortis' of the shops (aquafortis duplex) has usually the sp. gr. 1·36; and the single aquafortis' (aquafortis simplex), the sp. gr. 1·22; but both are commonly sold at much lower strengths.

Tests.—1. It stains the skin yellow.—2. When mixed with a little hydrochloric acid or chloride of ammonium, it acquires the power of dissolving gold leaf.—3. Morphia, brucia, and strychnia, give it a red colour, which is heightened by ammonia in excess.—4. When placed in a tube, and a solution of protosulphate of iron is cautiously added, a dark colour is developed at the line of junction, which is distinctly visible when only $\frac{1}{24,000}$th part of nitric acid is present. This test may be often conveniently modified by dropping into the liquid a crystal of protosulphate of iron; the fluid immediately surrounding this crystal then acquires a dark brown colour, which disappears upon simple agitation of the fluid, or by heating it.—5. When mixed with a weak solution of sulphate of indigo, and heated, the colour of the latter is destroyed.—6. When saturated with carbonate of potassium or sodium, and evaporated to dryness, the residuum deflagrates when thrown on burniug coals.—7. When the mixture of a nitrate with cyanide of potassium, in powder, is heated on a piece of platinum, a vivid deflagration follows, attended with distinct ignition and detonation. (Fresenius.)

The nitrates may all be tested as above by first adding a small quantity of pure sulphuric acid, which will liberate the nitric acid of the salt.

Estim.—The strength of nitric acid may be roughly estimated by its sp. gr.; but more accurately by ascertaining the amount of carbonate of sodium, or other salt of known composition, which is required to neutralize it. To render the assay trustworthy, it must be, in all cases, also tested to detect the presence of impurities. See ACIDIMETRY.

Ant., &c. See ACIDS.

Uses. Nitric acid is employed in assaying, in dyeing, in etching on copper, in the preparation of gun-cotton, oxalic and sulphuric acids, &c. In medicine, it is used as a caustic to corns and warts; and in doses of 1 to 10 drops, in a tumbler of water, in liver complaints, fevers, dyspepsia, syphilis, to remove the effects of mercury, or as a substitute for that drug, &c. Externally, it is employed in the form of baths, lotions, and ointment. Dr. Collier states that a strong lotion of nitric acid is almost a specific in lepra, and several other kindred skin diseases.

Concluding remarks.—The common source of nitric acid is nitrate of potassium, but it may

also be obtained from other nitrates by a similar process. Nitrate of sodium is frequently used instead of nitrate of potassium, and is more convenient in some respects, as the residuum is more easily dissolved out of the retort or cylinder. The residuum of the common process with nitre ('sal enixum') is chiefly employed as a flux by the glass-houses, and as a source of potash in the manufacture of alum.

By proper management, nitre yields more than $\frac{2}{3}$ of its weight of pure nitric acid, sp. gr. 1·500; and nitrate of soda, its own weight of acid, sp. gr. 1·4.

By the patent process of M. Mallet, dried nitrate of soda is decomposed by dried or monohydrated boracic acid, by heating the two together. The products are liquid nitric acid, which distils over, and biborate of soda (borax), which remains in the retort.

The crude coloured nitric acid of commerce (aquafortis) was originally prepared by distilling a mixture of nitre and copperas, and is still sometimes obtained in this way.

The nitric acid of commerce may be freed from the impurities alluded to above by one or other of the following methods:—

1. By the addition of a little nitrate of silver, as long as it produces any cloudiness, and, after repose, decanting the clear acid, and rectifying it at a heat under 212°. To ensure a perfectly colourless product, a small portion of pure black oxide of manganese should be put into the retort. (Murray.)

2. By agitating the acid with a little red oxide of lead, and then rectifying it, as before.

3. By adding 1% of bichromate of potassa to the acid before rectifying it. This answers well for acid not stronger than sp. gr. 1·48.

4. By rectification at a gentle heat, rejecting the first portion that comes over, receiving the middle portion as genuine acid, and leaving a residuum in the retort. (Ure.)

According to Apjohn and others, the strongest liquid nitric acid, sp. gr. 1·520, is a monohydrate; that of the sp. gr. 1·500, a sesquihydrate; that of 1·486, a binhydrate; and that of 1·244, a quadrihydrate; or containing respectively, 1, 1½, 2, and 4 atoms of water. (See *below*.)

Nitric Acid, Anhy'drous. N_2O_5. *Syn.* NITRIC ANHYDRIDE. This interesting substance was first obtained in a separate form by M. Deville, in 1849.

Prep. (M. Deville.) Nitrate of silver is dried by exposure to a current of dry carbonic acid at a temperature of 356° Fahr., and the tube containing it is then immersed in a water bath heated to 208° Fahr.; pure dry chlorine gas is next passed through the apparatus, and, as soon as the reaction commences, the temperature is reduced to 154° or even 136°, but not lower; the production of crystals in the receiver, which must be cooled by a powerful freezing mixture, soon commences; lastly, the liquid portion of the product is removed by a current of dry carbonic-acid gas.

Prop., &c. Colourless prismatic crystals, which melt at 86° Fahr., boil at about 115°, and at 122° begin to suffer decomposition; added to water, much heat is generated; it rapidly attacks organic bodies, even caoutchouc; sometimes it explodes spontaneously. The process for its preparation is tedious and difficult.

Nitric Acid, Dilute. ACIDUM NITRICUM DILUTUM (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Nitric acid (sp. gr. 1·42), 3 fl. oz.; distilled water, 17 fl. oz.; mix. Sp. gr. 1·082. "1 fl. oz. is saturated by 154 grs. of the crystals of carbonate of soda." It contains about 12% of pure anhydrous nitric acid.

2. (Ph. E.) Nitric acid (1·500), 1 fl. oz.; distilled water, 9 fl. oz. Or, commercial nitric acid (1·390), 1 fl. oz. 5½ drs.; water, 9½ fl. oz. Sp. gr. 1·077. It contains 11·16% of pure dry nitric acid.

3. (Ph. D.) Nitric acid (1·500), 4 fl. oz.; water, 29 fl. oz. Contains about 9·7% of pure acid. The above are used for convenience in dispensing.—*Dose.* 15 drops to ½ fl. dr., or more. The above must not be confounded with the acidum nitricum dilutum, Ph. D. 1826, which had the sp. gr. 1·280, nor with the following:—

4. (Henry's.) Sp. gr. 1·143; equal in saturating power to hydrochloric acid sp. gr. 1·074, and sulphuric acid 1·135. *Used* in assaying.

5. (B. P.) Nitric acid, 6; distilled water sufficient to make the mixture when cooled to 60° Fahr., measure 31. Contains 15 per cent. of anhydrous nitric acid. *Test.* Sp. gr. 1·101. Six fluid drachms (361·3 grains) by weight require for neutralisation 1000 grain measures of the volumetric solution of soda, and, therefore, contain exactly one equivalent in grains of anhydrous acid, namely, 54 grs. *Use.* Tonic, astringent, lithonlytic.—*Dose.* 10 to 30 minims.

Nitric Acid, Fu"ming. *Syn.* NITROUS ACID‡; ACIDUM NITRICUM FUMANS, L. The red fuming nitrous or nitric acid of commerce is simply nitric acid loaded with nitric peroxide (which *see*). That of the Ph. Bor. is distilled from nitre, 2 parts; oil of vitriol, 1 part.

NI'TRIC ANHY'DRIDE. See NITRIC ACID, ANHYDROUS.

NI'TRIC OX'IDE. See NITROGEN, OXIDES OF.

NI'TRITE. A salt of nitrous acid; *e.g.* KNO_2, nitrite of potassium.

NITRO-BEN'ZOL. $C_6H_5NO_2$. *Prep.* By treating benzol with strong fuming nitric acid, with heat; after the violence of the reaction is over, the liquid is diluted with water, and the heavy oily fluid which separates is collected, washed, and dried.

Prop., &c. Yellowish; very sweet; smells of bitter almonds; insoluble in water; little affected by reagents; boils at 415° Fahr.; sp. gr. 1·209. Heated with an alcoholic solution of caustic potassa, and the mixture submitted

to distillation, it yields a red, oily liquid, from which large red crystals of azobenzol separate. These are nearly insoluble in water, freely soluble in alcohol and ether, melt at 149° Fahr., and boil at 559·4° Fahr. BINITROBENZOL is made by dissolving benzol in a mixture of equal volumes of the strongest nitric and sulphuric acids, and boiling the liquid for a few minutes; the crystals dinitrobenzol) which form as it cools are insoluble in water, but are freely soluble in alcohol.

NI'TROGEN. N. *Syn.* AZOTE; NITROGENIUM, AZOTUM, L. A gaseous elementary substance, discovered by Rutherford, in 1722, and found to be a constituent of the atmosphere by Lavoisier, 1755. It is found both in the organic and inorganic kingdoms of nature; it forms about $\frac{4}{5}$, or $78\frac{0}{0}$ of the bulk of the atmosphere, enters largely into the composition of most animal substances, and is a constituent of gluten, the alkaloids, and other vegetable principles.

Prep. 1. A small piece of phosphorus is placed in a capsule floating on the surface of the water of the pneumatic trough, and after setting it on fire a gas or bell-jar is inverted over it; as soon as the combustion is over, and the fumes of phosphoric anhydride have subsided, the residual gas is washed by agitation with recently boiled distilled water, or with a solution of pure potassa. It may be dried by either letting it stand over fused chloride of calcium, or, what is better, by passing it through concentrated oil of vitriol.

2. A porcelain tube is filled with copper turnings, or, preferably, with spongy copper (obtained by reducing the oxide with hydrogen), and is then heated to redness, a stream of dry atmospheric air being at the same time directed through it. By repeating the process with the same air, and finally passing it over fragments of pumice moistened with strong solution of potassa to absorb carbonic anhydride, the product is rendered quite pure.

3. Chlorine gas is passed into a solution of pure ammonia, care being taken to employ a considerable excess of the latter; the evolved gas, after being dried, is pure nitrogen. There is some danger of producing the explosive compound, chloride of nitrogen, with this process.

4. (Corenwinder.) From solution of nitrate of potassium, 1 volume; concentrated solution of chloride of ammonium, 3 vols.; gently heated together in a flask, and the evolved gas passed through sulphuric acid. Pure.

5. By boiling a solution of nitrite of ammonium, or, which amounts to the same thing, a mixture of one measure of a solution of nitrite of potassium and three measures of a solution of chloride of ammonium. Both solutions must be concentrated. This is the easiest method of preparing nitrogen and of obtaining the gas in a pure state.

Note.—The nitrite of potassium to be employed in this process is best prepared by passing nitrous anhydride, evolved from starch and nitric acid, into a solution of potassa (sp. gr. 1·38) till it imparts an acid reaction to test-paper, and then neutralising by the addition of potassa.

6. From lean flesh digested in nitric acid, at a gentle heat.

Prop., &c. Pure nitrogen is a colourless, odourless, tasteless gas, neither combustible nor capable of supporting combustion or respiration. It is neutral to test-paper, does not affect lime water, and is only slightly absorbed by pure water. Its sp. gr. is ·9713. It is recognised by its purely negative qualities.

Nitrogen, Chlo''ride of. NCl_3. *Syn.* NITROGEN TRICHLORIDE, TERCHLORIDE OF NITROGEN. This compound was discovered by Dulong in 1811, but its nature was first accurately determined by Sir H. Davy.

Prep. (Liebig.) Dissolve chloride of ammonium, 1 oz., in hot water, 12 or 14 oz., and as soon as the temperature has fallen to 90° Fahr., invert a wide-mouthed glass bottle full of chlorine over it. The gas is gradually absorbed, the solution acquires a yellowish colour, and in the course of 15 to 20 minutes yellow, oil-like globules of chloride of nitrogen form upon the surface of the liquid, and ultimately sink to the bottom. The globules, as they descend, should be received in a small leaden saucer, placed under the mouth of the bottle for the purpose.

Prop., &c. Chloride of nitrogen should consequently be only prepared in very small quantities at a time. Both its discoverer and Sir H. Davy met with severe injuries while experimenting on it. Its sp. gr. is 1·653; it volatilises at 160° Fahr., and between 200° and 212° fulminates violently. Contact with combustible bodies at ordinary temperatures immediately causes detonation. *The explosive power of this compound seems to exceed that of every known substance, not even excepting fulminating silver.* A minute globule, no larger than a grain of mustard seed, placed on a platina spoon, and touched with a piece of phosphorus stuck on the point of a penknife, immediately explodes, and shivers the blades into fragments, at the same time that the vessel that contains it is broken to pieces. Olive oil, naphtha, and oil of turpentine, have a similar effect. See NITROGEN, IODIDE OF (*below*).

Nitrogen, I'odide of. Ni_3. *Syn.* NITROGEN TRI-IODIDE, TERIODIDE OF NITROGEN. A dark brown or black insoluble powder, which is most safely and conveniently prepared by saturating alcohol (sp. gr. ·852) with iodine, adding a large quantity of the strongest pure solution of ammonia, and agitating the mixture; water must now be added, when iodide of nitrogen will be precipitated, and must be carefully washed with cold distilled water. The filter containing the precipitate should be spread out

on a sheet of glass and torn into small pieces while the iodide is still moist. The precipitate should be simply exposed to air only.

Prop., &c. It detonates violently as soon as it becomes dry, by the slightest pressure or friction, even that of a feather, and often spontaneously; but this explosion is scarcely so powerful as that of the chloride of nitrogen. It also explodes whilst moist, though less readily. It should only be prepared in very small quantities at a time. Recent researches induce the belief that both the above compounds contain hydrogen.

Nitrogen, Ox'ides of. Nitrogen forms 5 distinct compounds with oxygen.

1. Nitrous ox'ide. *Syn.* PROTOXIDE OF NITROGEN; LAUGHING GAS; NITROGENII PROTOXYDUM, L. *Prep.* From fused nitrate of ammonium, introduced into a glass retort, or a flask furnished with a bent tube, and then exposed, over a spirit-lamp, or charcoal-chauffer, to a temperature of about 380° Fahr.; the evolved gas may be collected in bladders, gas-bags, a gasometer, or in the pneumatic trough over warm water. The gas may be purified by pouring it through three wash-bottles, one containing water, one a solution of sulphate of iron, and the other a solution of potassa.

Prop., &c. Colourless; possesses an agreeable odour, and a sweetish taste; at 32°, under a pressure of 30 atmospheres, it is liquid; this, when exposed under the receiver of a powerful air-pump, changes into a snow-like solid; at —180° Fahr., it is a transparent, colourless, crystalline body; it supports combustion, and is absorbed by cold water. Sp. gr. 1·520. Its most remarkable property is its action on the system when inspired. A few deep inspirations are usually succeeded by a pleasing state of excitement, and a strong propensity to laughter and muscular exertion, which soon subside, without being followed by languor or depression. Its effects, however, vary with different constitutions. From 4 to 12 quarts may be breathed with safety. It produces temporary insensibility to pain, like chloroform or ether; but its use is dangerous when affections of the heart, lungs, or brain are present. This gas is now successfully and extensively employed as an anæsthetic in dental surgery.

Obs. No particular caution is required in preparing the above compound, except the use of too much heat. The temperature should be so arranged as to keep the melted mass in a state of gentle ebullition, and should not be allowed, under any circumstances, to exceed about 500° Fahr. Should white fumes appear within the retort after the evolution of the gas has commenced, the heat should be at once lowered, as, when heated to about 600°, nitrate of ammonia explodes with violence.

Nitrous oxide may also be made in the same way, from crystallised nitrate of ammonia, or by exposing nitric oxide for some days over iron filings moistened with water, but, without great care, the product is not always fit for respiration. When pure, it is colourless, has an agreeable odour, and does not affect solution of nitrate of silver.

2. Nitric oxide. NO. *Syn.* DEUTOXIDE OF NITROGEN, NITROUS GAS, BINOXIDE OF NITROGEN; NITROGENII BINOXYDUM, L. *Prep.* By pouring nitric acid, sp. gr. 1·2, on metallic copper, in the form of turnings, clippings, or wire. Effervescence ensues, and nitric oxide is evolved, and may be collected over water or mercury in the pneumatic trough. The residual liquid yields crystals of nitrate of copper on evaporation.

Prop., &c. A colourless, tasteless, inodorous, irrespirable, and incombustible gas. In contact with free oxygen, it produces dense orange or red vapours of nitric peroxide (NO_2), which are freely absorbed by water. Nitric oxide is absorbed by a solution of ferrous sulphate, which it turns of a deep brown or nearly black colour, which is removed by boiling. Sp. gr. 1·039.

Nitrous Anhydride. N_2O_3. *Syn.* NITROGEN TRIOXIDE, ANHYDROUS NITROUS ACID. The easiest method of obtaining this compound consists in heating 1 part of powdered starch with 8 parts of nitric acid of sp. gr. 1·25, a passing the evolved gases, first through a di ing tube two feet long containing fused ch ride of calcium, and then into a dry and emp U-tube cooled to 20° Fahr. by surrounding i with a mixture of pounded ice and crystallize chloride of calcium. Nitrous anhydride thus produced is a blue liquid which emits red fumes, and which on admixture with water at ordinary temperatures is decomposed, producing nitric acid and nitric oxide. If nitrous anhydride be mixed with water at tempera tures below 0° Fahr. the two combine, an a blue solution is formed which (probably contains nitrous acid (HNO_2). See NITROU ACID.

Nitrogen Pentoxide. N_2O_5. *Syn.* NITRI PENTOXIDE, NITRIC ANHYDRIDE, ANHYDROU NITRIC ACID. See NITRIC ACID (ANHY DROUS).

Nitrogen Peroxide. NO_2. *Syn.* NITRI PEROXIDE, PEROXIDE OF NITROGEN, NITROGEN TETROXIDE, HYPONITRIC ANHYDRIDE. This compound forms the chief constituent of the red fumes which develope on mixing nitric oxide with air or oxygen. It is most readily prepared by heating thoroughly dried nitrate of lead in a retort, and conducting the evolved gases into a U tube surrounded with a freezing mixture of ice and salt for the purpose of condensing the nitric peroxide. If the U tube be perfectly dry, and the cold intense, the nitric peroxide obtained assumes the form o transparent crystals, but the presence of the slightest trace of moisture prevents their for mation and produces instead a colourless liquid which, as the temperature rises, acquires

yellow and ultimately a red colour. Nitric peroxide dissolves in nitric acid and turns it of a yellow or red hue. The so-called '*nitrous acid*' or '*fuming nitric acid*' of commerce owes its deep red colour to the presence of this compound. At very low temperatures water converts nitric peroxide into nitric and nitrous acids; at ordinary temperatures it transforms it into nitric acid, nitrous acid, and nitric oxide.

NITRO-HYDROCHLO'RIC ACID. *Syn.* NITRO-MURIATIC ACID; AQUA REGIA, ACIDUM NITRO-HYDROCHLORICUM (B. P.) A. NITRO-MURIATICUM, L.; EAU RÉGALE, Fr. *Prep.* (B. P.) Nitric acid, 3; hydrochloric acid, 4; water, 25. Mix the acids twenty-four hours before adding the water, (This precaution is necessary to allow of the development of the chlorine, and the chloronitrous and chloronitric gases which result from the mutual decomposition of the two acids, and upon which the therapeutic activity of the agent depends). Colourless. Keep the mixture in a cool and dark place.

2. (Ph. D. 1826.) Nitric acid, 1 part; hydrochloric acid, 2 parts; (both by measure;) mix in a refrigerated bottle, and keep the mixture in a cold and dark place. *Used* to dissolve gold and platinum; and in medicine, in liver complaints, syphilis, the exanthemata, &c., either internally, in doses of 5 to 15 drops with water, or externally, as a foot- or knee-bath. It is also occasionally employed as a caustic.

3. (AQUA REGIA WITH SAL AMMONIAC.) Nitric acid (sp. gr. 1·2), 16 fl. oz.; sal ammoniac, 4 oz.; dissolve. Occasionally used by dyers; does not keep well.

4. (DYER'S AQUAFORTIS.) Colourless nitric acid (sp. gr. 1·17), 10 lbs.; hydrochloric acid (sp. gr. 1·19), 1 lb.; mix. *Used* by dyers.

NITRO-PRUS'SIDES. A series of salts discovered by Dr. Playfair, and obtained by the action of nitric acid on the ferrocyanides and ferridcyanides. The most important of these salts is the nitroprusside of sodium (Na_2 (NO) $FeCy_5 . 2Aq.$). *Prep.* Dissolve 2 parts of powdered ferrocyanide of sodium in 5 parts of common nitric acid previously diluted with its own volume of water. When the evolution of gas has ceased, digest the solution on a water bath until it no longer yields a blue but a slate-coloured precipitate with ferrous sulphate. Cool the liquid, filter, neutralise the filtrate with carbonate of sodium, and again filter. This filtrate, on evaporation, yields crystals consisting of a mixture of nitro-prusside of sodium and nitrate of potassium; the former, which may be recognised by their rhombic shape and their fine ruling colour, should be picked out and preserved. *Use.* As a test for soluble sulphides, with which nitro-prusside of sodium strikes a beautiful violet tint. According to Playfair this is the most delicate test for alkaline sulphides.

NI'TROUS ACID. HNO_2. See NITROUS ANHYDRIDE under NITROGEN, OXIDES OF.

NI'TROUS OXIDE. See NITROGEN, OXIDES OF.

NODE. *Syn.* NODUS, L. A hard tumour proceeding from a bone, and caused by the swelling of its external membrane. The bones of the leg, forehead, and forearm, are those most commonly attacked. Nodes are generally accompanied with considerable pain, and often with caries and loss of vitality.

NOLI ME TANGERE. See LUPUS.

NOMENCLATURE (Chemical). The following information will doubtless prove useful to many of our readers, as serving to explain terms which are necessarily of frequent occurrence in this work:—

ACIDS.—*a.* When a substance produces only one acid compound, the name of this acid is formed by adding the termination -IC to that of the radical, or to the leading or characteristic portion of it; as sulphuric acid, an acid of sulphur. This is Latinized by changing -IC into ICUM; as, *acidum sulphur*ICUM.—*b.* When a body forms two acid compounds containing oxygen, the name of the one containing the smaller proportion of that substance ends in -OUS; as, *nitr*-OUS acid, which contains 1 atom of nitrogen and 2 of oxygen; *nitr*IC acid, containing 1 atom of nitrogen and 3 of oxygen. In this case the Latin name ends in -OSUM; as, acidum *nitr*OSUM.—*c.* When a substance forms more than two acids with oxygen, the Greek preposition HYPO- (below or under) is prefixed to the name of the acid in -OUS or -IC next above it; as, HY*pochlorous acid.*—*d.* When a new acid compound of a substance is discovered, containing more oxygen than another acid of the same substance already known, the name of which ends in -IC, the prefix PER- or HYPER- is added; as, PER*iodic acid.* This may be illustrated by the oxygen acids of chlorine:—

Hypochlorous acid	(*acidum hypochlorosum*)	H Cl O
Chlorous "	(" *chlorosum*)	H Cl O_2
Chloric "	(" *chloricum*)	H Cl O_3
Perchloric *or* Hyperchloric "	(" *perchloricum*)	H Cl O_4

OXIDES. The names of these have, in general, reference to the number of atoms of oxygen which they contain. When a metal forms only one basic compound with oxygen, this compound is simply called the oxide of such base; but as most substances form more than one compound with oxygen, certain prefixes are introduced to express the proportions. In such cases it is generally found that one out of the number has a strongly marked basic character, and contains 1 atom of each of its constituents. This is called the oxide, protoxide, or monoxide, and forms the standard to which those both above it and below it are preferred. Thus, supposing M to be the metal, we may have:—

closely corresponds to that of the mother of the infant, or that it does not differ, on this point, more than 3 or 4 weeks. In respect of the use of high-flavoured or improper food and beverages, medicine, &c., it appears that all these substances immediately affect the milk, and impart to it more or less of their peculiar flavour and properties; and, except with remedies administered under medical advice, in nearly all cases prove injurious to the infant. The diet of a nurse should be nutritious and succulent, and its healthy digestion should be promoted by exercise and pure air. Strong liquors, more especially spirits, act like slow poisons on the infant, and their habitual use by a nurse should, therefore, be considered as a positive disqualification for the duties of her office. The care of the mother or wet-nurse should be particularly directed to the maintenance of her own health and equanimity, by which both the health and good temper of the infant will be, as far as possible, ensured. A grieving, irritable or angry mother, forces her bad qualities on her offspring, in the shape of fits, convulsions, or hopeless marasmus. See INFANCY, MILK, &c.

NUT'MEG. *Syn.* MYRISTICÆ NUCLEUS, NUCISTA, NUX MOSCHATA, N. MYRISTICA, N. AROMATICA, MYRISTICA (B. P., Ph. L.), L. "The shelled seed of *Myristica officinalis* (Linn.; *M. moschata*—Thunberg), or nutmeg-tree." It is chiefly used as a spice and condiment, but it is also esteemed as an aromatic in flatulency and diarrhœa.—*Dose.* Half a teaspoonful, or more, grated. The distilled and expressed oils (OLEUM MYRISTICÆ) are also officinal.

NUTRI"TION. The phenomena of life are accompanied by the constant and unceasing waste of the materials of which the animal body is composed. Every act of volition, every exertion of muscular power, every functional action of the organism, whether perceptible or imperceptible and involuntary, every play of chemical affinity and decomposition, even thought itself, occasions the disorganization and destruction, as living matter, of a portion of ourselves. But the process of respiration, and the various important changes with which it is connected, tends, more than all the other vital functions, to waste the substance of the body, the temperature of which it is its special office to support. This loss, this change, which commences with life and terminates only with death, is compensated for by the constant renewal of the whole frame by the deposition and assimilation, or organization, of matter from the blood, which thus becomes gradually thinner and impoverished, unless, in its turn, it receives a corresponding supply of its vital elements. This it does from the food, which, by the functions of digestion, is converted into 'chyle,' and, after being taken up by the 'lacteals,' passes into the blood, of which it then becomes a part, and after being animalised and rendered similar to the being it is designed to nourish, by the peculiar action of the vital affinities, it attaches itself to those organs or tissues, the loss of which it is intended to supply. This constitutes nutrition.

The food of animals, or, rather, the nutritious portion of that food on which we live, is wholly organic matter, and is either directly or indirectly produced by the powers of vegetation from the inorganic world. The plant elaborates food for the herbivora, and these, in their turn, serve as food for the flesh-eating animals. In both cases the leading alimentary principles are the same; the difference is in their proportions. Flesh is identical in composition with blood, and with the body of the animal that blood is destined to nourish. It abounds in albumen, casein, and fibrin. The vegetable substances used as food also contain nitrogenised principles of a precisely similar character and chemical constitution to those found in flesh, and which we are, therefore, bound to believe are absolutely the same. The gluten of wheat, when purified from gliadin, presents all the characteristics of pure fibrin. The albumen extracted from vegetable juices, when coagulated by heat, cannot be distinguished from the boiled white of egg in a divided condition. The legumen or vegetable casein of almonds, peas, beans, and many of the oily seeds, bears the most striking resemblance to the casein of milk. These facts clearly show that the leading nitrogenized principles of animal bodies pre-exist in vegetables, and that the substances employed as food must have the same, or nearly the same, chemical composition as the body itself. The striking contrast of animal and vegetable food, as far as this point is concerned, is more apparent than real. The actual difference between the two is to be found in the existence of a large quantity of non-nitrogenized matter (sugar, starch, &c.) in the last, which is not contained in the other—matter which abounds in carbon, and which, by its combustion in the system, serves to support the animal heat at a less sacrifice of the organic fabric. In the flesh-eating animal the waste of the organic tissues is very rapid, and the tax upon the vital energies proportionate; for the temperature of its body is kept up, for the most part, by the burning of the nitrogenised matter of which these tissues are composed.

The process of digestion is that by which the available portions of the food are reduced to a form adapted for absorption by the vessels by which it is introduced into the system. In the flesh-eating animal this process is extremely simple, and consists in the mere comminution of the food by the teeth, and its reduction to the liquid state in the stomach, after which, from the nature of its composition, it is nearly all taken up, and at once conveyed into the blood. In the herbivora, however, the process of digestion is much

more complicated, and occupies a longer period. Besides the ordinary principles of flesh, their food contains starch, sugar, gum, &c., mixed with much inert vegetable fibre and other useless substances, from which it must be separated. The first of these supply materials for the waste and growth of the body, the second meet the requirements of respiration, and the last pass unaltered through the alimentary canal.

The nature of the digestive process is not clearly established. The principal objects effected appear to be the conversion of starch, coagulated albumen, fibrin, casein, &c., into a liquid form. It is known that the saliva contains a peculiar principle (ptyalin) resembling diastase, capable of transmuting starch into sugar, and that when a little starch is held in the mouth for a short time this change actually occurs. It is also known that the gastric juice contains a peculiar organic principles named 'pepsin,' and that this substance, in conjunction with dilute hydrochloric acid, which is likewise present in the stomach, possesses the property of dissolving the albuminous principles of food. (*See* PEPSIN.) These changes occur whenever these conditions are established out of the body, and hence it is inferred that the process of digestion is effected by similar means. Of this, however, there is no direct evidence.

The use of food, as already noticed, is twofold. It supplies the materials of nutrition to balance the waste of the tissues continually taking place in the body, and it conveys into the system those elements which, by their chemical combinations, produce heat. To effect these purposes in the most beneficial manner, the food should not only be sufficient in quantity, but the proportions of its nitrogenised and carbonaceous principles should bear such relations to each other as to amply meet the demands of the system for each without the existence, however, of an undue excess of either.

When the muscular movements of healthy animal are restrained, a genial temperature kept up, and an ample supply of food containing much amylaceous or oily matter given, an accumulation of fat in the system rapidly takes place; this is well seen in the case of stall-fed cattle. On the other hand, when food is deficient, and much exercise is taken, emaciation results. These effects are ascribed to differences in the activity of the respiratory function. In the first instance, the heat-food is supplied faster than it is consumed, and hence accumulates in the form of fat; in the second, the conditions are reversed, and the creature is kept in a state of leanness by its rapid consumption. The fat of an animal appears to be the provision of nature for the maintenance of life during a certain period under circumstances of privation. Hence it is that a lean animal suffers more from cold than a fat one, and is also sooner starved.

"The origin of fat in the animal body has recently been made the subject of much animated discussion; on the one hand, it was contended that satisfactory evidence exists of the conversion of starch and saccharine substances into fat, by separation of carbon and oxygen, the change somewhat resembling that of the vinous fermentation; it was argued, on the other side, that oily or fatty matter is invariably present in the food supplied to the domestic animals, and that this fat is merely absorbed and deposited in the body in a slightly modified state. The question has now been decided in favour of the first of these views, which was enunciated by Professor Liebig, by the very chemist who formerly advocated the second opinion. By a series of very beautiful experiments, MM. Dumas and Milne-Edwards proved that bees exclusively feeding upon sugar were still capable of producing wax, which was pointrd out as a veritable fact."

Professor Liebeg has divided the principles found in food into two classes:—plastic elements of nutrition, or flesh-and-blood-making principles; and elements of respiration, or those which, by their decomposition or combustion in the system, generate heat. They are as follows:—

Elements of Nutrition. (Plastic or Nitrogenous.)	*Elements of Respiration* (Heat-producing)
Animal flesh	Fat
Blood	Starch
Vegetable albumen	Cane sugar
" casein	Grape "
" fibrin.	Milk "
	Pectin
	Alcohol.

This division is doubtless in the main justified by fact, but, no doubt, the nitrogenous elements of food produce heat as well as the non-nitrogenous.

NUX VOMICA. *Syn.* FABA SANCTI IGNATII, POISON N., VOMIT N.; NUX VOMICA, NUX VOMICA (B. P., Ph. L. E. & D.). "The seed of *Strychnos Nux Vomica* Linn." (Ph. L.), imported from the East Indies (B. P.). This drug is chiefly known as a violent excitant of the cerebro-spinal system. In small doses, frequently repeated, it is tonic, diuretic, and occasionally laxative; in slightly larger ones it is emetic; and, in large doses, it is an energetic and fearful poison.—*Dose.* 1 to 3 grs.; in paralysis, nervous affections, impotence, chronic dysentery, chronic diarrhœa, &c. Its frequent use is said to render the system proof against the poison of serpents. See STRYCHNIA, the active principle.

OAK. The oak is the *Quercus Robur* of Linnæus; there are two varieties, *Q. pedunca* *sessiflora*. The wood of the oak is [illegible] le than that of any other tree, and [illegible] e supporting a weight,

[illegible] Obtain

resisting a strain, and not splintering by a cannon shot, it is superior to every other kind." It, nevertheless, "warps and twists much in drying; and, in seasoning, shrinks about 1·32nd of its width." Foreign oak is less durable, but more brittle and workable. The bark (OAK BARK; QUERCŪS CORTEX. QUERCUS—B. P., Ph. L. E. & D.) is used as an astringent and febrifuge, in doses of 30 to 120 gr., frequently; an astringent decoction is also made of it, but its chief employment is in tanning leather. The peculiar appearance of old oak or 'wainscoting' is given to the new wood by exposing it, whilst very slightly damp, to the fumes of ammonia.

OAT. *Syn.* AVENA, L. The common cultivated oat is the Avena sativa (Linn.), a graminaceous plant, of which there are several varieties, as the Avena sativa alba, or white oat; A. s. nigra, or black oat; the potato oat, &c. Other species are also cultivated, as Avena nuda (Linn.), pilcorn, or naked oat; A. strigosa, or Spanish oat, &c. The seed (OATS; CARYOPSIDES, SEMINA AVENÆ CRUDA) form the common horse-corn of this country, but in the northern parts of the country it is extensively used as food for man. The husked grain constitutes GROATS, and its meal OATMEAL. The latter does not form a dough with water, as wheaten meal or flour does.

Oats consist of from 24% to 28% of husk, and 74% to 78% of grain. According to M. Payen, they contain of starch 60·59%; azotized matter, 14·39%; saccharine and gummy matter, 9·25%; fatty matter, 5·50%; cellulose, 7·60%; silica and saline matter, 2·25%. The husk contains between 6 and 7% of saline matter. (Prof. Norton.) The ash is 2·18%, and consists of potassa and soda, 26·18%; lime, 5·95%; magnesia, 9·95%; oxide of iron, ·40%; phosphoric acid, 43·84%; sulphuric acid, 10·45%; chlorine, ·26%; silica, 2·67%; alumina, ·06%. (Johnston.)

The yield of oats is from 20 bushels per acre in poor soils, up to 60, 70, and even 80 bushels per acre in rich soils. The weight per bushel varies from 35 to 45 lb., and the product in meal is about one half the weight of the oats.

A large proportion of the oats given to horses passes off undigested. It has hence been proposed to prevent this loss, by either coarsely bruising them in a mill, or by pouring boiling water over them, and allowing them to macerate till cold, when they are to be given to the horses without straining off the water. It is stated on good authority, that oats thus treated will not only fatten quicker, but go twice as far as without preparation. Oat bruisers are now manufactured by most agricultural implement makers.

OAT'MEAL. *Syn.* AVENÆ FARINA, F. EX SEMINIBUS AVENÆ (Ph. D.), L. Of thirty samples of oatmeal examined by the 'Lancet Sanitary Commissioner,' no fewer than sixteen samples, or more than one half, were adulterated. The substance generally used for this purpose is barley meal, which is only half the price of oatmeal. That supplied to the army, navy, the workhouses, &c., is also very commonly adulterated with whiting, plaster of Paris, or ground bones. These frauds are readily detected by the microscope.

OBE"SITY. *Syn.* OBESITAS, POLYSARCIA, L. Unhealthy or troublesome fatness or corpulency. Sometimes the secretion of fat, and its accumulation in the adipose membrane, is almost as rapid as that of water in anasarca; on which account some of the old writers have called obesity a dropsy of fat. Persons in easy circumstances, of indolent habits, who live freely, and who are of a cheerful and contented disposition, are those most liable to obesity. The treatment consists in the very gradual reduction of the diet, until it falls rather below the average quantity required by a healthy adult; the very gradual disuse of fermented liquors, more especially beer; the gradual abridgment of the time devoted to repose, until it does not exceed 5 or 6 hours; the employment of several hours daily in exercise in the open air, at first moderate, but increased day by day in energy, until it becomes laborious; and, lastly, arousing the mind from a state of lethargy to one of active or even harassing employment.

In some few cases the accumulation of fat has been enormous. Bright, of Maldon, weighed 728 lb.; Daniel Lambert, of Leicester, 739 lb.; a girl, 4 years old, noticed in the 'Phil. Trans,' 1813, weighed 256 lb.

Persons affected with obesity are generally short-lived.

O'CHRES. These are native earthy compounds of clay, coloured with oxide of iron, with frequently a little chalk, or magnesia. The differences in the colour arise partly from the quantity of iron present, and partly from the state of oxidation in which the iron is found. Several varieties are known in commerce—BROWN OCHRE, FRENCH O., OXFORD O., RED O., ROMAN O., YELLOW O. All these with the exception of the first and fourth, have a yellow colour. ARMENIAN BOLE, INDIAN RED, VENETIAN R., and SPANISH BROWN, are also ochres.

All the ochres are darkened by calcination. The yellow ochres acquire a red or reddish-brown colour by this treatment. The pigment called 'light red' is thus prepared from yellow ochre.

ODONTAL'GIA. See TOOTHACHE.

O'DORAMENTS. *Syn.* ODORAMENTA, L. Substances employed in medicine on account of their odour. They differ from disinfectants, in only disguising, but not destroying, noxious vapours, &c. AMMONIA, STRONG VINEGAR, and PASTILLES, furnish the most familiar examples of this class of substances. See DISINFECTANTS, PERFUMES, &c.

O'DOUR. The emanation of an odoriferous or scent-giving body. See PERFUMES.

ŒNAN'THIC ETHER. See ETHER (Œnanthic).

OFFIC'INAL. *Syn.* OFFICINALIS, L. A term applied to substances or medicines ordered in the Pharmacopœia.

OIL. *Syn.* OLEUM, L.; HUILE, Fr. This name is given to numerous liquid or semi-liquid substances, expressed or drawn from animal or vegetable bodies; to various products of the distillation of bituminous minerals; and to several unctuous mixtures in perfumery and pharmacy. To facilitate reference, we have grouped the principal substances generally called 'oils' into classes, under the following heads:—OILS (Drying); OILS (Empyreumatic); OILS (Fixed); OILS (Medicated); OILS (Mineral); OILS (Mixed); OILS (Perfumed); OILS (Volatile). See these articles, also *below*:—

Oil, Consol'idated. *Syn.* CAMPTICON, FACTITIOUS CAOUTCHOUC. A substance having most of the properties of India rubber, prepared by oxidising boiled linseed oil, or any other oil that hardens on exposure to the atmosphere. To obtain the solid oil, plates of glass are dipped into linseed oil, the films are then allowed to dry, and the process is repeated again and again until the plates are coated with many layers of perfectly oxidised oil. Instead of plates of glass, extensive surfaces of prepared [illegible] employed when the manufacture is carried out on a large scale. The solid oil, having been scraped or peeled off the surfaces, is worked with a small proportion of shellac, by means of a mixing machine with hot rollers, until a material singularly like caoutchouc is produced. The consolidated oil can be rolled on to fabrics, so as to form a waterproof cloth, having the finish and flexibility of rubber-cloth. By the action of heat the consolidated oil may be converted into a hard substance, resembling vulcanite and ebonite. Its useful applications appear to be very numerous, but its manufacture has not as yet made much progress.

OIL-GAS. A mixture of several gaseous hydrocarbons, obtained by passing common whale or other cheap animal oil through red-hot tubes, or by allowing it to fall in drops on red-hot stones or bricks arranged in an iron retort, or other suitable apparatus. The gas has great illuminating power, requires no purification, and is quite free from the ammoniacal and sulphur compounds which vitiate coal-gas. The high price of oil prevents the general use of this gas for illuminating purposes.

OILS (Drying). All the fixed oils have an attraction more or less powerful for oxygen, and, by exposure to the air, they either become hard and resinous, or they only thicken slightly, and become sour and rancid. Those which exhibit the first property in a marked degree, as the oils of linseed, poppy, rape, and walnut, are called 'drying oils,' and are used as vehicles for colours in painting [illegible] for other

The resinifying or drying property of oils is greatly increased by boiling them, either alone or along with some litharge, sugar of lead, or white vitriol, when the product forms the 'boiled oil' or 'drying oil' (oleum desiccativum) of commerce. The efficacy of the process, according to Liebig, depends on the elimination of substances which impede the oxidation of the oil. The following formulæ are adopted for this purpose:—

1. Linseed oil, 1 gall.; powdered litharge, ¾ lb.; simmer, with frequent stirring, until a pellicle begins to form; remove the scum, and when it has become cold and has settled decant the clear portion. Dark coloured; used by house-painters.

2. Linseed oil and water, of each, 1 quart; white vitriol, in powder, 2 oz.; boil to dryness. Paler than the last.

3. Pale linseed or nut oil, 1 pint; [illegible] or dry sulphate of lead, in fine powder, mix, agitate frequently for 10 days, the bottle in the sun or a warm place, and decant the clear portion. Very [illegible]

4. Linseed oil [illegible] galls.; calcined vitriol [illegible] zinc'), in fine powder, 7 lbs.; [illegible] clean copper boiler, heat the whole to 235° Fahr., and keep it at that temperature, with constant stirring, for at least one hour; then allow it to cool, in 24 hours decant the clear portion, and in 3 or 4 weeks more rack it for use. *Used* for varnishes.

5. (Liebig.) Sugar of lead, 1 lb., is dissolved in rain water, ½ gall.; litharge, in fine powder, 1 lb., is then added, and the mixture is gently simmered until only a whitish sediment remains; levigated litharge, 1 lb., is next diffused through linseed oil, 2½ galls., and the mixture is gradually added to the lead solution, previously diluted with an equal bulk of water; the whole is now stirred together for some hours, with heat, and is, lastly, left to clear itself by exposure in a warm place. The lead solution which subsides from the oil may be used again for the same purpose, by dissolving in it another lb. of litharge, as before.

6. (Wilks). Into linseed oil, 236 galls., pour oil of vitriol, 6 or 7 lbs., and stir the two together for 3 hours; then add a mixture of fuller's earth, 6 lbs., and hot lime, 14 lbs., and again stir for 3 hours; next put the whole into a copper, with an equal quantity of water, and boil for about 3 hours; lastly, withdraw the fire, and when the whole is cold, draw off the water, run the oil into any suitable vessel, and let it stand for a few weeks before using it. *Patent.*

7. ('Allg. Polytech. Zeitung.') Binoxide of manganese (in coarse powder, but not dusty), 1 part; nut or linseed oil, 10 parts; mix, and keep the whole gently heated and frequently stirred for 24 to 36 hours, or until the oil begins to [illegible] mended for

the oils 'bright' after boiling or heating them with the lead solutions; the best way, on the small scale, is either to filter them through coarse woollen filtering paper, or to expose the bottle for some time to the sun or in a warm place. On the large scale, the finer oils of this kind are often filtered through Canton-flannel bags. The litharge and sulphate of lead used in the above processes may be again rendered available for the same purpose, by washing them in hot water, to remove adhering mucilage.

OILS (Empyreumat'ic). *Syn.* OLEA EMPYREUMATICA, L. The 'empyreumatic oils' of the old pharmaceutical writers were oily fluids obtained by the dry distillation of various substances, animal, vegetable, and mineral. But few of them are in use at the present day, though formulæ are given for them in some of the foreign pharmacopœias. Two or three have useful applications in the arts, and it is therefore necessary that we should briefly notice their preparation. When the ingredients are of a liquid or pasty nature, or when they are usually mixed with water, they are usually mixed with twice their weight of sand, powder, or other substance to divide the mass, and thus expose a large surface directly to the action of the fire. The still must also be furnished with a tube to carry off non-condensable gases liberated at the same time as the oil. The products of the first distillation are generally purified by rectification alone or along with water. In general they require to be preserved from the light and air.

The following are the principal substances belonging to this class:—

Oil of Al'oes. *Syn.* ALOETIC OIL; OLEUM ALOETICUM, L. 1. From Socotrine or hepatic aloes distilled along with sand.

2. (Batavian—Cadet de Gassicourt.) Olive oil, 1 lb.; hepatic aloes and myrrh, of each, in powder, 2 oz.; olibanum, ½ oz.; distil in a sand bath, from a stoneware retort. *Used* as an external vermifuge for children; a portion is rubbed 2 or 3 times a day over the umbilical regions.

Oil of Am'ber. *Syn.* OLEUM SUCCINI, L. From coarse pieces of amber, distilled in an iron retort, either alone or reduced to powder and mixed with sand. The oil is separated from the fetid liquor and succinic acid which passes over, and rectified along with about 6 times its volume of water, by a gentle heat. It then forms 'RECTIFIED OIL OF AMBER' (OLEUM SUCCINI—Ph. L. 1836, O. S. RECTIFICATUM—Ph. D. 1826, O. S. PURISSIMUM—Ph. E. 1841). *Prod.* 20%.

Prop., &c. It has a pale yellow colour, a strong, ungrateful odour, and a hot, acrid taste; heat and air blacken and thicken it; it boils at 186° Fahr. Sp. gr. ·758 at 75° [illegible] antispasmodic, rubefacient, and [illegible] into an [illegible]sy, and convulsive affections. Externally, as a friction, either alone or combined with laudanum or sweet oil, in rheumatism, tic douloureux, hooping-cough, &c. See MUSK (Factitious).

Oil, An'imal. 1. (Empyreumatic or Fetid; OIL OF HARTSHORN, DIPPEL'S O.; OLEUM ANIMALE EMPYREUMATICUM, O. CORNU CERVI, O. DIPPELII, L.) Chiefly obtained as a secondary product in the manufacture of bone-black. Fetid and dark coloured. *Used* chiefly to make lampblack.

2. (Ethereal; RECTIFIED OIL OF HARTSHORN; OLEUM ANIMALE ÆTHERIUM, O. CORNU CERVI RECTIFICATUM, LOCO OLEI ANIMALIS DIPPELII, L.)—*a.* A finer kind of animal oil, made by slowly distilling oil of hartshorn, and collecting only the first portion that comes over. Pale and limpid. Exposure to light discolours it.

b. (Ph. Bor.) Fetid animal oil distilled in a sand bath, and the product rectified with four times its volume of water. White, limpid, fragrant. Light discolours it.

Prop. The refined product is said to be antispasmodic, anodyne, and diaphoretic.—*Dose.* 5 to 30 drops, in water; in large doses, it acts as an irritant poison.

Oil of Birch. *Syn.* OLEUM BETULÆ, L. From the inner bark of the birch, by heating it in an earthen pot with a hole in the bottom, to allow the oil to flow through into another jar sunk in the ground and luted to it. Thick, balsamic, fragrant. *Used* chiefly to dress Russia leather.

Oil of Box-wood. *Syn.* OLEUM BUXI, O. B. EMPYREUMATICUM (Ph. L. 1746), L. From box-wood sawdust. Reputed resolvent; anodyne, antispasmodic, and diaphoretic.—*Dose.* 5 to 20 drops; in convulsions, epilepsy, gonorrhœa, &c. Externally, in toothache, &c.

Oil of Bricks. *Syn.* OLEUM LATERITIUM (Ph. L. 1746), L. From olive oil, mixed with brickdust, and distilled; or, from hot bricks steeped in olive oil, then broken to pieces, and distilled.

Oil of Bricks (Factitious). *Syn.* OLEUM LATERITIUM FACTITIUM, L. From linseed oil, 1 lb.; oil of turpentine, ½ lb.; oil of bones or of hartshorn and Barbadoes tar, of each, 1 oz.; simply stirred well together. This is generally substituted for the preceding in the shops.

Oil of Cade. *Syn.* OLEUM CADINUM, L.; HUILE DE CADE, Fr. From the *Juniperus oxycedrus* or Languedoc juniper. *Used* as oil of tar, which is commonly sold for it.

Oil of Coal. *Syn.* COAL OIL. From the gas-works. See NAPHTHA.

Oil of Gua'iacum. *Syn.* OLEUM GUAIACI, O. G. EMPYREUMATICUM, L. From guaiacum shavings or raspings. Reputed balsamic, pectoral, and resolvent.

Oil of Harts'horn. Bone oil and rectified bone oil are commonly sold for it, but are inferior to it. See ANIMAL OIL (*above*).

Oil, Paper. *Syn.* RAG OIL, PYROTHONIDÆ

OLEUM CHARTÆ, L. On the small scale, by burning paper on a cold tin plate, and collecting the oil; on the large scale, by the destructive distillation of paper or linen rags. In baldness, toothache, ear-ache, &c.

Oil, Par'affiin. See MINERAL OILS.

Oil, Petro'leum. See MINERAL OILS, PETROLEUM.

Oil, Rag. See PAPER OIL (*above*).

Oil, Rock. See NAPHTHA, MINERAL OILS, PETROLEUM.

Oil, Shale. See MINERAL OILS.

Oil of Soot. *Syn.* OLEUM FULIGINIS (Ph. L. 1746), L. From wood-soot. Fetid; reputed antispasmodic and nervine.

Oil of Tar. *Syn.* SPIRIT OF T.; OLEUM PINI, O. P. RUBRUM, O. TÆDÆ, O. PICIS LIQUIDÆ, L. By simple distillation from wood-tar. Reddish and strong scented. By one or more rectifications it becomes colourless and limpid. It soon gets thick. *Used* in ringworm and several other skin diseases, made into an ointment with lard. It is poisonous if swallowed in large doses.

Oil of Tobac'co (Empyreumatic). *Syn.* OLEUM TABACI EMPYREUMATICUM (Ph. U. S.), L. From tobacco, in coarse powder, gradually heated in a green-glass retort to dull redness, and kept at that temperature as long as any oil passes over; the oily portion is then separated from the water in the receiver, and kept for use. Highly narcotic and poisonous.

Oil of Wax. *Syn.* OLEUM CERÆ, L. From bees' wax and sand distilled together; the product is rectified once or oftener. Reputed diuretic.—*Dose.* 3 to 6 drops.

OILS (Fixed). *Syn.* FAT OILS, UNCTUOUS O.; OLEA FIXA, O. EXPRESSA, L.; HUILES GRASSES, Fr. The fixed oils are compounds of carbon, hydrogen, and oxygen (or hydro-carbons), obtained from the organic kingdom, and characterised by their insipidity, unctuosity, insolubility in water, and being lighter than that fluid. Olive oil, which is obtained from the vegetable kingdom, and spermaceti oil, which is obtained from the animal kingdom, may be taken as types of the rest.

The fixed oils are chiefly found in the fruit and seeds of plants, and in thin membranous cells, forming what is called the adipose tissue, in the bodies of animals. According to their consistence, they may be classed into 'OILS,' 'BUTTERS,' and 'TALLOWS.'

Prop., &c. Among the best-known properties of the fixed oils are—the permanent stain they give to paper, which they render translucid; their non-volatility at the ordinary temperature of the atmosphere, or at that of boiling water, or, indeed, at any temperature insufficient for their decomposition; their constantly floating on the surface of water when added to it; and, lastly, their inability to mix with that fluid. Some of them, as palm oil and cocoa-nut oil, are solid at ordinary temperatures; but the majority are fluid, unless they have been considerably cooled, when they separate into two portions—the one solid, consisting chiefly of stearin, or some analogous substance, and the other liquid, consisting chiefly of olein or elain. Nearly all of them, when exposed to the air, absorb oxygen rapidly, and either gradually harden or become rancid and nauseous. From the first are selected the 'drying oils' used by painters; the last are used as food, in cookery, and for machinery, lamps, &c. The whole of these oils, when heated to their boiling-points (500° to 600° Fahr.), suffer decomposition, yielding various hydrocarbons; and when suddenly exposed to a red heat, they furnish a gaseous product (oil-gas), which was formerly employed for illumination. It is owing to this property of oil and liquid fats that candles and lamps give their light. The wick is a gas-producing apparatus in miniature. With the caustic alkalies and water, the fixed oils unite to form soap. When some of these oils are absorbed by porous bodies, and thus expose a vastly increased surface to the air, they absorb oxygen with such rapidity as to generate a considerable degree of heat. Paper, tow, cotton, wool, straw, shavings, &c., slightly embued with oil, and left in a heap, freely exposed to the air or sun, often spontaneously inflame. In this way many extensive fires have arisen. The above is more particularly the case with linseed, rape, nut, and olive oil. The heat made into a paste with manganese, soon becomes hot, and ultimately inflames spontaneously.

The specific gravities of the fixed oils range between ·865 and ·970, water being 1·000.

Prep. The fixed oils, except where otherwise directed, are obtained from the bruised or ground fruit or seed, by means of powerful pressure, in screw or hydraulic presses, and are then either allowed to clarify themselves by subsidence or are filtered. Both methods are frequently applied to the same oil. In some cases the impurities are removed by ebullition with water, and subsequent separation of the pure oil. Heat is frequently employed to increase the liquidity of the oil, and thus lessen the difficulty of its expulsion from the mass. With this object the bruised mass, placed in bags, is commonly exposed to the heat of steam, and then pressed between heated plates of metal. This is always necessary with the 'butyraceous oils.'

Another method is by boiling the bruised seed in water, and skimming off the oil as it rises to the surface. This is the plan adopted for castor oil in the West Indies.

In a few cases, for medicinal purposes, the bruised mass is mixed with ½ its weight, or an equal weight, of alcohol or ether, and after 24 hours' digestion the whole is submitted to pressure, and the alcohol or ether removed by distillation at a gentle heat. The first menstruum is commonly employed for croton oil on the Continent; the second for that of ergot of rye.

TABLE *giving the reactions of various* OILS *with* SULPHURIC ACID *and with a saturated solution of* BICHROMATE OF POTASSA *in sulphuric acid.* Re-arranged from M. PENOT'S table, with additions, by Mr. COOLEY.

*** *The result indicated is obtained in each case by the action of* one drop *of the* REAGENT *on* twenty drops *of* OIL.

NAME OF OIL.	REAGENTS.		
	Sulphuric Acid.		Saturated Solution of Bichromate of Potassa in Sulphuric Acid.
	Not stirred.	*Stirred.*	*Stirred.*
Almond oil	Greenfinch yellow, with orange spots	Dirty green	Yellowish, small lumps.
Castor oil	Yellow, with slight spots	Little reaction	Slightly green.
Cod-liver oil (*fine sample of pale oil*)	Deep purple in the centre, rapidly turning brown, whilst violet or purple clouds or streaks spread out towards the circumference, the colour of which remains unaltered for some minutes after the central portion has turned nearly black	Deep purple, passing into purple brown, reddish brown, and gradually deepening to an intense brown, approaching black	Reddish-brown clots, changing to a clear bright green.
Hemp-seed oil	Small brown lumps or clots on a yellow ground	Greenish brown	Small yellow lumps or clots on a green ground.
Linseed oil (*from the Upper Rhine*)	Dark reddish brown	Brown small lumps on a gray ground	Brown small lumps on an almost colourless ground.
,, (*from Paris*)	Reddish brown, less dark coloured	Brown clots on a green ground	Brown small lumps on a green ground.
,, (*English*)	Chestnut brown	Brown clots on a greenish-gray ground	Brown lumps on a greenish-gray ground.
Liver-train oil	Dark red	Dark red	Dark red.
Madia-sativa oil	Slightly reddish brown underneath a thin grayish film	Olive green	Light brown small lumps on an olive-coloured ground.
Black-mustard oil	Bluish green	Olive green	Olive brown.
Neat's-foot oil	Yellow slight spots	Dirty brown	Brown spots on a brownish ground.
Nut oil (*recent*)	Yellowish brown	Clotted, dark brown	Small brown lumps or clots.
,, (*one year old*)	Yellow	Dirty brown, less dark coloured	Small brown lumps.
,, (*still older*)	Orange yellow	Dirty brown	Small brownish lumps.
Olein, oleic acid, lard, or tallow oil	Reddish spots, with reddish circles	Reddish brown	Bright chestnut colour.
Olive oil	Yellow	Dirty brown	Olive brown.
,, (*another sample*)	Orange yellow	Brownish gray	Brown.
,, (*from fermented olives*)	Orange yellow	Brownish gray	Brown.
Poppy oil (*recent cold drawn*)	Yellow spots	Olive brown	Small yellow lumps on a white ground.
,, (*recent, expressed with slight heat*)	Greenish-yellow spots	Olive brown, turning more on the green	Small yellow lumps on a greenish-gray ground.
,, (*one year old, expressed with heat*)	Greenish spots	Olive green	Small yellow lumps on a green ground.
Rape or colza oil (*trade*)	Yellowish-brown streaks surrounded by a bluish-green ring	Brownish, turning on the olive green	Yellow small lumps on a green ground.
,, (*recent*)	Green	Bluish green	Yellow small lumps on a green ground.
,, (*one year old*)	Green	Bluish green	Yellow lumps on a brighter green ground.
,, (*one year old, rough hot-pressed*)	Green	Olive green	Small yellow lumps, more numerous, on an olive-green ground.
Whale-train oil	Small reddish lumps on a brownish ground	Resembles wine lees	Small, bright, chestnut-coloured lumps on a brown ground.

become cold, is filtered through Canton flannel, and put into canisters. The commoner kinds are prepared by gently heating the crushed seeds, and pressing them whilst hot. Another method, sometimes adopted, is to put the crushed seed into loose bags, to boil these in water, and to skim off the floating oil.

Prop. It is the most viscid of all the fixed oils; when pure, it mixes in all proportions with alcohol and ether, and also dissolves, to a certain extent, in rectified spirit, but a portion of the oil separates on standing. Camphor and benzoic acid increase its solubility in spirit. By long exposure to the air, it becomes rancid, thick, and is ultimately transformed into a transparent yellow mass; light hastens these changes. Exposed to cold, a solid, white, crystalline fat separates from the liquid portion, and when cooled to 0° it congeals into a yellow transparent mass, which does not again liquefy until the temperature rises to about 18° Fahr. Sp. gr. ·9611 to ·9612, at 60°; ·9690, at 55° (Saussure); ·9575, at 77° (Saussure). *Prod.* 38 to 40% (62½—Ure).

Pur. Castor oil is sometimes adulterated with rape oil or with lard oil, a fraud which may be detected by its diminished density; and, when the added oil exceeds 33⅓, by its insolubility in its own weight of alcohol of ·820. In many cases croton oil is added to increase the purgative quality of the mixture. A compound of this kind is vended in gelatine capsules under the name of 'CONCENTRATED CASTOR OIL,' the use of which is fraught with danger. "I have heard of several cases in which very violent and dangerous effects were produced by these capsules." (Pereira.) The best is imported from the East Indies in tin canisters. The oil obtained from the seeds of *Ricinus viridis* (Willd.), or lamp-oil seeds, is often mixed with or sold for castor oil.

Uses, &c. Castor oil is an exceedingly useful mild purgative, particularly when abdominal irritation should be avoided, as in inflammations of the stomach and bowels, pregnancy, surgical operations, &c.—*Dose.* 2 fl. drs. to 1 fl. oz.

Oil, Co'coa-nut. *Syn.* COCOA-NUT BUTTER; OLEUM COCOIS NUCIFERÆ, L. By expression from the kernels of the cocoa nut, or fruit of the *Cocos nucifera.*

Oil, Cod-liver. *Syn.* MORRHUÆ OLEUM (B. P.), COD-FISH OIL; OLEUM JECORIS ASELLI, O. GADI, O. G. MORRHUÆ, OLEUM MORRHUÆ (Ph. L.), L. "The oil extracted from the fresh liver of the *Gadus morrhua* by a steam heat or water-bath not exceeding 180° Fahr. Yellow." "The oil prepared from the liver of *Gadus morrhua*, Linn." (Ph. L.)

The common cod-liver oil of commerce drains from the livers of the cod-fish when freely exposed to the sun, and just beginning to putrefy. It is dark coloured, strong, and nauseous, and is now chiefly employed in this country by the curriers, for dressing leather. It is the 'OLEUM JECORIS ASELLI FUSCUM' of Continental writers. Formerly, the less fetid varieties of this crude oil, after the impurities were removed, either by subsidence or filtration, constituted the only cod-liver oil used in medicine. As its employment as a remedy increased, its revolting flavour, and its great tendency to permanently disorder the stomach and bowels, was found, however, to be a serious obstacle to its general use. It was observed that the oil, as it exists in the liver of the cod, is bland, and nearly colourless, and has only a slight fishy, but not a disagreeable flavour. The attention of persons interested was therefore immediately directed to the subject, and improved methods of obtaining the oil were suggested, and ere long adopted on the large scale.

The methods of preparing cod-liver oil are noticed in another part of this work, but we think it advisable to add to these a description of the plan adopted by Messrs. Charles Fox and Co., of Newfoundland, Scarborough, and London, the well-known manufacturers and importers of cod-liver oil:—

"The Newfoundland fisheries are entirely carried on in small boats, principally by the hand-line system, and quite close to the shore. The boats go out early in the morning, and return about four o'clock in the afternoon. The fish, on landing, are handed over to a 'fish-room keeper,' whose duty it is to split and open the fish, and to deposit the livers in small tubs, holding 17 or 18 gallons each. These tubs are soon afterwards collected from the different 'fish-rooms,' and conveyed to the manufactory. The livers are here thrown into tubs filled with clean cold water, and, after being well washed and jerked over, are placed on galvanized iron-wire sieves to drain. They are next put into covered steam-jacket-pans, and submitted to a gentle heat for about three quarters of an hour, after which the steam is turned off, cold air again admitted, and the whole allowed to repose for a short time, during which the livers subside, and the oil separates and floats on the top. The oil is then skimmed off into tin vessels, and passed through flannel strainers into tubs, where it is left to subside for about 24 hours. From these the purer upper portion of oil is run into a very deep, galvanized-iron cistern, and again left to clarify itself by defecation for a few days. It is now further refined, by carefully passing it through clean and very stout mole-skin filters, under pressure. The transparent filtered oil is received in a clean, galvanized-iron cistern, containing a pump, from which the casks are filled for exportation. The latter, before being filled, are carefully seasoned and cleaned, to prevent their imparting either flavour or colour to the pure oil."

The superiority of the oil prepared as above consists essentially in every part of the process of extraction being performed whilst the livers

are fresh, and in no chemical means being adopted to give the oil a factitious appearance. Its natural pale colour is thus preserved from contamination, and its medicinal virtues maintained intact.

Much of the light-brown oil of commerce is obtained from *Gadus callarius* (the dorse), *G. carbonarius* (the coal-fish), and *G. pollachius* (the pollack).

Pur., &c. "The finest oil," remarks Dr. Pereira, "is that which is most devoid of colour, odour, and flavour. The oil, as contained in the cells of the fresh liver, is nearly colourless, and the brownish colour possessed by ordinary cod-liver oil is due to colouring matters derived from the composition (putrefying) hepatic tissues and fluids, or from the action of the air on the oil (age). Chemical analysis lends no support to the opinion, at one time entertained, that the brown oil was superior, as a therapeutical agent, to the pale oil. Chemistry has not discovered any substance in the brown oil that would confer on it superior activity as a medicine. On the other hand, the disgusting odour and flavour and nauseating qualities of the brown oil preclude its repeated use. Moreover, there is reason to suspect that, if patients could conquer their aversion to it, its free use, like that of other rancid and empyreumatic fats, would disturb the digestive functions, and be attended with injurious effects." ('Elem. Mat. Med.,' &c., 3rd edit., iii, 2239.)

Among the tests of purity, that generally relied on is known as the 'sulphuric-acid test.' See OILS. (Fixed) *Purity.*

DORSE OIL and other FISH OILS, sold as 'LIGHT-BROWN COD-LIVER OIL,' exhibit with this test much lighter reactions, which closely resemble those of LIVER-TRAIN and WHALE-TRAIN OIL.

To detect the presence of combined iodine, upon which, by some, the therapeutic value of cod-liver oil is thought to depend, the sample is saponified by trituration with a little caustic potassa and hot water, the resulting soap cautiously incinerated, the ashes digested with water, and the whole thrown on a filter. The usual tests for iodine may be then applied to the filtered liquid.

The presence of iodine artificially added is best detected by agitating the oil with a little rectified spirit, and then testing this last for iodine. Or, a little solution of starch and a few drops of sulphuric or nitric acid may be at once added to the oil, when a blue colour will be developed if iodine, or an iodide, has been mixed with the sample.

The sp. gr. of the pale oil is ·9230 to ·9238; of the light-brown oil, ·9240 to ·9245; of the dark-brown oil, ·9290 to ·9315. The density is, however, apt to vary a little with the quantity of moisture present.

Uses, &c. Cod-liver oil is a most valuable medicine in a great variety of diseases, more especially in glandular indurations and enlargements, scrofula, phthisis, rheumatism, gout, certain cutaneous diseases, amenorrhœa, chlorosis, caries, rickets, &c. To be of service, however, its use must be continued for several weeks, and the oil must be recent.—*Dose.* 1 to 2 table-spoonfuls, 3 or 4 times daily, or oftener.

Oil, Col'za. From the seeds of *Brassica campestris*, var. *oleifera*, or *colza de printemps*, a variety of *Brassica campestris* (Linn.). It may be regarded as a superior sort of rape oil. Burns well in lamps, especially after being refined. Sp. gr. ·9136. *Prod.* 39%. The term 'colza oil' is commonly applied to ordinary refined rape.

Oil, Cot'ton-seed. *Syn.* OLEUM GOSSIPII SEMINUM, L. From the seed of *Gossypium Barbadense.* Drying.

Oil, Cro'ton. *Syn.* CROTONIS OLEUM (B. P.), OLEUM CROTONIS (Ph. E.), O. TIGLII (Ph. L.), L. From the shelled seeds of *Croton tiglium* or Molucca grains. Imported chiefly from the East Indies. It is one of the most powerful cathartics known, and acts when either swallowed or merely placed in the mouth. *Externally,* it is rubefacient and counter-irritant, often causing a crop of painful pustules, like tartar emetic.—*Dose.* 1 to 2 drops, on sugar; in apoplexy, &c. It is poisonous in larger doses. Sp. gr. ·947 to ·953. *Prod.* Unshelled seeds, 22% to 20%; shelled do., 32% to 35%.

Pure croton oil is soluble in an equal volume of alcohol of ·796, but in 2 or 3 days about 96% of the oil separates. In France the marc is exhausted with alcohol, and the oil thus obtained is added to that previously obtained from the same seeds by expression. The East Indian oil (OLEUM CROTONIS EXOTICUM) is usually of a pale yellow; that pressed in England (O. CROTONIS ANGLICANUM) is much darker.

Oil of Cu'cumber. *Syn.* OLEUM CUCURBITÆ, L. From the seeds of *Curcurbita pepo*, or squash, and the *C. melopepo* or pumpkin. Pale, used in lamps; and, sometimes, as a soothing application to piles. Sp. gr. ·9231. *Prod.* 24%.

Oil of Eggs. *Syn.* OLEUM OVI, O. O. VITELLI, O. OVORUM, L. From the yolks of eggs, gently heated until they coagulate and the moisture has evaporated, and then pressed or broken up, digested in boiling rectified spirit, the tincture filtered whilst hot, and the spirit distilled off. Bland; emollient. The common plan is to fry the yolks hard; but the oil is then darker coloured and stronger. The P. Cod. orders them to be exhausted with ether, by displacement. Formerly commonly used to "kill" quicksilver, and still held in great esteem in some parts of England for sore nipples and excoriations. *Prod.* 10 to 12 eggs yield 1 oz. See MIXED OILS.

Oil of Gar'den Cress. *Syn.* OLEUM LEPIDII SATIVI, L. From the seed. Drying. Sp. gr. ·9240. *Prod.* 54%.

Oil of Garden Spurge. *Syn.* OLEUM LA-

THYBIS, O. EUPHORBIÆ L., L. From the seeds of *Euphorbia lathyris* or garden spurge. Cathartic. *Dose.* 3 to 8 drops. Sp. gr. ·9281. *Prod.* 30% to 41%. Croton oil mixed with 6 times its weight of nut or rape oil is usually sold for it.

Oil of Gingel'ly. *Syn.* OIL OF SESAMUM, BENNE OIL, TEEL O., TEL O.; OLEUM SESAMI, L. From the seeds of *Sesamum orientale* (Willd.), or gingelly. Pale; bland. *Used* in salads, paints, &c.; also to addlterate oil of almonds. *Prod.* 46%.

Oil, Gourd. See CUCUMBER OIL.

Oil of Ground Nuts. From the nuts of *Arachis hypogæa.* Glutinous.

Oil of Hemp. *Syn.* OLEUM CANNABIS, L. From the seed of *Cannabis sativa* (Linn.), or common hemp. Mawkish. Sometimes used for frying, but chiefly for paints, soaps, &c. Freely soluble in boiling alcohol; does not thicken until cooled to 5° Fahr. Sp. gr. ·9276. *Prod.* 18% to 24%.

Oil of Jatro'pha. *Syn.* OIL OF WILD CASTOR SEEDS; OLEUM JATROPHÆ, L. From the seeds of *Jatropha purgans.* Somewhat resembles CROTON OIL. *Used* for lamps in the East Indies.

Oil, Kun'dah. *Syn.* TALLICOONAH O.; OLEUM TOULOUCOUNÆ, L. From the fruit of *Carapa Touloucouna.* Rancid, nauseous, vermifuge, rubefacient, emetic, and purgative. Chiefly used in lamps.

Oil, Lard. *Syn.* TALLOW O., CRUDE OLEIN, C. OLEIC ACID; OLEUM ADIPIS, L. By separating the olein of lard from the stearin by means of boiling alcohol. Only applicable where spirit is cheap. The product is, however, excellent. The crude oleic acid, or lard oil of commerce, is chiefly obtained as a secondary product in the manufacture of stearin. It is purified by agitation with sulphuric acid, and subsequently by steaming it, or washing it with hot water. Burns well in lamps, if the wick-tube is kept cool. Sp. gr. ·9003.

Oil, Linseed. *Syn.* OLEUM LINI (B. P., Ph. L. E. & D.), L. 1. (COLD-DRAWN LINSEED OIL; OLEUM LINI SINE IGNE.) From the seed of *Linum usitatissimum* (Linn.), or common flax, bruised or crushed, and then ground and expressed without heat. Pale, insipid, viscous; does not keep so well as the next. *Prod.* 17% to 20%.

2. As the last, but employing a steam heat of about 200° Fahr. Amber coloured; less viscous than the last; congeals at 2°; soluble in 5 parts of boiling and 40 parts of cold alcohol. Both are drying and cathartic.—*Dose.* 1 to 2 oz.; in piles, &c. Chiefly used in paints, varnishes, &c. Sp. gr. ·9347. *Prod.* 22% to 27%.

3. (BOILED LINSEED OIL.) See OILS (Drying).

Oil of Mace (Expressed). See OIL OF NUTMEG (Expressed).

Oil of Mustard. *Syn.* OLEUM SINAPIS, L. 1. (OIL OF WHITE MUSTARD.) From *Sinapis alba,* or white mustard, but chiefly from *Sinapis arvensis, S. chinensis, S. dichotorna, S. glauca, S. ramosa,* and *S. tori.* Sweet. *Used* for the table. Sp. gr. ·9142 (·2160—Ure). *Prod.* 36%.

2. (OIL OF BLACK MUSTARD; OLEUM SINAPIS NIGRI, L.) From the 'hulls' of black-mustard seed. Viscid, stimulant. *Used* in rheumatism. Sp. gr. ·9168 to ·9170. See OILS (Volatile).

3. (OIL OF WHITE MUSTARD; OLEUM RAPHANI, L.) From the seed of *Raphanus Raphanistrum* (Linn.), or jointed charlock or wild mustard. *Prod.* 30%.

Oil, Neat's-Foot. *Syn.* NERVE OIL, TROTTER O.; OLEUM BUBULUM, O. NERVINUM, AXUNGIA PEDUM TAURI, L. From neat's-fee and tripe, by boiling them in water, and skimming off the oil. Does not thicken by age. *Used* to soften leather, to clean fire-arms, and for other purposes.

Oil, Nut. *Syn.* HAZEL-NUT O.; OLEUM NUCIS, O. CORYLI, L. From the kernels of *Corylus Avellana* (Linn.), or hazel-nut tree. Pale, mild tasted, drying; superior to linseed oil for paints and varnishes. It is commonly sold for oil of almonds and oil of ben, and is extensively employed to adulterate both. Walnut oil is also frequently sold for nut oil. Sp. gr. ·9260. *Prod.* 60% (Ure).

Oil of Nut'meg (Expressed). *Syn.* EXPRESSED OIL OF MACE, BUTTER OF M.; OLEUM MYRISTICÆ (CONCRETUM) (Ph. L.), MYRISTICÆ ADEPS (Ph. E.), M. BUTYRUM, O. MYRISTICÆ EXPRESSUM (B. P.), O. MOSCHATÆ, O. NUCISTÆ, L. "The concrete oil expressed from the seed of *Myristica officinalis,*" Linn. (Ph. L.), or common nutmeg. The nutmegs are beaten to a paste, enclosed in a bag, exposed to the vapour of hot water, and then pressed between heated iron plates. Orange coloured, fragrant, spicy; butyraceous, or solid. It is a mixture of the fixed and volatile oils of the nutmeg. When discoloured and hardened by age, it is called 'BANDA SOAP' (OL. MACIS IN MASSIS). When pure, it is soluble in 4 parts of boiling alcohol and in 2 parts of ether. It has been used in rheumatism and palsy, but is now chiefly employed for its odour and aromatic qualities. From the East Indies. *Prod.* 17% to 20%.

Oil, Ol'ive. *Syn.* SALAD OIL, SWEET O.; OLIVÆ OLEUM (B. P.), OLEUM OLIVARUM, O. OLIVÆ (Ph. L. E. & D.), L. The "oil expressed from the fruit" of "*Olea europæa,* Linn." (Ph. L.), or common olive. Five different methods are employed to obtain the oil from the fruit:—

1. (VIRGIN OIL; O. O. VIRGINEUM, L.); HUILE VIERGE, Fr.) From olives, carefully garbled, either spontaneously or only by slight pressure, in the cold. That yielded by the pericarp of the fruit is the finest.

2. (Ordinary 'FINE OIL.') This is obtained by either pressing the olives, previously crushed and mixed with boiling water, or by pressing,

at a gentle heat, the olives from which the virgin oil has been obtained. The above processes furnish the finer salad oils of commerce. The cake which is left is called 'GRIGNON.'

3. (SECOND QUALITY.) By allowing the bruised fruit to ferment before pressing it. Yellow; darker than the preceding; but mild and sweet tasted. Much used for the table.

4. ('GORGON.') By fermenting and boiling the pressed cake or marc in water, and skimming off the oil. Inferior.

5. (OIL OF THE INFERNAL REGIONS; OLEUM OMPHACINUM) is a very inferior quality of oil, which is skimmed off the surface of the water in the reservoirs into which the waste water which has been used in the above operations is received, and allowed to settle. The last two are chiefly used for lamps, and in soap-making, &c.

Of the principal varieties of olive oil known in commerce, and distinguished by the place of their production, 'PROVENCE OIL' is the most esteemed; 'FLORENCE OIL' and 'LUCCA OIL' are also of very fine quality; 'GENOA OIL' comes next, and then 'GALLIPOLI OIL,' which forms the mass of what is used in England; 'SICILY OIL,' which has a slightly resinous flavour, is very inferior; and 'SPANISH OIL' is the worst imported.

Prop., &c. Olive oil is a nearly inodorous, pale greenish-yellow, unctuous fluid, with a purely oleaginous taste, peculiarly grateful to the palate of those who relish oil. It does not suffer active decomposition at a heat not exceeding 600° Fahr.; and when cooled to 36° it congeals into a granular solid mass. It is very slightly soluble in alcohol, but its solubility is increased by admixture with castor oil. It is soluble in 1½ part of ether. When pure, it has little tendency to become rancid. Sp. gr. ·9170 to ·9173; .9192, at 53½° (Saussure); ·9176, at 59° (Heidenreich); and ·9109, at 77° Fahr. (Saussure). *Prod.* 32⅝, of which 21⅝ is furnished by the pericarp, and the remainder, which is inferior, by the seed and woody matter of the fruit.

Pur. Olive oil, with the exception of that of almonds, being the most costly of the ordinary fixed oils of commerce, is, consequently, the one most subject to adulteration. Nut, poppy, rape, and lard oil, are those most commonly used for this purpose. Refined tallow olein, including that obtained from the 'knackers' yards' of Paris, is said to have been used in the same way. The addition of any other oil to olive oil renders it far less agreeable to the palate, and, by increasing its tendency to rancidity, much more likely to offend and derange the stomach and bowels of those who consume it. Parties who indulge themselves in the use of this luxury would, therefore, do well to ascertain that what they purchase is pure. When pure, and also fresh, olive oil is most wholesome as an article of food or as a condiment.

The detection of the sophistication of salad oil is a matter of no great difficulty. The palate of the connoisseur will readily perceive the slightest variation in the quality of his favourite condiment. Other methods, however, of a more accurate and certain description, and of more general application, are adopted. Amongst these, in addition to those mentioned above, are the following:—

a. When pure olive oil is shaken in a phial, only half filled, the 'bead' or bubbles rapidly disappear; but if the sample has been mixed with poppy or other oil, the bubbles continue longer before they burst.

b. Olive oil congeals at 36° Fahr., and is completely solidified when a small bottle containing it is surrounded by ice, or a freezing mixture; but when mixed with poppy oil, it remains partly liquid, even when the latter forms only 1-4th of the mass; if more than 1-3rd of poppy oil is present, it does not solidify at all, unless cooled much below the freezing point of water.

c. (Ph. E.) When olive oil is "carefully mixed with $\frac{1}{12}$th part of its volume of a solution of 4 oz. of mercury in 8 fl. oz. 6 drs. of nitric acid (sp. gr. 1·500), it becomes in 3 or 4 hours like a firm fat, without any separation of liquid oil."

d. M. Pontet recommends the mercurial solution to be made by dissolving 6 parts of mercury in 7½ parts of nitric acid (sp. gr. 1·35), without heat; of this solution he adds 1 part to every 48 parts of the oil, and well shakes the mixture every 30 minutes, until it begins to solidify. This it does after about 7 hours in summer and 4 or 5 hours in winter, and when the oil is pure it will have formed, in 24 hours, a mass so hard that some little force must be employed to thrust a glass rod into it. The other edible oils do not furnish a hard mass with nitrate of mercury. The solidity of the mass is exactly in proportion to the quantity of foreign oil present. When the sophistication is equal to 1-8th of the whole, a distinct liquid layer separates; when the mixture contains ½ its volume of an inferior oil, one half only of the mixture becomes solid, and the other half continues liquid. A temperature of about 90° Fahr. is the best to cause the oil and coagulum to separate then perfectly from each other. When the oil has been adulterated with animal oil, the mixture solidifies in about five hours; but in this case the coagulum consists of the animal oil, whilst the olive oil floats on the surface, and may be decanted for further examination. This coagulum, on being heated, exhales the well-known odour of rancid fat or melted tallow.

Uses, &c. The dietetical uses of olive oil are well known. In Spain and Italy it is commonly employed as a substitute for butter. It is highly nutritious, but is digested with difficulty by some persons, and hence should be avoided by the dyspeptic. Like almond oil, it is occasionally employed as a laxative

and vermifuge, and is, perhaps, one of the mildest known. In pharmacy it is extensively employed in the preparation of cerates, liniments, ointments, and plasters.—*Dose.* For an adult, ½ to 1 wine-glassful as a mild aperient; for an infant, ½ to 1 teaspoonful, mixed up with an equal quantity of honey, syrup of roses, or syrup of violets. The white fibrous sediment which forms in the recently expressed oil is the 'AMURCA' of Pliny, and was formerly highly esteemed in medicine.

Oil, Olive, Droppings. *Syn.* SWEET-OIL D. The 'foots' or 'deposits,' and the 'drippings' of the casks, cisterns, and utensils. *Used* for machinery, making soap, &c.

Oil, Olive (Oxygenated). *Syn.* OLEUM OLIVÆ OXYGENATUM (Ph. Batav), L. Olive oil, 16 oz., is placed in a receiver surrounded with ice or very cold water, and chlorine is slowly transmitted through it for several days, or until it becomes thick and viscid, after which it is well washed with warm water.

Oil, Palm. *Syn.* PALM BUTTER; OLEUM PALMÆ, L. From the fruit of *Elais Guineensis*, and *E. melanœocca*, the Guinea oil palms. Orange or red coloured; butyraceous or solid; smells of violets; unchanged by alkalies; bleached by sunlight, age, exposure, chlorine, chromic acid, and oil of vitriol; melts at 117½° Fahr. Sp. gr. ·968. Demulcent. *Used* to colour and scent ointments, pommades, &c.; but chiefly to make soap and candles. From Africa.

Oil, Pi''ney. *Syn.* PINEY TALLOW, P. DAMMAR, P. RESIN. From *Vateria Indica* (Linn.), or pænoe tree. Resinous flavoured, fragrant; made into candles. Sp. gr. ·926.

Oil, Pop'py. *Syn.* OLEUM PAPAVERIS, L.; OLIETE, HUILE BLANCHE, Fr. From the seeds of *Papaver somniferum* (Linn.), or white poppy. Sweet; pale; dries and keeps well. *Used* for salads, paints, and soaps; also (extensively) to adulterate almond oil, for the inferior qualities of which it is frequently sold. It does not freeze until cooled to 0° Fahr. Sp. gr. ·9243 to ·9215. *Prod.* 48% to 54%.

Oil, Rape. *Syn.* COLZA OIL, BROWN O.; OLEUM RAPÆ, L. From the seed of *Brassica Napus* (Linn.; cole or rape), and from *Brassica campestris* (Linn.; wild navew or rape). Glutinous; buttery at 25° Fahr. Dries slowly; makes soft soaps and good ointments, but bad plasters; smokes much in burning, unless well refined. Sp. gr. ·9135 to ·9136. *Prod.* 32%.

OIL, REFINED OR PALE RAPE (OLEUM RAPÆ REFINUM, OL. R. ALBUM) is prepared from crude rape oil, by agitating it with about 2% of oil of vitriol, previously diluted with about twice its weight of water, and, after 10 or 12 days' repose, decanting the clear oil, and filtering it through Canton flannel or felt. The quality is improved by washing it with hot water or steam, before filtration. *Used* for lamps, blacking, and machinery; also extensively employed to adulterate both almond and olive oil. It forms the common 'SWEET OIL' of the oilmen and druggists. Sp. gr. ·9136 to ·9140.

Oil, Seal. *Syn.* OLEUM PHOCÆ, L. From the hood seal, and harp seal, and other species of *Phocidæ*. PALE SEAL OIL is that which drains from the blubber before putrefaction commences, and forms about 60% of the whole quantity of oil obtained. It is very clear, free from smell, and, when recently prepared, not unpleasant in its taste. REFINED SEAL OIL is the last, washed and filtered. Ranks close after sperm oil. BROWN OR DARK SEAL OIL is that which subsequently drains from the putrid mass. It is very strong-scented and nauseous, and smokes in burning. Both are used for lamps and dressing leather. A full-grown seal yields 8 to 12 galls. of oil; a small one, 4 to 5 galls.

Oil of Ses'amum. *Syn.* OIL OF GINGELLY (*above*).

Oil, Shark-liver. The lightest of the fixed oils. Sp. gr. ·865 to ·867.

Oil, Skate. *Syn.* OLEUM RAIÆ, L. From the livers of *Raia batis* (Linn.), or common skate, as cod-liver oil; also from *Raia rhinobatus*, or white skate, and *Raia clavata*, or thornback. Often sold and mixed with cod-liver oil.

Oil, Spermace'ti. *Syn.* SPERM OIL; OLEUM CETACEI, L. From the 'head matter' of *Physeter macrocephalus*, or spermaceti whale; a species once common in all the principal seas, but now chiefly confined to the Southern Ocean. It is very limpid, smells little, and burns well; and has long been reputed the best oil for lamps and machinery, as it does not thicken by age or friction. It is frequently adulterated with refined seal oil. Sp. gr. ·875.

Oil, Sun'flower. *Syn.* OLEUM HELIANTHI, L. From the seeds of *Helianthus annuus* and *H. perennis*. Clear, pale yellow, tasteless; thickens at 60° Fahr. *Used* for salads and lamps. Sp. gr. ·9261. *Prod.* 15%.

Oil, Teel. See GINGELLY OIL (*above*).

Oil, Tobac'co-seed. *Syn.* OLEUM TABACI (EXPRESSUM), L. From the seeds of *Nicotiana Tabacum* (Linn.), or true tobacco plant. Pale; dries well; equal to nut oil. Its production has recently been carried on with considerable success in some parts of Russia. Sp. gr. ·9232.

Oil of Touloucou'na. See KUNDAH OIL (*above*).

Oil, Train. See WHALE OIL (*below*).

Oil, Wal'nut. *Syn.* OLEUM JUGLANDIS, O. NUCIS J., L. From the kernels of the nuts of *Juglans regia* (Linn.), or common walnut tree. Soon gets rank; dries well. *Used* in paints, and occasionally in plasters. When 'cold drawn' and washed, it is sometimes eaten with salad. Sp. gr. ·9260 to ·9262. *Prod.* 48% to 52%.

Oil of Wax. *Syn.* BUTTER OF WAX; OLEUM CERÆ, L. From bees' wax, by quick distillation in a close vessel. Butyraceous. By

rectification along with quicklime it yields a liquid oil.

Oil, Whale. *Syn.* TRAIN OIL, WHALE-TRAIN O.; OLEUM BALÆNÆ, O. CETI, L. From the blubber of the *Balæna mysticetus* (Linn.), or the common or Greenland whale, by heat. Coarse; stinking. SOUTHERN WHALE OIL is the best. *Used* for lamps, machinery, &c. Sp. gr. ·9231. *Prod.* per fish, about 1½ ton for each foot of bone.

Oil of Wheat. *Syn.* OLEUM TRITICI, L. From bruised Colne wheat, with heat. In chilblains, ringworm, and several other skin diseases.

Oil of Wine-stones. *Syn.* GRAPE-STONE OIL; OLEUM VITIS VINIFERÆ LAPIDUM, L. From the seeds of grapes, separated from the marc. Pale yellow, bland, emollient. *Used* for salads and lamps. Sp. gr. ·9202. *Prod.* 14% to 18%.

*** The numbers given above, under 'products,' unless when otherwise stated, refer to the respective fruits, kernels, nuts, seeds, &c., deprived of their husks, pods, shells, and every other portion destitute of oil.

OILS (Medicated). *Syn.* OLEA COCTA, O. INFUSA, O. MEDICATA, L. These are prepared by infusion or decoction. The bruised ingredients are either simply digested in 2 to 4 times their weight of olive oil for some days, or they are gently boiled in it until they become dry and crisp, great care being taken that the heat towards the end of the process is not greater than that of boiling water. As soon as the process is complete, the oil is allowed to drain from the ingredients, which are then (if necessary) submitted to the action of the press. The product is commonly run through flannel or a hair sieve whilst still warm, after which it is allowed to repose for a week or ten days, when the clear portion is decanted from the dregs. The green or recent plants are usually employed for this purpose, but, in many cases, the dried plants, reduced to powder, and digested for 6 or 8 hours in the oil, at the heat of hot water, with frequent agitation, yield a much more valuable product. They are nearly all employed as external applications only.

*** The following are the most important preparations of this class:—

Oil of Adder's Tongue. *Syn.* OLEUM OPHIOGLOSSI, L. From the herb, as OIL OF BELLADONNA. A popular vulnerary.

Oil of Belladon'na. *Syn.* OLEUM BELLADONNÆ (P. Cod.), L. *Prep.* From the fresh leaves, bruised, 1 part; olive oil, 4 parts; digested together at a gentle heat until the moisture is evaporated; the oil is then strained off, with pressure, and filtered.

Oil of Cantha'rides. *Syn.* OLEUM CANTHARIDIS, O. CANTHARIDIBUS, L. *Prep.* (P. Cod. 1839.) From Spanish flies (powdered), 1 part; olive oil, 8 parts; as OIL OF BELLADONNA. Stimulant and rubefacient. *Used* as a dressing to indolent sores, blisters, &c.; and in dropsy, rheumatism, gout, &c. OIL OF THE OIL-BEETLE (*Meloe proscarabæus*—Linn.) is prepared in a similar manner.

Oil of Cap'sicum. *Syn.* OLEUM CAPSICI, L. *Prep.* (Dr. Turnbull.) From powdered capsicum or Cayenne pepper, 4 oz., olive oil, 1 pint; digested together for 6 hours, with heat, and strained. Stimulant; rubefacient in colic, cholera, &c.

Oil of Cham'omile. *Syn.* OLEUM ANTHEMIDIS, OL. CHAMÆMELI, L. From the dried flowers (rubbed to pieces), 1 part, olive oil, 8 parts; digested together, with heat, for 6 hours. Stimulant, emollient, and vermifuge.

Oil of Col'ocynth. *Syn.* OLEUM COLOCYNTHIDIS, L. From the pulp, as OIL OF CHAMOMILE. Diuretic. In dropsy, neuralgia, rheumatism, worms, &c.

Oil of Elder-flowers. *Syn.* WHITE OIL OF ELDER; OLEUM SAMBUCI ALBUM, O. SAMBUCINUM (P. Cod.), L. *Prep.* From the flowers, as OIL OF CHAMOMILE. Emollient and discussive.

Oil of Elder-leaves. *Syn.* GREEN OIL, GREEN OIL OF ELDER, OIL OF SWALLOWS; OLEUM VIRIDE, O. SAMBUCI VIRIDE, L. *Prep.* 1. Green elder leaves, 1 lb.; olive oil, 1 quart; boil gently until the leaves are crisp, press out the oil, and again heat it till it turns green.

2. As before, but by maceration, at a heat under 212° Fahr. More odorous than the last.

3. Elder leaves, 1 cwt.; linseed oil, 3 cwt.; as No. 1.

Obs. The last form is the one usually employed on the large scale. It is generally coloured with verdigris, ½ lb. to the cwt., just before putting it into the casks, and whilst still warm; as, without great skill and a very large quantity of leaves, the deep-green colour so much admired by the ignorant cannot be given to it. The oil is got from the leaves by allowing them to drain in the pan or boiler (with a cock at the bottom), kept well heated. Emollient; in great repute among the vulgar as a liniment, in a variety of affections.

Oil of Fen'ugreek. *Syn.* OLEUM FŒNUGRÆCI, L. *Prep.* (P. Cod.) From the seeds, as OIL OF CANTHARIDES or of CHAMOMILE. Emollient and resolvent.

Oil of Fox'glove. *Syn.* OLEUM DIGITALIS, L. *Prep.* (P. Cod.) From the fresh leaves, as OIL OF BELLADONNA. *Used* as an application to chronic ulcers and indurations, painful swellings, &c. As usually met with, it is nearly inert.

Oil of Garden Night'shade. *Syn.* OLEUM SOLANI, L. *Prep.* (P. Cod.) From the leaves, as OIL OF BELLADONNA. Anodyne and discussive.

Oil [of Gar'lic. *Syn.* OLEUM ALLII INFUSUM, L. From garlic, as OIL OF BELLADONNA. *Used* as a liniment in deafness, diarrhœa, infantile convulsions, palsy, rheumatism, &c.

Oil, Green. *Syn.* OLEUM VIRIDI, L. From bay leaves, origanum, rue, sea wormwood, and elder leaves, of each, 2½ oz.; olive oil, 1 quart; as OIL OF ELDER. Detergent, stimulant, and resolvent. Green oil of elder is now usually sold for it.

Oil of Hem'lock. *Syn.* OLEUM CONII, L. *Prep.* (P. Cod.) As OIL OF BELLADONNA. Anodyne and emollient; in painful ulcers, glandular tumours, &c.

Oil of Hen'bane. *Syn.* OLEUM HYOSCYAMI, L. *Prep.* (P. Cod.) As OIL OF BELLADONNA. *Used* as the last, in various painful local affections.

Oil of Ju"niper (by Infusion). *Syn.* OLEUM JUNIPERI INFUSUM, L. From the crushed berries, as OIL OF BELLADONNA. Diuretic and vulnerary; in frictions, &c.

Oil of Lil'ies. *Syn.* OLEUM LILIORUM, L. From white lilies, 1 lb.; olive oil, 3 lbs.; as OIL OF BELLADONNA. Emollient; *used* to soften and ripen tumours, indurations, &c.

Oil of Mel'ilot. *Syn.* OLEUM MELILOTI, L. As the last, avoiding much heat. Emollient and resolvent.

Oil of Mu'cilages. *Syn.* OLEUM MUCILAGINUM, O. CUM MUCILAGINIBUS, L. *Prep.* 1. (Ph. L. 1746.) Marshmallow root, ½ lb.; linseed and fenugreek seed, of each, bruised, 3 oz.; water, 1 quart; boil 1 hour, add of olive oil, 2 quarts, and boil until the water is consumed.

2. Fenugreek seeds, 8 oz.; linseed oil, 1 quart; infuse a week, and strain. Once a highly popular emollient application in various local affections.

Oil of Mu'dar. *Syn.* OLEUM MUDARIS, L. From mudar bark (in coarse powder), 1 dr.; warm olive oil, ½ pint; digest 24 hours and strain. *Used* as an application to cutaneous ulcers, the bites of venomous animals, &c., and as a friction in worms.

Oil of O"pium. *Syn.* ANODYNE OIL, OPIATED O.; OLEUM OPIATUM, L. *Prep.* From opium (in powder), 1 dr.; olive oil, 2½ fl. oz.; digest at a gentle heat, with frequent agitation, for 5 or 6 hours. The powder should be rubbed in a mortar with a few drops of the oil before adding the remainder. As a local anodyne. The above is the only reliable formula for this preparation. Others are extant, but whilst the products of several are much stronger, those from others have only 1-5th or 1-6th the strength.

Oil of Pel'litory. *Syn.* OLEUM PYRETHRI, L. From bruised pellitory root, as OIL OF BELLADONNA. *Used* as the last.

Oil of Black Pep'per (by Infusion). *Syn.* OLEUM PIPERIS INFUSUM, L. From black pepper, in coarse powder, as OIL OF CAPSICUM. Stimulant and rubefacient; in frictions.

Oil of Poison Oak. *Syn.* OLEUM RHOIS TOXICODENDRI, L. From the leaves, as OIL OF BELLADONNA. Externally; in paralysis, &c.

Oil of Rhu'barb. *Syn.* OLEUM RHEI, L. From rhubarb (in powder), 1 part; oil of almonds, 8 parts; digested together in a gentle heat for 4 hours, and strained, with expression. As an application to indolent ulcers, and as a friction over the abdomen in diarrhœa, English cholera, &c., or as a laxative when the stomach will not bear medicine.

Oil of Ro"ses. *Syn.* OLEUM ROSÆ, O. ROSACEUM, OLEUM INFUSUM, O. ROSATUM, L. *Prep.* From the fresh petals, pulled to pieces, crushed, and digested for 2 or 3 days in the sun, or a warm situation, in 4 times their weight of olive oil, and then pressed; the process being repeated with fresh roses. Ph. E. 1744 and P. Cod. are nearly similar. ALMOND, BEN, or OLIVE OIL, coloured with ALKANET, and scented with attar of roses, is now almost universally sold for it. *Used* for the hair.

Oil of Rue. *Syn.* OLEUM RUTÆ (INFUSUM), L. *Prep.* (P.Cod.) From fresh rue, bruised, as OIL OF CHAMOMILE. Reputed antispasmodic, emmenagogue, stimulant, and vermifuge. In frictions.

Oil of St. John's Wort. *Syn.* OLEUM HYPERICI (Ph. L. 1746), O. H. SIMPLEX, BALSAMUM H., L. From the flowers, 1 part; olive oil, 6 parts; digested together until the oil is well coloured. Antispasmodic, stimulant, and resolvent. A mixture of equal parts of RAPE OIL and GREEN ELDER OIL is usually sold for it.

Oil of Scam'mony. *Syn.* OLEUM SCAMMONII, O. PURGANS, L. *Prep.* (Van Mons.) From scammony (in powder), 1 dr.; hot oil of almonds, 3 fl. oz.; triturate together until cold, and the next day decant the clear portion. *Dose,* ½ to 1 table-spoonful.

Oil of Stramo"nium. *Syn.* OLEUM STRAMONII, L. *Prep.* (P. Cod.) From the leaves of thorn apple or stramonium, as OIL OF BELLADONNA. Anodyne and discussive; as an application to painful tumours, joints, &c.

Oil of Tobac'co (by Infusion). *Syn.* OLEUM TABACI, O. T. INFUSUM, L. From fresh tobacco leaves (bruised), like OIL OF CHAMOMILE. As an application in ringworm, irritable ulcers, pediculi, &c.; and as a friction in itch, neuralgia, painful indurations, &c. It must be used with extreme caution, as it is poisonous.

Oil of Tooth'wort. *Syn.* OLEUM SQUAMARIÆ, L. From the herb of *Lathræa squamaria* (Linn), as OIL OF ST. JOHN'S WORT. Astringent and vulnerary. This must not be confounded with another preparation sometimes called 'OIL OF TOOTHWORT' (OLEUM PLUMBAGINIS EUROPÆÆ), and which has been occasionally used in itch, as the latter is acrid and apt to cause much irritation.

Oil of Worm'wood. *Syn.* OLEUM ABSINTHII, L. From the fresh herb, as OIL OF LILIES. The P. Cod. and Ph. Wurtem. order only 1 part of the herb to 8 parts of oil. Applied to the abdomen in dyspepsia, diarrhœa, heartburn, worms, &c. It is seldom used in this country.

OILS (Mineral). *Syn.* HYDROCARBON OILS. An important class of liquids, consisting solely of carbon and hydrogen—the elements of ordinary coal-gas, and obtained, by the distillation of coal, lignite, petroleum, and other bituminous substances. For the purposes of illumination, many of these oils are in most respects superior to the fixed or fat oils containing oxygen. They give a whiter and more brilliant light, and are produced at a much lower cost. The lamps in which they are burnt, when properly constructed, are less liable to get out of order than those adapted for the combustion of fat oils, and require less attention when in use. The experiments of Dr. Frankland on the relative value of the ordinary illuminating agents,[1] prove that the mineral oils are cheaper than all other portable illuminating agents in common use, and that they give, while burning, the largest amount of light with the least development of heat, and the smallest production of carbonic acid. With the oils adapted for burning in lamps other oils are produced. Some are very volatile and highly inflammable, and the safety of the burning oils depends on their proper extraction. These volatile liquids, when isolated, are used in the arts as substitutes for spirits of turpentine, as solvents for various substances, and to increase the illuminating power of coal-gas. Others are of a greasy nature, and are too heavy to be conveniently used in lamps. These, however, are well adapted for lubricating fine machinery, and are extensively employed instead of sperm oil by the cotton manufacturers of Lancashire. The distillation of coal, lignite, and petroleum, has of late become a very extensive and highly important branch of industry, and although great loss of life and property has resulted from accidents with unpurified and explosive mineral oils, the demand for the products is daily increasing. When the more volatile ingredients are separated from the burning oils, the latter are perfectly safe. (See *Tests, below.*)

Hist. For many years the manufacture of burning oils by the distillation of bituminous schists has been extensively carried out on the Continent, but the discovery which formed the foundation of the modern manufacture was made only fourteen years ago by our countryman, Mr. James Young. This gentleman took the lease of a spring of petroleum in 1847, and after numerous experiments succeeded in obtaining two useful oils from the crude liquid; the one being adapted for lubricating machinery, and the other for burning in lamps. The almost total cessation of the flow of petroleum terminated the business after two years' working, and led Mr. Young to institute a series of experiments, to try if petroleum could be produced artificially by the destructive distillation of coal. These experiments resulted in the discovery of an oil which Mr. Young named 'Paraffin' as it had many of the chemical properties the solid body paraffin, discovered twe years before by Reichenbach in beech-wo tar. Young's patent (dated Oct. 7, 18 involved the slower distillation of coals, a lower temperature than had hitherto been e ployed for the purpose, and this novelty practice was followed by the novel result of copious production of liquid hydrocarbo The gas or cannel coals were found to yie the liquids in largest quantities, that vario known as Boghead coal or Torbane H mineral being specially adapted for t patented process. (See PARAFFIN OIL, *below* Soon after Young's discovery native petr leum was brought from Rangoon, and pur fied by distillation, so as to produce oils ver similar to the coal products. During the las few years rich sources of petroleum have bee discovered in Canada and the North Americ States, and at the present vast quantities of th native liquid are imported into this countr from those sources. An Act of Parliamen was passed in 1862, to prevent the storage without a licence, of more than 40 gallons o petroleum, or any product thereof that give off inflammable vapours under 100° Fahr. This Act has not had the effect intended, and it is notorious that petroleum and its products are recklessly stored in large quantities where their accidental ignition would produce terrible effects. It is estimated that 20,000,000 gallons of petroleum, most of it in the crude and therefore dangerous condition, were brought to this country in 1863.

Tests, Precautions. As there is little demand as yet for the more volatile and dangerous constituents of petroleum, unprincipled dealers frequently allow them to remain in the oils sold for burning. In consequence of this criminal recklessness many frightful accidents have taken place, To ascertain the character for safety possessed by any oil is, therefore, a very important matter. The Sanitary Commission of the 'Lancet' took as the limit of safety an oil that gave off inflammable vapour when heated to 130° Fahr., and this has been generally accepted by dealers. If an oil gives off inflammable vapours before being heated up to 130°, it is considered unsafe for domestic use.

1. The plan for testing this, recommended in the 'Lancet,' is to heat a portion of the suspected oil in a gallipot placed in boiling water, ascertaining by a thermometer suspended in the oil the temperature at which it will take fire on the surface when a lighted wax vesta is applied to it. This is a troublesome and dangerous process, and has little practical value.

2. A rough and ready method of testing the inflammability of a sample is to pour a little out on a dry flat board, and try whether it can be ignited readily by a lighted paper. If it catches fire like turpentine or brandy, the oil is dangerous.

[1] See article ILLUMINATION.

3. The following plan, proposed by Mr. Tegetmeier, requires no scientific knowledge, and no apparatus but what is to be found in every house, while it is sufficiently accurate for all practical purposes:—

Take an earthenware dish, holding about half a pint (a breakfast cup will do), fill the cup full from a kettle of boiling water, pour this into an earthenware quart jug, then fill the same cup again with boiling water from the kettle, and pour it also into the quart jug, then fill the cup with cold water, put it into the jug, shake the jug to mix the hot and cold water, then pour the tepid water from the jug into the cup till the cup is half full, then pour about a table-spoonful of the oil to be tested on the tepid water in the cup, take the oil-can with the oil out of the room, then touch the surface of the oil in the cup with a lighted splinter of wood, or a match without sulphur. If the match causes a flash of flame to appear on the surface of the oil, the oil is below the standard of safety, and should not be used; if no flame appears, the oil is up to the standard. We may mention that in this trial no time should be lost after pouring the boiling water from the kettle, as the water may get too cold, but the whole may be gone through in from two to three minutes. It is well to have a saucer at hand, and if the oil should be a bad oil, and ignite with the match, place the saucer on the mouth of the cup, and the flame is extinguished. This trial should be done by daylight, and at a distance from a fire, and the directions must be followed exactly in the order as given above.

4. Provided that the oils to be examined have been produced by careful fractional distillation, their relative volatility, as indicated by their specific gravity, shows to a great extent the facility with which they ignite. The lightest oils are more volatile and more easily inflamed than those which are heavier. Oils much under ·800 inflame directly a lighted match is thrown into them, whereas oils at about ·815 to ·823 (if unmixed products) cannot be set on fire in this manner. The specific gravity test cannot, however, be depended on to determine the inflaming point of any commercial oil. A heavy oil, badly rectified, may contain a proportion of very volatile vapour, and have a low inflaming-point; whereas a much lighter oil may be perfectly safe, from its having the more volatile portions carefully removed. See PETROLEUM.

To prevent accidents with paraffin or petroleum lamps, the following precautions ought to be observed:—

The lamps should be filled and trimmed by daylight.

They should never be overfilled; the oil should not be allowed to come into contact with the metal work of the burner.

Any portion of oil spilled on the outside of the lamp should be carefully wiped away.

When not in use, the wick should be turned down into the wick-holder.

*** The principal products noticed below rank high among the numerous varieties of mineral oil now in the market, but there are doubtless many others equally good and safe. Their properties are described in accordance with the results obtained by Mr. W. B. Tegetmeier, who has devoted much time to the examination of the mineral oils:—

Oil, Al'bertite. From 'Albertite,' a lustrous black mineral found in New Brunswick. A sample was shown in the Colonial Department of the International Exhibition of 1862, but the oil has not yet appeared in the English market.

Prop. Odour very slight; illuminating power high; boiling-point 338° Fahr., or 126° above that of water.

Oil, American. See PETROLEUM OIL (*below*).

Oil, Apyroec'tic. *Syn.* NON-EXPLOSIVE OIL. A burning oil introduced by F. Tall, of Hull, and prepared, we believe, from American petroleum.

Prop. Slightly coloured; perfectly limpid; odour slight, but not perceivable during combustion. The most remarkable property of this oil is that, in spite of its limpidity, the point at which it gives off inflammable vapour is 180° Fahr., or 80° above the requirements of the Petroleum Act.

Oil, Bel'montine. From Rangoon tar, or Burmese petroleum, by distillation; superheated steam being employed as the heating agent.

Prop. Colourless; odour not unpleasant; sp. gr. ·847; but although so heavy, the oil is altogether free from viscosity, and will rise rapidly in a comparatively long wick; inflaming-point 134° Fahr.; burns with an exceedingly white light, and possesses a very high illuminating power.

Obs. The distillation of the Rangoon tar is carried on by Price's Patent Candle Company, under a patent. Besides the above lamp oil, several beautiful and useful products are obtained:—At first there comes over a very volatile liquid, termed SHERWOODOLE, used as a detergent for removing grease from fabrics, cleaning gloves, &c.; then comes the BELMONTINE OIL, already noticed; then two lubricating oils, the one light and the other heavy; and, last of all, when the temperature is considerably elevated, the beautiful white, translucent solid, known as BELMONTINE, distils over. This last is a kind of paraffin, and is used for making ornamental candles.

Oil, Caz'eline. An excellent burning oil, probably prepared from American petroleum, introduced by Cassell, Smith, and Co., of London.

Prop. Bright, limpid, with scarcely a trace of colour; odour very slight, and quite free from any objectionable character; sp. gr. ·805; lowest point of ignition 144° Fahr.; burns

with a pure white light, free from smoke and smell.

Oil, Col'zarine. A heavy hydrocarbon oil, adapted for burning in lamps constructed from the old 'Moderators' and 'Carcels,' formerly so much used for the fat oils.

Prop. Limpid; quite inodorous; of a pale amber colour; sp. gr. about ·838; temperature at which the vapour can be permanently ignited, 250° Fahr. Tested in the altered moderator, it gives an intense white light, without smoke or smell. Compared with vegetable colza oil, its illuminating power is in the proportion of 3 to 2.

Obs. This oil is manufactured by Cassell, Smith, and Co., under Martin's patent for the modification of mineral oils, to fit them for burning in lamps where 'colza' and other vegetable and animal oils have been usually consumed. Similar oils are prepared by other firms.

Oil, Machin'ery. *Syn.* LUBRICATING OIL, SHAFTING O., SPINDLE O. The heavier hydrocarbon oils obtained in distilling coal, shale, and petroleum, have almost superseded the fat oils for lubricating purposes. They have no chemical action on the ordinary metals, and are not affected by cold. The lightest of these comparatively heavy oils are used for spindles, of other kinds of rapid machinery; the heaviest for the bearing parts of heavy machinery; and those of an intermediate character for such things as printing-presses, agricultural steam-engines, &c. The firm of Whitmore and Craddock is favourably known for the manufacture and purification of these machinery oils. See BELMONTINE OIL (*above*), and PARAFFIN OIL (*below*),

Oil, Par'affin. *Syn.* PARAFFINE OIL. This name was given by Mr. Young to the oil produced by the distillation of cannel coal, Boghead coal, &c., at a temperature considerably lower than that employed in the manufacture of illuminating gas. This product being the most important of the mineral oils, some account of its manufacture will be expected from us. The following is a brief outline of the process adopted at the great paraffin works at Bathgate, Linlithgowshire:—

Manuf. (Young's patent.) Boghead coal, broken into small fragments, is introduced into perpendicular tubes or retorts, about eleven feet in height, by conical hoppers at their upper extremities. Four of these tubes constitute a set, being built into one furnace, and charged by a single workman. They pass completely through the furnace, and are closed below by dipping into shallow pools of water, while the openings into the hoppers above may be shut by spherical valves. The coal in each tube is gradually heated as it descends to that part which passes through the furnace, and when it reaches the bottom of the tube it has parted with its volatile constituents, and is raked away as refuse, the coal from above descending as it is removed. Thus, the action of these perpendicular retorts is continuous, and the distillation goes on uninterruptedly both day and night. The vapours produced are conducted by iron tubes to the main condensers, which consist of a series of syphon pipes freely exposed to the air. The quantity of incondensible gas formed is inconsiderable; and it is this result, so different from that obtained in the ordinary gas-works, that marks the great value of Young's process. The crude oil, a dark-coloured, thick liquid, is then distilled to dryness in large iron cylindrical stills, and is thus freed from the excess of carbon which is left behind as coke. The oil, after distillation, is further purified by being acted upon by strong sulphuric acid (oil of vitriol), which chars the principal impurities, and causes them to subside in the form of a dense black, heavy acid tar. To separate the remaining impurities, and that portion of the sulphuric acid which remains in the oil, it is next subjected to the action of caustic soda. As thus purified, the paraffin oil contains four distinct commercial products. To effect their separation, the process of fractional distillation is first employed. The first elevation of temperature drives over the lighter and more volatile portions, which, when purified by a subsequent distillation, yields the fluid known as 'paraffin naphtha.' This product is used as a substitute for 'turps,' as a solvent for India rubber, and for burning in those naphtha lamps so much employed by costermongers, and workmen in railway tunnels and similar situations. On the perfect separation of this naphtha the safety of the burning oil depends. This burning oil, the 'paraffin oil' of commerce, comes over at a much higher temperature than the naphtha. It is a perfectly safe lamp oil, and has a greater illuminating value than any other oil in the market. Its properties are noticed *below*. The third product in point of volatility is a comparatively heavy liquid (machinery oil), largely used for lubricating purposes in the Lancashire factories. From this oil, and others which come over at a very high temperature, the fourth commercial product is separated by the action of artificial cold. This last product is the beautiful translucent solid, paraffin, now much used as a candle material.[1] (See PARAFFIN.)

Prop. The paraffin oil of commerce is of a very pale amber colour; is bright, perfectly transparent, and remarkably limpid. Its sp. gr. is ·823. Its point of temporary ignition is 150° Fahr., that of permanent ignition being a few degrees higher. Its odour is very slight. Its rate of combustion is slow, as may be inferred from the absence of the lighter oils, as indicated by its high sp. gr. and inflaming-point. At the same time, its limpidity proves the absence of the heavier oils, and

[1] For a detailed account of the processes carried on at the Bathgate works, see Mr. Tegetmeier's paper in '*England's Workshops*.'—Groombridge and Sons.

and let it stand over a little alkanet root, until sufficiently coloured.

White Oils. *Syn.* WHITE EGG-OILS. *Prep.* 1. Yolks of eggs, 4 in number; oil of tur- [illegible] of ammonia

perfume; but even a less quantity than this is commonly employed, on account of its costliness, the deficiency being made up by a mixture of the oils of rhodium, rosemary, and bergamotta. Most of the oils of this class are

accounts for it rising through a long wick wi[illegible] freedom, and burning without charring the cotton.

Oil, Petro'leum. *Syn.* KEROSENE OIL, REFINED PETROLEUM. Many of the burning oils now in the market are derived from American petroleum. The native petroleums vary greatly in properties, and numerous methods of refining are employed by the manufacturers. Some make use of both acids and alkalies, others employ alkalies alone, and steam is applied at various degrees of heat. Some of the oils produced are of excellent quality, but others are inferior, and do not ascend the wick in sufficient quantity to afford a constant light. None of the native petroleums contain carbolic acid and other impurities which exist in the oils distilled from coals and shales; hence their purification is simple and comparatively cheap. See PETROLEUM, and *above*.

Oil, Shale. Products analogous to those derived from cannel or Boghead coal are obtained by the destructive distillation of bituminous shales and schists, and lignites or brown coals. On the Continent shale oils have for some time been manufactured on a large scale.

OILS (Mixed). *Syn.* COMPOUND OILS; OLEA COMPOSITA, OLEA MIXTA, L. Under these names are commonly included various mixtures of oils and other substances that possess an unctuous appearance. When not otherwise stated, they are prepared by simply agitating the ingredients together, and, after a sufficient time, decanting the clear portion, which, in some cases, is then filtered. A few of them only possess any importance. Some of them are highly esteemed as remedies among the vulgar, and the use of others is confined to veterinary medicine.

The following include the principal mixed oils of the shops, to which the names of a few other compounds, which are frequently called '*oils*' by the ignorant, are added, for the purpose of facilitating a reference to them:—

Acou'stic Oil. *Syn.* EAR OIL; OLEUM ACOUSTICUM, O. TEREBINTHINÆ ACOUSTICUM, L. *Prep.* From oil of turpentine, 1 part; oil of almonds, 6 parts; mix. In atonic deafness, accompanied with induration of the wax. 1 or 2 drops are poured into the ear, or on a piece of cotton wool, which is then gently placed in it.

Black Oil. *Syn.* OLEUM NIGRUM, L. *Prep.* 1. Oil of turpentine, 1 pint; rape oil, 3 pints; oil of vitriol, ½ lb.; agitate well together with care; then add of Barbadoes tar, 3 oz.; again agitate well, and in 10 days decant the clear portion. Linseed oil is preferred for the above [illegible] by many persons.

[illegible] Sweet oil, 1 pint; oil of turpentine, of each, ½ lb.

rapidly absorb oxygen, [illegible] gradually of oil of

[illegible]fter
[illegible]nall
OLEUM BRITANNICUM, O. PETRÆ VULGARE, L. *Prep.* From oil of turpentine, 1 quarter Barbadoes tar, 1 lb.; oils of rosemary and origanum, of each, 1 oz. Stimulant. Formerly reputed to possess the most astonishing virtues.

Camphora'ted Oil. Liniment of camphor.

Car'ron Oil. Liniment of lime.

Chabert's Oil. *Syn.* CHABERT'S EMPYREUMATIC OIL; OLEUM CHABERTI, O. CONTINUAL TÆNIAM CHABERTI, L. Oil of turpentine, 6 parts; Dippel's animal oil, 1 part; mix, and distil 3 parts. It must be preserved from air and light. *Used* in tapeworm.—*Dose*, to 2 teaspoonfuls, in water, night and morning, until 5 or 6 fl. oz., or more, have been taken; a cathartic being given every third day.

Fur'niture Oil. *Syn.* MAHOGANY OIL, PERSTAIN. *Prep.* 1. From refined linseed oil, 1 pint; alkanet root, ½ oz.; digested together for 20 in a warm place until the former is sufficiently coloured, when it is poured off and strained.

2. Pale boiled oil, 1 pint; bees' wax, ½ ounce, melted together, and coloured as before. Common, a superior polish, which becomes very tough, and by age.

3. Linseed or boiled oil, 1 pint; Venice turpentine (pure), 6 oz.; as before. The cloth is are used for mahogany and other dark-coloured woods.

4. (Pale.)—*a*. As the preceding, only the alkanet.

b. From nut oil, ¾ pint; bees' wax, 1 oz.; melted together.

c. To the last, add of copal varnish, 4 oz.

The last three are employed for pale oil is sufficient. They are all applied by means of a 'woollen rag' by power-'furniture brush.' A little strong

Hair Oil. See OIL (Perfumed).

Oil and Hartshorn. Liniment of

I'ron Oil. *Syn.* OLEUM FERRI, L. The old name for the liquid perchloride of iron is allowed to by free exposure to the air. It is caustic and corrosive.

Lime Oil. See CALCIUM (Chloride).

Macas'sar Oil. See OILS (Perfumed).

Mar'row Oil. *Prep.* From clarified marrow, 1 part; oil of almonds, 1 part; melted together, and strained through and melted together, and strained through flannel or sesamace, and slightly tinged with annotta. *Used* for the hair.

Marshall's Oils. *Prep.*

[illegible]ter
[illegible]ter
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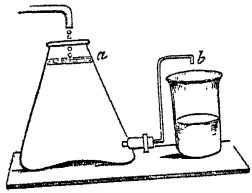
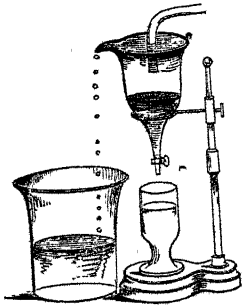
tected by the gradually decreasing quantity of water towards the end of the process, and empyreuma prevented. When the distilled water is to be repeatedly cohobated on the ingredients, a convenient and economical plan is to so arrange the apparatus that, after the water has separated from the oil in the receiver, it shall flow back again into the still. An ordinary worm-tub, or other like condensing apparatus, may be employed; but in the case of those oils which readily solidify, the temperature of the water in the condenser must not fall below about 55° Fahr.

The mixed vapours which pass over condense and fall as a milky looking liquid into the receiver. This separates after a time into two portions, one of which is a solution of a part of the newly eliminated oil in water, and the other is the oil itself. The latter either occupies the upper or the lower portion of the receiver, according as its specific gravity is less or greater than that of distilled water. The separation of the oil and water is effected by allowing the mixed liquids to drop into a 'Florentine receiver' (see *engr.*) when the oil is the lighter of the two, by which means the latter accumulates at *a*, and the water flows over by the spout *b*.



The same receiver may be employed for oils heavier than water, by reversing the arrangement; but a glass 'separator' (see *engr.*) is, in general, found more convenient. In this case the oil accumulates at the bottom of the vessel, and may be drawn off by the stop-cock provided for the purpose.



The essential oils of lemons and oranges of commerce, and of some other fruits, are chiefly obtained by submitting the yellow rind to powerful pressure; but in this way they are not so white, nor do they keep so well, as when distilled, although in the case of the fruits referred to the oils are more fragrant than when prepared by any other method.

The London College excluded the usual directions for the preparation of the essential oils from their Pharmacopœia of 1851, on the ground that these substances are seldom prepared by the druggist or apothecary, or at all on the small scale.

"The fruit of anise, caraway, and juniper, the flowers of chamomile, lavender, and elder, the berries of allspice, the tops of rosemary, and the entire recent plants of the other herbs, are to be employed." "Put any one of these into an alembic, then pour in as much water as will cover it, and distil the oil into a large vessel, kept cool." (Ph. L. 1836.)

The Edinburgh College directs—"As much water only is to be employed as will prevent empyreuma during the distillation. The distillation may be immediately commenced after a proper maceration, and the oil afterwards separated from the water," in the manner already noticed.

"It is also necessary to observe, in preparing these oils, as well as the distilled waters, that the quality of the substances, their texture, the season of the year, and similar circumstances, must occasion so many differences, that it is scarcely possible to give any certain and general rules which shall strictly apply to every example. Many things, therefore, must be regulated by the judgment of the operator."

The Dublin College directs the vegetable substances to be macerated in the still with about 5 times their weight of water, for 24 hours, when one half of the water is to be drawn over. The oil having been separated from this in the usual manner, it is to be returned to the still, and the same quantity drawn over, as before, from which the oil must again be separated.

Chevallier gives the following rules for the distillation of essential oils:—

1. Operate upon as large quantities as possible, in order to obtain a greater product, and one of finer quality.
2. Conduct the distillation rapidly.
3. Divide the substances minutely, in order to facilitate the extrication of the oil.
4. Employ only sufficient water to prevent the matter operated on from burning, and the product from being contaminated with empyreuma.
5. For substances whose oil is heavier than water, saturate or nearly saturate the water in the still with common salt, to raise the boiling-point, and thus to enable the vapour to carry over more oil.
6. Employ, when possible, water which has been already distilled from off the same substances, and has thus become saturated with oil.

7. For oils naturally fluid, keep the water in the refrigeratory cool; but for those oils which easily become solid, preserve it at 80° to 90° Fahr. (?)

To the above may be added:—

8. Collect the oil as soon as possible after it separates from the water with which it passes over, and in its subsequent treatment keep it, as much as possible, from free contact with the air.

Dr. Ure remarks, "The narrower and taller the alembic is, within certain limits, the greater will be the proportion of oil, relative to that of the aromatic water, from like proportions of aqueous and vegetable matter employed." "Some place the plants in baskets, and suspend these immediately over the bottom of the still, under the water, or above its surface in the steam; but the best mode, in my opinion, is to stuff an upright cylinder full of the plants and to drive down through them steam of any desired force, its tension and its temperature being further regulated by the size of the outlet-orifice leading to the condenser. The cylinder should be made of strong copper, tinned inside, and encased in the worst conducting species of wood, such as soft deal or sycamore."

The newly distilled oils may be separated from adhering water, which frequently renders them partially opaque or 'cloudy,' by repose in a temperature between 60° and 70° Fahr., and subsequent decantation; but to render them quite dry (anhydrous), it is necessary to let them stand over some fragments of fused chloride of calcium. This is not, however, required with the commercial oils.

The rectification of the volatile oils is commonly performed without water, by the careful application of a heat just sufficient to make them flow over pretty rapidly, so that they may be kept heated for as short a time as possible. One half, or at most two thirds only, is drawn off, that left in the retort being usually mixed with raw oil intended to be sold in that state. This method often leads to much loss and disappointment, and we have known more than one rather dangerous explosion result from its use. A better plan is to rectify the oil from strong brine, and then to separate any adhering water, either by repose or chloride of calcium.

Pres. Volatile oils should be preserved in well-closed and nearly full bottles, in the shade, and should be opened as seldom as possible. By age they darken, lose much of their odour, increase in density, and become thick and clammy. It is then necessary to distil them, by which the undecomposed portion is separated from the resin. Agitation along with animal charcoal will restore their clearness and original colour, but nothing more.

Pur., Tests. The essential or volatile oils of commerce are very frequently adulterated with the fatty oils, resins, spermaceti, or alcohol, or with other essential oils of a cheaper kind or lower grade. The presence of the first three of these may be readily detected by placing a drop of the suspected oil on a piece of white paper, and exposing it for a short time to heat. If the oil is pure, it will entirely evaporate; but if adulterated with one of these substances, a greasy or translucent stain will be left on the paper. These substances also remain undissolved when the oil is agitated with thrice its volume of rectified spirit.

The presence of alcohol may be detected by agitating the oil with a few small pieces of dried chloride of calcium. These remain unaltered in a pure essential oil, but dissolve in one containing alcohol, and the resulting solution separates, forming a distinct stratum at the bottom of the vessel. When only a very little alcohol is present, the pieces merely change their form, and exhibit the action of the solvent on their angles or edges, which become more or less obtuse or rounded.

Another test for alcohol in the essential oils is the milkiness occasioned by agitating them with a little water, as well as the loss of volume of the oil when it separates after repose for a short time.

A more delicate test of alcohol in the essential oils than either of the preceding is potassium, as employed by M. Beral:—12 drops of the oil are placed on a perfectly dry watch-glass, and a piece of potassium, about the size of an ordinary pin's head, set in the middle of it. If the small fragment of metal retains its integrity for 12 or 15 minutes, no alcohol is present; but if it disappears after the lapse of 5 minutes, the oil contains at least $4\frac{0}{0}$ of alcohol; and if it disappears in less than 1 minute, it contains not less than $25\frac{0}{0}$ of alcohol.

This species of adulteration is very common, as it is a general practice of the druggists to add a little of the strongest rectified spirit to their oils, to render them transparent, especially in cold weather. Oil of cassia is nearly always treated in this way.

The admixture of an inferior essential oil with one more costly may be best detected by pouring a drop or two on a piece of porous paper or cloth, and shaking it in the air, when, if occasionally smelled, the difference of the odour at the beginning and the end of the evaporation will show the adulteration, especially if the added substance is turpentine. The presence of the latter may also be detected by agitating the oil with rectified spirit, when it will remain undissolved.

The purity of essential oils may likewise, in many cases, be determined by taking their sp. gr.; or, with still greater accuracy and convenience, by measuring their index of refraction, as suggested by Dr. Wollaston. A single drop of oil is sufficient for the application of the last method.

The adulteration of a heavy oil with a light one, or the reverse, may be detected by agi-

tating the suspected oil with water, when, in most cases, the two will separate and form distinct strata.

Uses, &c. The volatile oils are chiefly used by perfumers and rectifiers, and in medicine. Some of the cheaper kinds are largely employed as vehicles for colours, and in the manufacture of varnishes. The dose of the aromatic and carminative oils is from 1 to 10 drops, on sugar, or dissolved in a little weak spirit. This does not apply to oil of bitter almonds, the dose of which is ¼ to ½ a drop.

*** The following list includes short notices of nearly all the volatile oils which have been examined, as well as of some other substances of a similar character, which commonly pass under the name.

Oil of Allia'ria. From the roots of *Alliaria officinalis*, or sauce-alone. Identical with the oil of black mustard.

Oil of All'spice. See OIL OF PIMENTO.

Oil of Al'monds. See OIL OF BITTER ALMONDS.

Oil of American Arbor Vitæ. *Syn.* HUILE CEDRE BLANC, Fr. From the fresh tops of *Thuja occidentalis*, or American arbor-vitæ tree. Yellow; fragrant; stimulant. *Used* in frictions for rheumatism. *Prod.* 1½ to 2% (nearly).

Oil of Angel'ica. From the dried root of *Angelica Archangelica*. *Prod.* ·25% (fully).

Oil of An'iseed. *Syn.* OLEUM ANISI (Ph. L. E. & D.), O. ESSENTIALE ANISI, L. From the fruit (seeds) of *Pimpinella anisum*, or anise. Nearly colourless. It is very frequently adulterated with one or other of the cheaper oils, in which case spermaceti or camphor is added to it, to make it 'candy.'

Prop., &c. When pure, it congeals into a solid crystalline mass on being cooled to 50° Fahr., and does not melt again until heated to about 63°. Treated with iodine, it quickly congeals into a solid hard mass, with a perceptible increase of temperature, and the development of orange-coloured and gray fumes. Sulphuric acid, with heat, turns it of a rich purple-red colour, and the compound soon afterwards becomes inspissated and hard (resinified). In alcohol of ·806 it is soluble in all proportions, but rectified spirit (·838) dissolves only 42% of this oil. Sp. gr. (recent) ·9768; (one year old) ·9853 to ·9855; (old) ·9856 to ·9900. The foreign oil is generally the heaviest.

Oil of aniseed is carminative and pectoral; and both itself and preparations have long been in favour with the masses in coughs, colds, &c. In preparing it, care must be taken that the temperature of the water in the receiver and refrigerator does not fall lower than about 68° Fahr. *Prod.* (From the dried fruit of commerce) av. 2% (nearly). See OIL OF STAR-ANISE.

Oil, Ap'ple. See AMYL (Valerianate of), and ESSENCE OF APPLE.

Oil of Ar'nica. *Syn.* OLEUM ARNICÆ, O. A. RADICUM, L. From the roots of *Arnica montana*. Yellowish-brown. Sp. gr. ·940. *Prod.* 16 lbs. yielded 1 oz. of oil. The oil from the flowers of arnica is blue.

Oil of Asarabac'ca. *Syn.* OLEUM ASARI, O. ASARI LIQUIDUM, L. From the roots of *Asarum Europæum*. Yellow; glutinous. Two butyraceous oils pass over at the same time.

Oil of Assafœt'ida. *Syn.* OLEUM ASAFŒTIDA, L. From the gum resin. Contains sulphur. Very fetid and volatile.

Oil of Balm. *Syn.* OLEUM MELISSÆ, L. From the herb (*Melissa officinalis*). Pale yellow; fragrant. Sp. gr. ·970 to ·975. *Prod.* 100 lbs. of the fresh flowering herb yielded ¼ oz. of oil (M. Raybaud). A mixture of oil of lemons and rosemary is commonly sold for it.

Oil of Balsam of Peru. See CINNAMEINE.

Oil of Ber'gamot. *Syn.* BERGAMOT, ESSENCE OF B.; OLEUM BERGAMII, O. BERGAMOTÆ, L. By expression from the yellow portion of the rind of the fruit of *Citrus Bergamia*, or bergamot orange. Pale greenish-yellow; highly fragrant. It is obtained purer by distillation, but its perfume is then slightly less delicate. Sp. gr. ·875 to ·885. *Prod.* The rind of 100 bergamot oranges yielded by distillation nearly 3 oz. of oil. (M. Raybaud.)

Oil of bergamot is frequently adulterated with rectified spirit, or with the oils of lemons, oranges, or turpentine. The presence of these substances may be detected in the manner explained under OILS (Volatile), *Purity and Tests* (*antè*), as well as by the altered density of the oil. Pure bergamot oil is much more soluble in rectified spirit than either of the others, and is further distinguished from them by its free solubility in solution of potassa, forming a clear solution.

Oil of Bit'ter Almonds. *Syn.* ESSENCE OF B. A.; OLEUM AMYGDALÆ AMARÆ, O. A. ESSENTIALE, L. From the ground cake of bitter almonds from which the fixed oil has been expressed. The common plan is to soak the cake (crumbled to fragments) for about 24 hours in twice its weight of water, to which ⅓rd or ¼th of its weight of common salt has been added, and then to submit the whole to distillation, allowing the first half of the water that passes over to deposit its oil, and to run back again into the still. Pale golden-yellow; colourless when rectified; tastes and smells strongly nutty, like peach-kernels. It consists of 85% to 90% of hydride of benzoyl and 8% to 12% of hydrocyanic acid, with a variable quantity of benzoic acid and benzoin. The density varies a little with the age of the oil, and the temperature and rapidity with which it has been distilled. Sp. gr. (recent) 1·0525; (trade crude oil) 1·079 (G. Wippel); (old) 1·081 (1·0836—Pereira). "Essential oil of almonds, free from adulteration, should have a sp. gr. at most of 1·052." (Ure.) According to Prof. Redwood,

the density may vary from 1·0524 to 1·0822. The light oil contains the most hydride of benzoyl, and the heavy oil the most benzoin. *Prod.* From less than ·2 to ·5%.

Pur. This oil is generally adulterated with cheaper oils, and in nearly every case with alcohol. When it is pure—Mixed with oil of vitriol, it strikes a clear crimson-red colour, without visible decomposition. — Mixed with an alcoholic solution of potassa, crystals are eliminated.—Iodine dissolves only partially and slowly in it, without further visible results. —Chromate of potassa does not affect it.—Nitric acid (sp. gr. 1·42) causes no immediate reaction, and in the course of 3 or 4 days crystals of benzoic acid begin to appear; but if only 8% or 10% of alcohol or rectified spirit is present, a violent effervescence speedily commences, and nitrous fumes are evolved. By using nitric acid, sp. gr. 1·5, the smallest quantity of alcohol may be detected.

Obs. This oil does not pre-exist in the almond, but is formed by the action of water on a peculiar crystallisable substance, called amygdalin. It is essentially the hydride of benzoyl, but it always contains a portion of hydrocyanic or prussic acid, to which it owes its very poisonous properties. It is occasionally employed as a substitute for hydrocyanic acid in medicine; but its principal consumption is as a flavouring ingredient and a perfume by cooks, confectioners, liquoristes, and perfumers. For this purpose it is dissolved in rectified spirits. (See ESSENCE.) *Dose.* ¼ to 1 drop.

An oil closely resembling that from bitter almonds is obtained by distillation from the leaves of the peach and cherry-laurel, the bark of the plum-tree, the bruised kernels of cherries, plums, and peaches, the pips of apples, and from several other vegetable substances that possess a nutty odour and flavour.

A NON-POISONOUS OIL OF ALMONDS has been introduced. This is simply the ordinary oil of commerce freed from hydrocyanic acid, and is intended to be substituted for the crude, poisonous oil for domestic purposes. Unfortunately, the purified essence does not keep well, and is often converted after a few months into little else than a solution of benzoic acid, almost devoid of the usual odour and flavour of the bitter almond. "No wonder, then, under such circumstances, that the public preferred the preparations they had been accustomed to, which were not so liable to change." (Redwood.) The following methods have been adopted for this purpose:—

1. (Liebig.) Agitate the crude distilled oil with red oxide of mercury, in slight excess, and, after a few days' contact, rectify the oil from a little fresh oxide of mercury. The product is quite pure, when the process is properly managed. The cyanide of mercury thus formed may be either employed as such, or reconverted into mercury and hydrocyanic acid.

2. (Mackay.) Commercial oil of almonds, 1 lb.; fresh-slaked lime, q. s. to form a milk-like liquid; afterwards add, of solution of potassa, 1½ lb.; water, 3 pints; agitate occasionally for 48 hours, then distil over the oil, and a fresh mixture of lime and pot.

3. ·27 The oil is mixed with an equal q ater, and the mixture is digested bath with red oxide of mercury, a quantities of fresh-slaked lime and pr de of iron, with as little access of air as le; as soon as decomposition of the acid taken place, the whole is introduced into a er retort, and submitted to distillation. The roduct is perfectly free from hydrocyanic acid. The first process is, however, the simplest, cheapest, and best.

The sp. gr. of this non-poisonous oil is 1·051. (G. Whippell.) That of pure, colourless hydride of benzoyl is 1·043; it boils at 356° Fahr.; is soluble in 35 parts of water, and in all proportions in alcohol and ether. Exposed to the air, it greedily absorbs oxygen, and becomes converted into a mass of crystallised benzoic acid. The purified oil of almonds does the same, only less rapidly.

Oil of Almonds (Factitious). *Syn.* ESSENCE OF MIRBANE, NITROBENZOL. The preparation of this article on the small scale is explained under NITROBENZOL. It is now extensively prepared as a substitute for the oil of almonds obtained by distillation. The following is Mansfield's process:—The apparatus consists of a large glass worm, the upper end of which is divided into two branches, gradually dilating so as to form two funnel-shaped tubes. Into one of these concentrated nitric acid is poured, and into the other benzol, which need not, for this purpose, be chemically pure. These bodies meet at the point of junction of the two tubes, and the rate of their flow is regulated by any appropriate means. Chemical reaction instantly takes place, and the new compound is cooled by its passage through the worm, which is refrigerated for the purpose. It has then only to be washed with water or a very weak solution of carbonate of soda for the process to be complete. The product has the sp. gr. 1·209, boils at 415° Fahr., has an intensely sweet taste, and an odour closely resembling, but not actually identical with, that of oil of bitter almonds. Unlike genuine oil of almonds or hydride of benzoyl, it is insoluble in water, and does not distil without suffering partial decomposition. It is chiefly used to scent soaps, and to adulterate the genuine oil. The benzol for this purpose is obtained from coal-tar. See BENZOL and NITROBENZOL.

Brand'y Oil. See GRAPE OIL.

Oil of Bu'chu. *Syn.* OLEUM BAROSMÆ, O. DIOSMÆ, L. From the leaves of *Diosma crenata*. Yellow; lighter than water; smells of the leaves.

Oil of Caj'eput. *Syn.* CAJEPUTI OIL, KYAPOOTIE O.; CAJEPUTI OLEUM (B. P.), OLEUM

fruit of the orange-tree. Does not keep well. (See *below*.)

Oil of Orange-flowers. *Syn.* NEROLI, OIL OF N., ESSENCE OF N.; OLEUM NAPHÆ, O. AURANTII FLORUM, AURANTII OLEUM (Ph. E. and D.), L. From the flowers of either the bitter (Seville) or sweet orange (*Citrus vulgaris* or *C. aurantium*), by distillation with water. That from the fruit is said to be preferred, but there does not appear any actual difference between the two. Very fluid; lighter than water, in which it is slightly soluble; it is delightfully aromatic and fragrant, but the odour differs slightly from that of the flowers. *Prod.* 100 lbs. of flowers gathered in May or December yield 3 to 6 oz. of oil; 6 cwt. of the fresh flowers yield 1 lb. of oil.

Pur. Neroli is commonly adulterated with alcohol or essence de petit grain, and generally with both of them. The presence of the first is easily determined (see *above*); that of the second can only be discovered by comparing the odour evolved during the evaporation of a drop of the suspected oil, placed on a piece of white paper, with a like drop of pure neroli similarly treated. (See *above* and *below*.)

Oil of Orange-leaf. *Syn.* OLEUM AURANTII FOLII, L.; ESSENCE DE PETIT GRAIN, Fr. From the leaves of either the bitter or sweet orange; that from the first being preferred. Delightfully fragrant. Extensively used to adulterate oil of neroli, and is itself commonly sophisticated with both alcohol and oil of orange-berries. (See *above*.)

Oil of Orig'anum. *Syn.* OLEUM ORIGANI, O. O. ESSENTIALE, L. From the flowering herb of *Origanum vulgare*, or common or winter marjoram. Pale yellow colour; fragrant; acrid, pungent, and rubefacient. Sp. gr. ·927 (·940—Baumé). *Prod.* ·5% to 75%. The dark-coloured oil of origanum of the shops is obtained from *Thymus vulgare*. The oil of origanum (Ph. E.) is oil of *Origanum marjorana*. See OILS OF MARJORAM, THYME, and LEMON THYME.

Oil of Or'ris. *Syn.* ESSENCE OF VIOLET; OLEUM IRIDIS, L. From the dried rhizomes of *Iris Florentina*, or Florentine orris-root. Fragrant. Sold for oil and essence of violets.

Oil of Par'sley. *Syn.* OLEUM PETROSELINI, L. From the fresh herb or dried fruit (seed) of *Apium petroselinum*, or garden parsley. Yellowish; smells strongly of the plant. It consists of two oils, separable by agitation with water, one of which is concrete, and melts at 80° Fahr.; the other, liquid. *Prod.* Herb, ·50 to 1%. (nearly).

Oil of Par'tridge-berry. *Syn.* OIL OF WINTER-GREEN, METHYLO-SALYCILIC ETHER, SALICYLATE OF OXIDE OF METHYL; OLEUM GAULTHERIÆ (Ph. U. S.), L. From the leaves or the whole plant of *Gaultheria procumbens*, a herb common in North America, and otherwise known by the names—Box-berry, chequer-berry, partridge-berry, mountain tea, winter-green, &c. Pale yellow, growing brown by exposure and age; aromatic; sweet; highly pungent; when diluted, agreeably fragrant; mixed with a dilute solution of potassa, it solidifies to a crystalline mass (salicylate of methyl and potassa), from which the oil may be again separated by the addition of an acid. It is the heaviest of all the essential oils. Sp. gr. 1·173. Boils at 412°, and, when purified, at 435° Fahr.

Oil of partridge-berry, dissolved in rectified spirit, is in common use in the United States of America as an antispasmodic, carminative, diuretic, emmenagogue, and stimulant; chiefly as an adjunct to mixtures, &c.; and also with the view of increasing the flow of milk during lactation. It is likewise extensively used in perfumery, and is an object of great interest to the organic chemist, on account of its peculiar constitution and reaction.

Oil of Partridge-berry (Facti''tious). See SALICYLIC ACID.

Oil, Pearl. See AMYLE (Acetate of), and ESSENCE OF JARGONELLE PEAR.

Oil of Pennyroy'al. *Syn.* OLEUM PULEGII (Ph. L.), O. MENTHÆ P. (B. P., Ph. E. & D.), O. P. ESSENTIALE, L. From the flowering herb of *Mentha Pulegium*, or the common pennyroyal of our gardens. Pale yellow, growing reddish-yellow by age and exposure; antispasmodic, carminative, and emmenagogue. Boils at 395° Fahr. Sp. gr. ·925 to ·931. *Prod.* ¾ to 1%. (See *below*.)

Oil of Pennyroyal (American). *Syn.* OLEUM HEDEOMÆ (Ph. U. S.), L. From *Hedeoma pulegioides*, as the last. Light yellow; closely resembles oil of pennyroyal, for which it passes in the U. S. Sp. gr. ·945 to ·948.

Oil of Pepper. *Syn.* OIL OF BLACK P.; OLEUM PIPERIS, O. P. NIGRI, L. From bruised black pepper (*Piper nigrum*). Colourless, turning yellow; odorous; pungent; not so hot as the spice. Sp. gr. ·9932. *Prod.* 1·25% to 1·5%. White pepper (of commerce), 1% (barely).

Oil of Pep'permint. *Syn.* OLEUM MENTHÆ PIPERITÆ (B. P., Ph. L. E. & D.), O. ESSENTIALÆ M. PIPERITIDIS, L. From the fresh flowering herb of *Mentha piperita*, or garden peppermint. Nearly colourless, or at most a very pale greenish-yellow; powerfully odorous; tastes pungent, at the same time imparting a sensation of coldness to the tongue and palate. Boils at 365° Fahr. Sp. gr. ·902 to ·905. *Prod.* Fresh flowering herb, ·25% to ·4%; dried do., 1% to 1·25% (fully). In a warm dry season, 5 lb. of the fresh flowering herb yield 1 oz. of oil; in a wet and unfavorable one, 11 lb. yield barely the same quantity.

Pur. The oil of commerce usually contains fully a third part of rectified spirit, and is also frequently adulterated with the oils of rosemary, spearmint, and turpentine. When pure —1. It is soluble in its own weight of rectified spirit.—2. Mixed with 1-4th its volume of nitric acid, a rich purple-red colour is developed.—3.

Chromate of potash, in solution, turns it of a deep reddish-brown colour, and converts it into a soft coagulum, which assumes a flaky form when divided with a glass rod, whilst the solution of the salt loses its yellow colour or becomes greenish-yellow.—4. With iodine it forms a homogeneous mass, without fulmination. If it explodes with iodine, it contains turpentine. The yellowish, resinous oil, sold under the name of 'American' or 'crude oil of peppermint,' consists chiefly of oil of turpentine, and on evaporation leaves a residuum of pine resin.

Obs. English oil of peppermint is the best, a fact clearly shown by its price in the market being so greatly above that of the imported oil. The oil distilled at Mitcham, in Surrey (Mitcham oil of peppermint), is the most esteemed. It has usually a very pale greenish colour, which is often imitated by steeping a leaf or two of green mint or parsely in the oil. Old dark-coloured oils are commonly bleached by exposure to the light, to the destruction of a portion of their other properties.

Oil of peppermint is stimulant, antispasmodic, and carminative, and has always been a favourite remedy in flatulence, nausea, vomiting, loss of appetite, cramp of the stomach, colic, griping pains, diarrhœa, the early stage of cholera, &c.—*Dose.* 1 to 3 drops, on sugar.

Oil of Petro'leum. See NAPHTHA, OILS (Mineral), PETROLEUM, &c.

Oil of Pim'ento. *Syn.* OIL OF ALLSPICE; OLEUM PIMENTÆ (B. P., Ph. L. E. & D.), L. From the bruised fruit of *Eugenia pimenta*, allspice, or Jamaica pepper. Pale yellow, growing reddish-brown by age; odour, a combination of cloves and cassia; taste, pungent. Sp. gr. 1·021. *Prod.* 5% to 8%.

Obs. Oil of pimento contains two oils similar to those found in clove oil. When pure, nitric acid turns it red, with active effervescence and the assumption of a rusty brown colour. It combines with the salifiable bases in a nearly similar manner to oil of cloves. It is much used in perfumery, especially in hair cosmetics.

Oil of Pim'pernel. *Syn.* OLEUM PIMPINELLÆ, L. From the root of *Sanguisorba officinalis*, or pimpernel. Blue; carminative.

Oil, Pine-ap'ple. This artificial essential oil dates its commercial importance from the Great Exhibition of 1851. It is essentially butyric ether, and may be regarded as simply the crude form of that substance. On the large scale, it is prepared by saponifying butter or crude butyric acid with a strong lye of caustic potassa, and dissolving the resulting soap in the smallest possible quantity of hot alcohol; to the solution is added a mixture of alcohol and oil of vitriol in excess, and the whole is then submitted to distillation as long as the product has an aromatic fruity odour; the product is rectified from dried chloride of calcium and a little litharge. Dissolved in rectified spirit, it is much used as a flavouring substance by confectioners and liquoristes. See ETHER (Butyric) and ESSENCE OF PINE-APPLE, &c.

Oil of Pota'to Spirit. See AMYL (Hydrate of) and FUSEL OIL.

Oil of Ravensa'ra. *Syn.* OLEUM RAVENSARÆ, L. From the roots of *Ravensara aromatica*. Chiefly used to adulterate oil of cloves, which it somewhat resembles.

Oil of Rho'dium. *Syn.* OLEUM RHODII, L. Said to be derived from the wood of species of *Rhodoriza*. Very fluid and limpid; pale yellow; soon darkens by age and exposure; tastes bitter and aromatic; has a modified odour of roses. Chiefly used as a substitute for otto of roses in cheap perfumery, and to adulterate it. Oil of sandal-wood is frequently sold for it. *Prod.* 1% to 16%. See OIL OF ROSES (*below*).

Oil of Ro''ses. *Syn.* OLEUM ROSÆ, L. *Prep.* 1. From the petals of *Rosa sempervirens* (Linn.), or the musk rose, as oil of cloves, observing to keep the water in the worm-tub at 85° Fahr., and afterwards subjecting the water in the receiver to refrigeration. Resembles otto of roses, of which it is merely a variety. *Prod.* $\frac{1}{10}$ to $\frac{1}{10}$ of 1%.

2. (ATTAR OF ROSES, OTTO OF R.; OLEUM ROSÆ—Ph. E.) From the petals of *Rosa centifolia* and *Rosa sempervirens* (damask and musk rose), principally the first, by saturating the water, by returning it repeatedly on fresh flowers, and then exposing it to a low temperature. In the East Indies it is obtained by stratifying gingilly seeds in alternate layers with rose petals, for some days, and repeating the arrangement with fresh roses till the seeds are saturated, when the oil is expressed and distilled along with water. In the neighbourhood of Mecca the rose leaves are macerated in salt-and-water for 2 or 3 days, and then distilled, the water being received in separate receivers at different parts of the process. The water is afterwards exposed in porous earthenware vessels, tied over with linen, in trenches dug in the earth, and over which moistened straw is thrown, when in a short time the otto separates and floats on the surface.

Prop., &c. Colourless, or nearly so; odour intense, penetrating, and diffusive, and in a concentrated state far from pleasant, but when dilute very agreeable; taste, bland and sweetish; when pure, it congeals at 80°, and does not remelt until heated to fully 85° Fahr.; 1000 parts of alcohol of ·806 dissolve only 7 parts of otto at 57° Fahr., and only 33 parts at 72°. Sp. gr. ·832 at 90°, to water 1·000 at 60° Fahr. *Prod.* 100 lbs. of roses yield 2 to 3 dr.

Pur. Otto of roses is frequently adulterated with the oils of rhodium, sandal-wood, and geranium, and with camphor; and occasionally with spermaceti, to give the spurious compound the usual crystalline appearance. The following are reliable tests:—1. Pure otto has a bland, sweet taste; if it is bitter, it contains oil of rhodium or sandal-wood; if it is pun-

gent, or 'bites' the palate, it contains either oil of geranium or camphor, and probably both; if it imparts an unctuous sensation, it contains spermaceti.—2. Exposed for some hours to the fumes of a small quantity of iodide under a bell-glass in the cold, pure otto remains white, and continues so when exposed to the air; an adulterated sample, on the contrary, becomes yellow or brown, and afterwards, on exposure to the air, continues to darken in colour, until it becomes of a deep brown, or even perfectly black, according to the quantity of foreign oil present. A single drop may be thus tested.—3. (Guibourt.) One or two drops of the suspected oil are put into a watch-glass; the same number of drops of concentrated sulphuric acid are added, and the two fluids are mixed with a glass-rod. All the oils are rendered more or less brown by this proceeding; but, otto of roses retains the purity of its odour—oil of geranium acquires a strong and disagreeable odour, which is perfectly characteristic—the odour of the oil of rhodium is increased, and becomes somewhat unctuous, and, in general, it acquires an odour distinctly like that of cubebs.

Oil of Rose'mary. *Syn.* ROSMARINI OLEUM (B. P.), OLEUM ANTHOS, O. ROBISMARINI, O. ROSMARINI (Ph. L. E. & D.), O. ROBISMARINI ESSENTIALÆ, L. From the flowering tops of *Rosmarinus officinalis*. In the Ph. L., English oil of rosemary (O. ROSMARINI, ANGLICUM) is ordered, as it is superior to that from abroad. Colourless; strongly fragrant, but scarcely agreeable unless compounded; carminative and stimulant. Boils at 365° Fahr. Sp. gr. ·910; recent, ·897; rectified, ·8887. *Prod.* ¾ to 1% (nearly).

Pur., &c. It is frequently adulterated with oil of turpentine. When pure, it dissolves in all proportions in spirit of ·830. By age it deposits a crystalline stearoptene, and acquires a terebinthinate odour. It is chiefly used as a stimulant in liniments, hair oil, pomatums, &c.

Oil of Rose'wort. *Syn.* OIL OF ROSE-ROOT; OLEUM RHODIOLÆ, L. From the roots of *Rhodiola rosea*. Yellowish; odour resembles that of oil of rhodium, for which it is often sold, as well as the distilled water for rose water. 1½ lb. yields about 1 dr.

Oil of Rue. *Syn.* RUTÆ OLEUM (B. P.), OLEUM RUTÆ (Ph. L. & E.), L. The "oil distilled from the fresh herb of *Ruta graveolens*," (B. P.), or common rue. Pale yellow, turning brown by age, and depositing a brownish, resinous sediment; congeals at about 40° Fahr.; acrid, bitter; odour that of the plant; stimulant, antispasmodic, and emmenagogue. Sp. gr. ·909 to ·911. *Prod.* ¼ to 1% (nearly). According to Raybaud, the recent dried seeds yield fully four times as much oil as the flowering herb.

Pur. Nearly always adulterated. When pure—1. It forms a clear solution with rectified spirit.—2. It does not form a camphor with gaseous hydrochloric acid.—3. Iodine dissolves in it slowly, without any apparent reaction, beyond a darkening and a slight increase of viscidity.—4. It is unaffected by a solution of chromate of potassa.—5. Nitric acid very slowly changes it into a greenish-yellow liquid balsam.—6. If it forms a reddish-brown solution with liquor of potassa and a still darker one with oil of vitriol, or if it fulminates with iodine, it is adulterated with the oil of some labiate plant.—7. It is more soluble in both rectified spirit and water than any of the oils used to adulterate it.

Oil of Saffron. *Syn.* OLEUM CROCI, L. From the pistils of *Crocus sativus* (saffron). Yellow; heavier than water; acrid, pungent, and narcotic; decomposed by exposure to light and age, with the formation of a white solid matter, which is lighter than water.

Oil of Sage. *Syn.* OLEUM SALVIÆ, L. From the herbaceous portion of *Salvia officinalis*, or common sage.

Oil of San'dal-wood. *Syn.* OLEUM SANTALI, O. S. ALBI, L. From the wood of *Santalum album*, or sandal-tree, and preferably from that of Malabar. It has an odour somewhat resembling that of oil of rhodium, for which it is commonly used; also used to adulterate otto of roses. *Prod.* 9 lbs. yield 1 oz.; 100 lbs. yield 5 oz. (Raybaud).

Oil of Sarsaparil'la. *Syn.* OLEUM SARZÆ, L. From the root bark, distilled along with salt-and-water. Acrid; odour and flavour same as the root.

Oil of Sas'safras. *Syn.* VOLATILE OIL OF S.; OLEUM SASSAFRAS (Ph. E.), O. LAURI S., O. S. OFFICINALIS, L. From bruised sassafras chips, the sliced root of *Sassafras officinale*, as oil of cloves. Pale yellow; highly odorous; hot, pungent, rubefacient, and stimulant; reputed alterative, sudorific, and diuretic, and, as such, occasionally given in rheumatism, cutaneous affections, &c. Sp. gr. 1·094 to 1·096. *Prod.* 1½ to 2% (fully).

Pur., &c.—1. If the density is lower than 1·094, it is adulterated.—2. Nitric acid acts on this oil, at first slowly, merely turning it of an orange-red, but afterwards with violence, and a reddish-brown resin is formed.—3. Mixed with about one half its weight of sulphuric acid, a green colour is at first developed, which, by heat, is changed to a blood-red. A large quantity of sulphuric acid acts at once violently, white fumes are given off, and mere charcoal is left.—4. With iodine it forms a permanently clear solution, or at least one that remains so for some time.—5. By agitation with water, it separates into two oils—one lighter, the other heavier, than that fluid.

Oil of Sav'ine. *Syn.* OLEUM SABINÆ (B. P.), OLEUM JUNIPERI SABINÆ, O. SABINÆ (Ph. E. & D.), L. From the fresh tops or leaves of *Juniperus sabina*, or common savin. Pale yellow; limpid; acrid, pungent, and stimulant. It possesses the general properties of the plant in a highly exalted degree. Sp. gr.

·915. *Prod.* Fresh herb, 1·25 to 1·5%; dried do. (recent), 2½ to 3%. *Dose.* 2 to 6 drops; as an anthelmintic, diaphoretic, and emmenagogue. Its use must be carefully avoided during pregnancy or disease of the abdominal viscera.

Pur., &c. It is less frequently adulterated than the other volatile oils. Its high sp. gr. and free solubility in rectified spirit offer the means of detecting the presence of either oil of turpentine or alcohol, the substances occasionally added to it. A mixture of equal parts of oil of savin and oil of vitriol, by distillation from milk of lime, furnishes an oil apparently identical with oil of thyme. (Winckler.)

Oil of Sen'na. *Syn.* OLEUM SENNÆ VOLATILE, L. Possesses the nauseous odour and flavour of the leaves, and, as well as the distilled water, is purgative.

Oil of Spear'mint. *Syn.* ENGLISH OIL OF SPEARMINT (B. P.), OIL OF MINT, OIL OF GREEN M.; MENTHÆ VIRIDIS OLEUM (B. P.); OLEUM MENTHÆ VIRIDIS (Ph. L. E. & D.), O. M. SATIVÆ, O. ESSENTIALE MENTHÆ S., L. From the fresh flowering herb of *Mentha viridis* (Linn.), or garden or spearmint. Pale yellow; reddened by age; odour and general properties resemble those of oil of peppermint, but it is less grateful. It boils at 320° Fahr. Sp. gr. ·915 (·9394, Brande). *Prod.* ·2% to ·25%. Its common adulterants are alcohol and oil of turpentine.

Oil of Spike (True). *Syn.* FOREIGN OIL OF LAVENDER; OLEUM SPICÆ, O. S. VERUM, O. STŒCHADIS, O. LAVANDULÆ S., L.; HUILE D'ASPIC, Fr. Chiefly from *Lavandula spica* and *L. Stœchas*, or French and Alpine lavenders. It differs from English oil of lavender by its darker green colour and inferior odour. From France. *Used* by artists to mix their colours in, and to make varnishes. Oil of turpentine scented with lavender is commonly sold for it. *Prod.* From *L. spica* (fresh), ¾ to 1½%; *L. Stœchas* (dried), ¾ to 1% (fully).

Oil of Spike'nard. *Syn.* OLEUM NARDI, L. The precious oil mentioned under this name in Scripture is supposed to have been derived from *Andropogon Iwarancusa*. The commercial oil of geranium (see *above*) is also called by this name.

Oil of Spring Grass. *Syn.* OLEUM ANTHOXANTHI ODORATI, L. From *Anthoxanthum odoratum*, or sweet-scented vernal grass. It is this oil gives the very agreeable odour to new hay.

Oil of Star-an'ise. *Syn.* BADIAN OIL; OLEUM BADIANI, O. ANISI STELLATI, L. From the capsules of *Illicium anisatum*, or star-anise. It continues liquid at 35½° Fahr. This, and its weaker reaction with iodine, distinguish it from the preceding compound, which it is commonly used to adulterate. *Prod.* 2% (fully).

Oil of Sweet Fen'nel. See OIL OF FENNEL.

Oil of Sweet Flag. *Syn.* OLEUM ACORI, O. A. AROMATICA, L. From the rhizomes or roots of *Acorus Calamus* (Linn.), or sweet flag. Yellow; agreeably fragrant. *Used* to scent snuff, aromatic vinegar, &c. *Prod.* Fresh rhizomes, ¾ to 1%; dried (recent), 1 to 1·25°.

Oil of Tan'sy. *Syn.* OLEUM TANACETI, L. From the flowering herb of *Tanacetum vulgare* (Linn.), or tansy. Pale greenish-yellow; very odorous; bitter; aromatic. Sp. gr. ·946 to ·950. *Prod.* Fresh, ·25 to 5%; dried (recent), ½ to 1% (fully).

Oil of Thyme. *Syn.* OLEUM THYMI; OIL OF ORIGANUM, OLEUM ORIGANI (of the shops). From the flowering herb of *Thymus vulgaris* (Linn.), or garden thyme. Nearly colourless; the imported oil has a reddish colour, which it loses by rectification; very fragrant; acrid, hot tasted, stimulant, and rubefacient; boils at 354° Fahr. Sp. gr. ·867 to ·875. *Prod.* ·5% to ·75%.

Obs. This is the dark-coloured 'OIL OF ORIGANUM' of the shops. It is frequently adulterated with oil of turpentine. It is occasionally *used* in toothache and in stimulating liniments; but its chief consumption is in perfumery, more particularly for hair-oils, pomatums, and hair-washes, as it is reputed to make the hair grow and to prevent baldness.

Oil of Tobac'co (Volatile). From the leaves of *Nicotiana tabacum* (Linn.), or the tobacco plant. Concrete.

Oil of Tur'pentine. *Syn.* SPIRIT OF T., ESSENCE OF T., TURPS, CAMPHENE, CAMPHINE; TEREBINTHINÆ OLEUM (B. P.), SPIRITUS TEREBINTHINÆ, ESSENTIA T., OLEUM TEREBINTHINÆ (Ph. L. & D.), O. T. PURIFICATUM (Ph. E.), L. The oil of turpentine of commerce is obtained by distilling strained American turpentine along with water. The residuum in the still is 'resin' or 'rosin.' The product in oil varies from 14% to 16%. The Colleges order it to be rectified before being employed for medicinal purposes. This is effected by re-distilling it along with 3 or 4 times its volume of water, observing not to draw over quite the whole. The portion remaining in the retort (balsam of turpentine) is viscid and resinous. A better plan is to well agitate it with an equal measure of solution of potassa or milk of lime before rectifying it. This is the plan adopted for the camphine used for lamps. By agitating crude oil of turpentine with about 5% of sulphuric acid, diluted with twice its weight of water, and after repose and decantation rectifying it from 5 or 6 times its volume of the strongest lime water, a very pure and nearly scentless oil may be obtained. Dr. Nimmo recommends oil of turpentine to be purified by agitation with ⅛th part of rectified spirit, after repose to decant the spirit, and to repeat the process 3 or 4 times. The product retains, however, fully ⅛th part of spirit in solution, and hence this method is objectionable, except for medicinal purposes, for which, according to Dr. Garrod, it is better than the oil purified by rectification. The sweet spirits of turpentine (SPIRITUS TEREBINTHINÆ DULCIS), vended of

late years in the shops, is simply the common oil which has been agitated with, and rectified from, somewhat dilute sulphuric acid.

Prop. Pure oil of turpentine is colourless; limpid; very mobile; neutral to test-paper; has an odour neither powerful nor disagreeable when recently prepared, but becoming so by exposure to the air; dissolves $\frac{1}{10}$th part of alcohol of ·830; is soluble in 6 parts of ether and in 7½ parts of rectified spirit; hot strong alcohol dissolves it freely, but the greater part separates in globules as the liquid cools. Oil of vitriol chars it, and strong nitric acid attacks it violently, even with flame. It congeals at 14°, and boils at 312° Fahr. Sp. gr. ·867; that of the oil of the shops varies from ·872 to ·878. It possesses a very high refractive power. At 72° it absorbs 163 times its volume of hydrochloric-acid gas (if kept cool), and in 24 hours from 26% to 47% of crystals (KIND'S CAMPHOR) separate. These have a camphoraceous odour, and, after being washed with water, and sublimed along with some dry chalk, lime, or charcoal, assume the form of a white, translucent, flexible, crystalline mass, which is volatile, soluble in alcohol, and possesses a considerable resemblance to camphor. A nearly similar substance is produced by the action of oxygen gas on oil of turpentine.

Uses, &c. Oil of turpentine is extensively used in the manufacture of varnishes and paints. Under the name of 'camphine,' it is occasionally employed for burning in lamps. For the last purpose it must be newly rectified and preserved from the air. By exposure, it rapidly absorbs oxygen, resin is formed, its density increases, and it gives a dull fuliginous flame. In medicine, it is employed as a diaphoretic, stimulant, vermifuge, &c.—*Dose.* 6 to 30 or 40 drops; in rheumatism, hemicrania, &c., 1 fl. dr. every four hours, in combination with bark or capsicum; in tape-worm, 3 fl. dr. to 1 fl. oz., either alone or combined with a little syrup of orange peel, every 8 hours, until the worm is expelled. The common symptoms of large doses of this oil are dizziness and a species of temporary intoxication, and occasionally nausea and sickness, which subside after two or three alvine evacuations, leaving no other effect, when the oil is pure, than a certain degree of languor for a few hours. In tape-worm, a little castor-oil may be advantageously combined with the second and subsequent doses. Oil of turpentine imparts a violent odour to the urine. To prevent loss by evaporation and resinification, this oil should be kept in tin cans or glass bottles. For store vessels, closely covered tin cisterns are the best. To *prevent accidents*, it is proper to caution the operator of the extremely penetrating and inflammable nature of the vapour of this oil, even in the cold. During the process of its distillation, without the greatest precautions are taken, an explosion is almost inevitable.

Oil of Vale"rian. *Syn.* OLEUM VALERIANÆ (Ph. Bor.), L. From the root of *Valeriana officinalis* (Linn.), or wild valerian. Yellowish; viscid; lighter than water; smells strongly of the plant. By exposure to the air, it is partly converted into valerianic acid, and more readily so under the influence of an alkali. In its usual form it consists of valerol, a neutral oily body; borneene, a volatile liquid hydrocarbon; and valerianic acid. It is powerfully antispasmodic, emmenagogue, tonic, and stimulant, and, in large doses, narcotic.—*Dose.* 2 to 6 drops; in epilepsy, hysteria, hemicrania, hypochondriasis, low fevers, &c. *Prod.* 1¼ to 2½% (nearly).

Oil of Ver'bena. *Syn.* OLEUM VERBENÆ, L. From the fresh flowering herb of *Verbena odorata*. *Prod.* ·2% to ·5%. The 'OIL OF VERBENA' of the shops is imported from India, and is obtained from *Andropogon citratum*. See OIL OF LEMON GRASS.

Oil of Wine. *Syn.* HEAVY OIL OF WINE, ETHEREAL OIL, OILY ETHEREAL LIQUOR, SULPHATE OF ETHER AND ETHEROLE; OLEUM ÆTHEREUM (Ph. L.), OLEUM VINI, LIQUOR ÆTHEREUS OLEOSUS, L. This is an artificial production which, for convenience, may be included under this head.

1. (Ph. L.) Rectified spirit, 2 pints, and sulphuric acid, 36 fl. oz., are cautiously mixed together in a glass retort, and submitted to distillation until a black froth appears, when the retort is immediately removed from the fire (sand heat); the lighter, supernatant liquor is next separated from the fluid in the receiver, and exposed to the air for 24 hours; it is then agitated with a mixture of solution of potassa and water, of each, 1 fl. oz., or q. s., and, when sufficiently washed, is, lastly, separated from the aqueous liquid from which it has subsided. The formula of the Ph. L. 1836 is nearly similar.

2. (Ph. D.) Rectified spirit and oil of vitriol (commercial), of each, 1½ pint; as the last, employing a Liebig's condenser, and a capsule for the exposure to the air; the oil is then transferred to a moistened paper filter, and washed with a little cold water, to remove any adhering acid.

3. (Ph. D. 1826.) From the residuum in the retort after the process of preparing ether, distilled to one half, by a moderate heat, and the oil treated as before.

4. From rectified spirit (sp. gr. ·833), 2 parts; oil of vitriol, 5 parts; mix and distil, as before; wash the product with distilled water, and free it from adhering water and undecomposed alcohol by exposure in the vacuum of an air-pump, between two open capsules, the one containing fragments of solid potassa, and the other concentrated sulphuric acid. Pure.

5. By distilling a mixture of ether and oil of vitriol, and treating the product as before.

6. By the destructive distillation of dry sulphovinate of calcium; the product is freed

from alcohol, &c., by washing it. This process yield the largest product.

Prop., &c. An oily liquid, nearly colourless, neutral, with an aromatic taste, and an odour resembling that of oil of peppermint. It is insoluble in water, but freely soluble in both alcohol and ether; boiling water converts it into sulphovinic acid, and a volatile liquid called light or sweet oil of wine; with an alkaline solution, this effect is produced with even greater facility. Sp. gr. 1·05 (Hennel & Ph. L.); 1·13 (Serullas). Boils at 540° Fahr. "Dropped into water, it sinks, the form of the globule being preserved." (Ph. L.) *Prod.* 1·25 to 1·5%; 33 lbs. of rectified spirit, and 64 lbs. of oil of vitriol, yield 17 oz. of this oil (Hennel).

Uses. Oil of wine is reputed anodyne, but is only used in the preparation of other compounds. See SPIRIT OF ETHER (Compound), &c.

Oil of Wine (Light). *Syn.* SWEET OIL OF WINE. See ETHERIN, ETHEROLE, and *above*.

Wood Oil (of India). From the *Chloroxylon Swietenia* (De Cand.), the tree which yields the satin-wood of the cabinet-makers. Another wood oil (GÛRJUN BALSAM) is obtained by incision from various species of *Dipterocarpus*. This balsam yields about 38% of a volatile oil by distillation, which in its general properties closely resembles OIL OF COPAIBA. (O'Shaughnessey.)

Oil of Worm'seed. *Syn.* OLEUM CHENOPODII (Ph. U. S.), L. From the seeds of *Chenopodium anthelminticum*, or Jerusalem oak (American wormseed). Light yellow, or greenish; powerfully anthelmintic. Sp. gr. ·908.—*Dose.* For an adult, 25 to 30 drops, in sugar, honey, or milk, night and morning, for 3 or 4 days, followed by a good dose of castor oil, or some other suitable purgative.

Oil of Worm'wood. *Syn.* OLEUM ABSINTHII, L. From the herbaceous portion of *Artemisia Absinthium*, or common wormwood; green or brownish-green; odorous; acrid; bitter; stomachic. Sp. gr. ·9703 (Brisson); ·9720 (Pereira); ·9725 (Brande). *Prod.* Fresh herb (picked), ¼ to ⅓%; dry herb (a year old), ½% (fully); do. (recent), ¾ to 1⅞ (fully).

Pur. That of the shops is nearly always either adulterated or partly spoiled by age; hence the discrepancies in the densities given for this oil by different authorities. A specimen of this oil distilled by Mr. Cooley from the green plant had the sp. gr. ·9712; but after being kept for 12 months, it had increased to ·9718. Nitric acid of 1·25 colours the pure oil first green, then blue, and, lastly, brown. The positive character of these reactions is in direct proportion to the purity and freshness of the sample.

OILY EMUL'SION. See LINCTUS (Emollient).

OILY ETHE'REAL LIQ'UOR. See OIL OF WINE (*above*).

OINT'MENT. *Syn.* UNGUENTUM, L. Any soft, fatty substance applied to the skin by inunction. The term is now commonly restricted to those which are employed in medicine.

Ointments (unguenta) differ from 'cerates' chiefly in their consistence, and in wax not being a constant or essential constituent; and they are made and used in a nearly similar manner to that class of preparations. Their proper degree of solidity is that of good butter, at the ordinary temperature of the atmosphere. When the active ingredients are pulverulent substances, nothing can be more suitable to form the body of the ointment than good fresh lard, free from salt; but when they are fluid or semi-fluid, prepared suet, or a mixture of suet and lard, will be necessary to give a due consistence to the compound. In some instances wax is ordered for this purpose. Another excellent 'vehicle' for the more active ingredients is a simple ointment, formed by melting together 1 part of pure white wax with about 4 parts of olive oil. The use of the last excludes the possibility of the irritation sometimes occasioned by the accession of rancidity, when inferior lard is employed. In a few cases butter is employed to form the body of the ointment.

Some ointments are made from recent vegetable substances by infusion or coction, in the manner adopted for medicated oils. See OILS, MEDICATED.

The precautions to be used in the choice of lard are noticed in the article devoted to this substance. Lard is included in the Materia Medica of the London College. In the last Ph. D. lard for medicinal use (ADEPS SUILLUS PRÆPARATUS—Ph. D.) is ordered to be prepared by melting it in twice its weight of boiling water, stirring it constantly for some time, then setting the mixture aside to cool; and, lastly, separating the fat when it has solidified.

Ointments are best preserved by keeping them in salt-glazed earthen or stoneware jars, covered with tin foil, in a cool situation.

The accession of rancidity in ointments and other unctuous preparations may be greatly retarded, if not wholly prevented, by previously dissolving in the fat about 2½% of gum-benzoin, in fine powder, or rather less quantity of benzoic acid, by the aid of heat. This addition renders the ointment peculiarly soothing to irritable or highly sensitive skins. Poplar buds act in a similar manner.

*** The formulæ for all the more useful and generally employed ointments are given below. Those not included in the list may be prepared of the proper strength for all ordinary purposes, by combining about 12 to 15 times the medium dose of the particular medicinal with 1 oz. of lard or simple ointment. For substances which possess little activity, ½ to 1 dr. per oz., or even more, may be taken. See CERATE, FAT, &c.

Ointment of Ac'etate of Lead. *Syn.* UNGUENTUM PLUMBI ACETATIS (B. P., Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Acetate of lead, in fine powder, 1 oz.; simple ointment, 20 oz.; mix them thoroughly (by trituration).

2. (Ph. D.) Ointment of white wax, 1 lb.; melt by a gentle heat, then add, gradually, of acetate of lead, in very fine powder, 1 oz., and stir the mixture until it concretes.

3. (B. P.) Acetate of lead, in fine powder, 12 grs.; benzoated lard, 1 oz.; mix.

Obs. A useful, cooling, astringent, and desiccative ointment. For the formula of Ph. L., see CERATE.

Ointment, Ace'tic. See VINEGAR OINTMENT.

Ointment of Ac'onite. *Syn.* UNGUENTUM ACONITI, L. *Prep.* 1. (Dr. Turnbull.) Alcoholic extract of aconite, 1 part; lard, 2 parts; carefully triturated together. In neuralgia, &c.

2. (Ammoniated; UNGUENTUM ACONITI AMMONIATUM — Turnbull.) Ammoniated extract of aconite, 1 part; lard, 3 parts. In neuralgia, paralysis, old rheumatic affections, &c. The use of the above preparations of aconite requires the greatest caution. They are intended as substitutes for OINTMENT OF ACONITINE, a still more dangerous preparation.

Ointment of Acon'itine. *Syn.* UNGUENTUM ACONITINÆ, L. *Prep.* 1. (Dr. Garrod.) Pure aconitine, 1 gr.; lard, 1 dr.; mix by careful trituration.

2. (Dr. Turnbull.) Aconitine, 2 grs.; rectified spirit, 6 or 7 drops; triturate together, then add of lard, 1 dr., and mix well.

3. (B. P.) Aconitia (aconitine), 8 grs.; rectified spirit, ½ dr.; dissolve and add lard, 1 oz.; mix.

Use, &c. As a topical benumber in neuralgic affections, rheumatic pains, &c. Its application generally occasions considerable tingling, and sometimes redness of the part to which it is applied, followed by temporary loss of sensation in the skin and the cessation of the pain. For slight cases Dr. Paris formerly employed only 1 gr. to the oz. Owing to the intensely poisonous nature of aconitine, this ointment must be both prepared and used with great caution, and must never be applied to an abraded surface. It is seldom employed, owing to its extreme costliness. See ACONITINE, and *above*.

Ointment, Ague. See ANTI-PERIODIC OINTMENT.

Ointment, Albinolo's. See PATENT MEDICINES.

Ointment, Alkaline. *Syn.* UNGUENTUM ALKALINUM, L. *Prep.* 1. (Biett.) Carbonate of soda, 2 drs.; fresh-slaked lime, 1 dr.; powdered opium, 2 grs.; lard, 2 oz.; mix by trituration. In prurigo, ringworm, and some other cutaneous affections.

2. (Cazenave.) Carbonate of potassa, 1 dr.; lard, 1 oz. In psoriasis, lepra, and scorbutic eruptions.

3. (Devergie.)—*a.* From carbonate (not sesquicarbonate) of soda, 10 to 15 grs.; lard, 1 oz. In lichen.

b. From carbonate of soda, 20 to 30 grs.; lard, 1 oz. In ichthyosis, lepra, psoriasis, and some other scaly skin diseases.

c. From carbonate of soda, ½ to 1 dr.; lard, 1 oz. In porrigo favosa, especially when occurring in adults.

4. (Soubeiran.) Carbonate of soda, 1 to 2 drs.; wine of opium, 1 fl. dr.; lard, 1 oz. In any of the above affections, when there is much pain or irritation.

Obs. Carbonate of potassa is thought to be preferable to carbonate of soda, when the above affections occur in scorbutic habits. A little camphor is also occasionally added.

Ointment of Al'um. *Syn.* UNGUENTUM ALUMINIS, L. *Prep.* 1. Alum, in very fine powder, 1 dr.; lard, 1½ oz. In piles.

2. To the last add of powdered opium, 7 grs. In piles, when there is much pain. See BANYER'S OINTMENT.

Ointment, Ammoni'acal. *Syn.* UNGUENTUM AMMONIACALE, U. AMMONIÆ, L.; LIPAROLE D'AMMONIAQUE, POMMADE DE GONDRET, Fr. *Prep.* 1. (P. Cod.) Suet and lard, of each, 1 oz.; melt in a strong wide-mouthed bottle, add of liquor of ammonia (sp. gr. ·923), 2 oz., at once close the bottle, and agitate it until its contents concrete. As little heat as possible should be employed, to prevent unnecessary loss of ammonia.

2. (Gondret.) Lard, 3 parts; suet, 2 parts; almond oil, 1 part; strong solution of ammonia, 6 parts; mix, as before. Rubefacient, vesicant, and counter-irritant. Smeared over the skin and covered so as to prevent evaporation, it raises a blister in 5 or 6 minutes. Its general effects and uses are similar to those of compound liniment of ammonia.

Ointment of Car'bonate of Ammo''nia. *Syn.* UNGUENTUM AMMONIÆ CARBONATIS, U. A. SESQUICARBONATIS, L. *Prep.* From carbonate of ammonia, 1 dr.; lard, 9 drs. An excellent application to painful joints, indolent tumours, scrofulous sores, &c.

Ointment of Ammo'niated Mercury. *Syn.* UNGUENTUM HYDRARGYRI AMMONIATI (B. P.). Ammoniated mercury, 62 grs.; simple ointment, 1 oz., mix. See next preparation.

Ointment of Ammo''nio-chloride of Mercury. *Syn.* WHITE PRECIPITATE OINTMENT; UNGUENTUM HYDRARGYRI AMMONIO-CHLORIDI (Ph. L.), U. H. PRECIPITATI ALBI, U. PRECIP. A. (Ph. E.), U. H. SUBMURIATIS AMMONIATI (Ph. D. 1826), L. *Prep.* 1. (Ph. L.) Ammonio-chloride of mercury, 2 drs.; lard, 3 oz.; triturate together.

2. (Ph. E.) As the last, but employing heat.

Uses, &c. Alterative; detergent; stimulant. In itch, scald-head, and various other skin diseases; in inflammation of the eyes; as an application to scrofulous and cancerous tumours; to destroy vermin on the body, &c. It "may be safely used" (in small quantities) "on infants." (A. T. Thomson.)

Ointment, An''glo-Saxon. *Prep.* Heat olive oil, 1 pint, and bees' wax, ½ lb., until the mixture acquires a reddish-brown colour; then add red lead (levigated), ½ lb., and continue

the heat, with constant stirring; when the union appears complete, add of amber and burnt alum, of each, in fine powder, ½ oz.; lastly, when considerably cooled, add of powdered camphor, 3 drs. As a dressing to foul ulcers.

Ointment, An'odyne. See OINTMENT OF OPIUM, HEMLOCK, &c.

Ointment of An'thracoka'li. *Syn.* POMMADE DE ANTHRACOKALI, Fr. *Prep.* (Dr. Polya.) Anthracokali, in very fine powder, 1 part; lard, 30 parts. See ANTHRACOKALI.

Ointment, Antiherpet'ic. *Syn.* UNGUENTUM ANTIHERPETICUM, L. *Prep.* 1. (Alibert.) Red sulphide of mercury, 3 drs.; powdered camphor, 1 dr.; lard, 3 oz.

2. (Chevallier.) 'Subsulphate of mercury' (Turpeth mineral), 2 drs.; chloride of lime, 3 drs.; almond oil, 6 drs.; lard, 2 oz. In herpes or tetters.

Ointment, Antimo'nial. See OINTMENT OF POTASSIO-TARTRATE OF ANTIMONY.

Ointment, Antiperiod'ic. *Syn.* AGUE OINTMENT; UNGUENTUM ANTIPERIODICUM, U. FEBRIFUGUM, L. *Prep.* 1. Disulphate of quinine, 1½ dr.; saccharine carbonate of iron, 1 dr.; oil of cajeput, 30 drops; fresh butter, 1 oz.

2. (Antonini.) Sulphate of quinine, 1 oz.; rectified spirit and sulphuric acid, of each, q. s. lard, 4 oz.

Uses, &c. About ½ oz. of either of the above to be rubbed on the vertebral regions once every 2 or 3 hours for 3 or 4 days, in intermittent fevers, more especially in those accompanied by vomiting; or, into the epigastrium, in cholera, diarrhœa, or dysentery.

Ointment, Aromat'ic. *Syn.* BALSAMUM STOMACHALE WACKERI, UNGUENTUM AROMATICUM, L. *Prep.* (Ph. Austr. 1836.) Simple ointment, 2½ lbs.; yellow wax and oil of laurel, of each, 3 oz.; melt together, and, when considerably cooled, add of oils of juniper, mint, lavender, and rosemary, of each, 2 drs. Anodyne, balsamic, and stimulant.

Ointment, Arsen'ical. *Syn.* OINTMENT OF WHITE ARSENIC; UNGUENTUM ARSENICALE, U. ARSENICI, U. ACIDI ARSENIOSI, L. *Prep.* 1. Arsenious acid (levigated), 3 grs.; lard or simple ointment, 1 oz. In lepra, psoriasis, malignant whitlows, &c.

2. (Hosp. F.) Levigated white arsenic, 15 to 20 grs.; lard, 1 oz. As a dressing for cancerous sores.

3. (Soubeiran.) White arsenic, 1 dr.; lard and spermaceti ointment, of each, 6 drs. In malignant cancer. The above must be carefully prepared, and used with great caution. See CERATE.

Ointment of Arse"niate of I'ron. *Syn.* UNGUENTUM FERRI ARSENIATIS, L. *Prep.* 1. (Carmichael.) Arseniate of iron, ½ dr.; phosphate of iron, 2 drs.; spermaceti ointment, 6 drs.

2. (Dr. Pereira.) Arseniate of iron, ½ dr.; lard, 1½ oz. In cancer.

Ointment, Astrin'gent. *Syn.* UNGUENTUM ASTRINGENS, L. *Prep.* Triturate powdered catechu, 1½ dr., with boiling water, 2 fl. drs., add, gradually, of spermaceti ointment (melted), 1½ oz., and continue the trituration until the mass concretes. An excellent dressing for ill-disposed sores and ulcers, especially during hot weather. See the several LEAD OINTMENTS, OINTMENT OF GALLS, &c.

Ointment of Atro"pia. *Syn.* UNGUENTUM ATROPIÆ (B. P.), L. *Prep.* 1. Atropia, 1½ gr.; simple ointment, 1 dr.; mix by careful trituration.

2. (Dr. Brookes.) Atropia, 5 grs.; lard, 3 drs.; otto of roses, 1 drop. In neuralgia, rheumatic pains, &c., when the affection is not deeply seated.

3. (B. P.) Atropia, 8 grs.; rectified spirit, ½ dr.; lard, 1 oz.; dissolve the atropia in the spirit and mix with the lard.

Ointment, Bailey's. See ITCH OINTMENT.

Oil of Bal'sam of Peru. *Syn.* UNGUENTUM BALSAMI PERUVIANI, L. *Prep.* 1. Lard or spermaceti ointment, 1 oz.; balsam of Peru, 1 dr.; melt together by the heat of boiling water, stir for 5 or 6 minutes, allow it to settle, and pour off the clear portion. In chaps and abrasions.

2. (Compound; UNG. B. P. COMPOSITUM—Copland.) Lard, 1 oz.; white wax, ¼ oz.; balsam of Peru, 1 dr.; melt as before, and when nearly cold, add of oil of lavender, 10 or 12 drops. As the last, and to restore the hair.

Ointment, Banyer's. *Syn.* COMPOUND ALUM OINTMENT; UNGUENTUM ALUMINIS COMPOSITUM, U. CALOMELANOS, U. BANYERI, L. *Prep.* From burnt alum and calomel, of each, 1½ oz.; carbonate of lead or litharge (levigated), 2 oz.; Venice turpentine, ½ lb.; lard, 2 lbs.; carefully triturated together. In milk-scald, porrigo, &c.

Ointment of Bark. See OINTMENT OF CINCHONA.

Ointment, Basil'icon. *Syn.* BASILICON, YELLOW B.; UNGUENTUM BASILICUM; U. B. FLAVUM, L. *Prep.* (Ph. L. 1746.) Olive oil, 16 fl. oz.; yellow wax, yellow resin, and Burgundy pitch, of each, 1 lb.; melt, remove the vessel from the fire, and stir in of common turpentine, 3 oz. This form is still occasionally employed in some shops, but is generally superseded by the resin cerate and resin ointment of the Pharmacopœias. A nearly similar preparation, under the name of 'basilicon ointment,' is contained in the Ph. Bor. 1847. (See *below*.)

Ointment, Basilicon (Black). See OINTMENT OF PITCH.

Ointment, Basilicon (Green). *Syn.* UNGUENTUM BASILICUM VIRIDE, L. *Prep.* (Ph. L. 1746.) Prepared verdigris, 1 oz.; yellow basilicon, 8 oz.; olive oil, 3 fl. oz. Detergent. *Used* to keep down fungous growths, to dress syphilitic ulcers, &c. See CERATE and OINTMENT OF VERDIGRIS.

Ointment, Bateman's. See ITCH OINTMENT.

Ointment of Bay-leaves. See LAUREL OINTMENT.

Ointment of Belladon'na. *Syn.* UNGUENTUM BELLADONNÆ (B. P., Ph. L.). *Prep.* 1. (Ph. L.). Extract of belladonna (deadly nightshade), 1 dr.; lard, 1 oz.; mix by trituration.

2. (Soubeiran.) Fresh belladonna leaves (bruised), 1 part; lard, 2 parts; simmer together until the leaves become crisp, and, after digestion for a short time longer, drain with pressure.

3. (B. P.). Extract of belladonna, 1; rubbed with a few drops of water, and mix with lard, 5½.

Uses, &c. As a local anodyne, in painful and indolent tumours, nervous irritations, &c. Also as an application to the neck of the uterus in cases of rigidity. (Chaussier.)

4. (Compound; UNGUENTUM BELLADONNÆ COMPOSITUM, L.)—*a.* (W. Cooley.) Compound iodine ointment, 7 drs.; extract of belladonna, 1 dr. Powerfully discutient. A most excellent application to all glandular tumours and indurations, buboes, &c., which it is desirable to disperse instead of mature, more especially when there is much pain. It is particularly suitable to cases occurring on shipboard, and when its application (at least twice a day) is accompanied with the internal use of the mixture of iodine and gold (see ANTISCROFULOUS MIXTURE), this treatment has seldom failed, even when the parties were dieted chiefly on salt food.

b. (Debreyne.) Extract of belladonna and lard, of each, 3 drs.; powdered opium, ½ dr. As an external anodyne and benumber, more especially in neuralgia, painful cancerous tumours, &c. A small piece is to be applied to the part, and the friction continued for 6 or 8 minutes. The above preparations are useless unless the extract employed is recent, and of good quality.

Ointment of Bismuth. *Syn.* UNGUENTUM BISMUTHI, L. *Prep.* 1. Nitrate of bismuth ('white bismuth'), 1 dr.; simple ointment, 1 oz.

2. (Fuller.) Nitrate of bismuth, 1 dr.; spermaceti ointment, 19 drs. In itch, and some chronic cutaneous diseases.

Ointment, Blist'ering. See OINTMENT OF CANTHARIDES, and VESICANTS.

Ointment, Blue. This is the vulgar name in England of mercurial ointment. On the Continent, an ointment made of smalts and Goulard water is commonly so called.

Ointment of Bor'ax. *Syn.* UNGUENTUM BORACIS, L. *Prep.* From borax (in very fine powder), 1 dr.; simple ointment or lard, 7 drs. In excoriations, chaps, &c.

Ointment of Bro'mide of Potas'sium. *Syn.* UNGUENTUM POTASSII BROMIDI, U. POTASSÆ HYDROBROMATIS, L. *Prep.* (Magendie.) Bromide of potassium, ½ dr.; lard, 1 oz. Resolvent; in bronchocele, scrofula, &c.

Ointment of Bro'mine. *Syn.* UNGUENTUM BROMINII, U. B. COMPOSITUM, L. *Prep.* (Magendie.) Bromide of potassium, 20 grs.; bromine, 6 to 12 drops; lard, 1 oz. As the last, but more active.

Ointment, Brown. *Syn.* FRENCH POOR-MAN'S FRIEND; UNGUENTUM FUSCUM, U. HYDRARGYRI, F., L. *Prep.* (P. Cod.) Nitric oxide of mercury (levigated), ½ dr.; resin ointment, 1 oz. In ophthalmia (cautiously), after the inflammatory stage is over; as an application to sore legs, &c.

Ointment of Cad'mium. *Syn.* UNGUENTUM CADMII, U. C. SULPHATIS, L. *Prep.* (Radius.) Sulphate of cadmium, 1 to 2 grs.; pure lard, 1 dr.; carefully triturated together. In specks on the cornea.

Ointment of Cala'mine. *Syn.* UNGUENTUM CALAMINÆ, U. LAPIS CALAMINARIS, U. ZINCI CARBONATIS IMPURI, L. *Prep.* (Ph. D. 1826). Prepared calamine, 1 lb.; ointment of yellow wax, 5 lbs. Desiccative and healing. This is the old Dublin form for Turner's cerate.

Ointment of Cal'omel. *Syn.* UNGUENTUM HYDRARGYRI SUBCHLORIDI (B. P.), UNGUENTUM CALOMELANOS, U. HYDRARGYRI CHLORIDI, L. *Prep.* 1. From calomel, 1 dr.; lard, or simple ointment, 1 oz.

Obs. "Were I required to name a local agent pre-eminently useful in skin diseases geuerally, I should fix on this. It is well deserving a place in the Pharmacopœia." (Pereira.) Dr. Underwood uses elder-flower ointment as the vehicle.

2. (Compound; UNGUENTUM CALOMELANOS COMPOSITUM—Dr. A. T. Thomson.) Calomel, 1 dr.; tar ointment, 4 drs.; spermaceti ointment, 1 oz.

3. (B. P.). Calomel, 1; prepared lard, 5½; mix. In lepra.

Ointment of Cam'phor. *Syn.* UNGUENTUM CAMPHORÆ, L. *Prep.* 1. Camphor, 1 to 2 drs.; lard, 1 oz.; dissolve by a gentle heat and stir until the mass is nearly cold. Stimulant and anodyne; in prurigo, psoriasis, &c.

2. (Compound.) From powdered opium, ½ dr.; powdered camphor, 1½ dr.; lard, 1½ oz.; mix by trituration, As an anodyne friction in rheumatic pains, swelled joints, colic, &c.

Ointment of Canthar'ides. *Syn.* UNGUENTUM CANTHARIDIS (B. P., Ph. L. D. & U. S.), U. LYTTÆ, L. *Prep.* 1. (Ph. L.) Cantharides (in very fine powder), 3 oz.; distilled water, 12 fl. oz.; mix, boil to one half, to the strained liquid add of resin cerate, 1 lb., and evaporate to a proper consistence.

2. (Ph. D.) Liniment of Spanish flies, 8 fl. oz.; white wax, 3 oz.; spermaceti, 1 oz.; melt together with a gentle heat, and stir until it concretes.

3. (Ph. E.)—*a.* UNGUENTUM INFUSI CANTHARIDIS—Ph. E.) Powdered cantharides, 1 oz.; boiling water, ¼ pint; infuse one night (12 hours), strain with expression, add of lard, 2 oz., and boil until the water is expelled; then add bees' wax and resin, of each, 1 oz.,

and when these are liquefied, remove the vessel from the fire, and further add of Venice turpentine, 2 oz.

b. (UNGUENTUM PULVERIS CANTHARIDIS—Ph. E.) Resin ointment, 7 oz.; melt, add of cantharides (in fine powder), 1 oz., and stir until the whole is nearly cold.

4. (B. P.) Cantharides, in fine powder, 1; olive oil, 6; yellow wax, 1: digest the cantharides in the oil for twelve hours, and for ¼ hour at 212°; strain, add the melted wax, and stir till cold.

Obs. The above preparations are frequently called 'blister ointment' or 'epispastic ointment.' They are *used* to keep blisters open after they have been produced by stronger compounds. The first three compounds are regarded as milder than the last (3, *b*), which contains the flies in substance. The P. Cod. contains an ointment (UNG. EPISPASTICUM FLAVUM) which is weaker than the above, prepared by digesting the bruised flies in lard, for 3 hours, over a warm bath; about ⅛th part of wax is next added to the strained fat, which is then coloured with turmeric, and scented with oil of lemon. See CERATE, POMMADE, VESICANTS, and *below*.

Ointment of Canthar'idine. *Syn.* UNGUENTUM CANTHARIDINÆ, L. *Prep.* (Soubeiran.) Cantharidine, 1 gr.; white wax, 1 dr.; lard, 7 drs.; mix thoroughly. (See *above*.)

Ointment of Cap'sicum. *Syn.* UNGUENTUM CAPSICI, L. *Prep.* (Dr. Turnbull.) Tincture of capsicum (pure), q. s.; gently evaporate it until it begins to gelatinize, then mix the extract with twice its weight of lard. As a powerful stimulant and rubefacient. When very freely used, it vesicates.

Ointment of Car'bonate of Am″monia. See AMMONIACAL OINTMENT.

Ointment of Car'bonate of Lead. *Syn.* WHITE LEAD OINTMENT; UNGUENTUM PLUMBI CARBONATIS (P. B., Ph. E. & D.), U. CERUSSÆ, L. *Prep.* 1. (Ph. E.) Carbonate of lead, 1 oz.; simple ointment, 5 oz.; mix thoroughly.

2. (Ph. D.) Carbonate of lead, 3 oz.; ointment of white wax, 1 lb.; mix with heat.

3. (B. P.) Carbonate of lead, in fine powder, 1; simple ointment, 7: mix.

Uses, &c. Cooling; desiccative. Useful to promote the healing of excoriated parts and slight ulcerations. The camphorated white ointment of old pharmacy (UNG. ALBUM CAMPHORATUM—Ph. L. 1744) was made by adding 40 grs. of camphor to the first of the above.

Ointment of Cat'echu. *Syn.* UNGUENTUM CATECHU, L. *Prep.* From alum, 1 oz.; catechu, 3 oz.; (both in very fine powder;) added to olive oil, ½ pint, and yellow resin, 4 oz., previously melted together. *Used* to dress ulcers in hot climates, where the ordinary fat ointments are objectionable; also in this country during hot weather. See ASTRINGENT OINTMENT.

Ointment of Char'coal. *Syn.* UNGUENTUM CARBONIS, L. *Prep.* 1. Resin ointment, 10 drs.; recently burnt charcoal (levigated), 3 drs. As a dressing to foul ulcers, especially those of the legs.

2. (Caspar.) Lime-tree charcoal and dried carbonate of soda, of each, 2 drs.; rose ointment, 1 oz., or q. s. In scald-head.

3. (Radius.) Animal charcoal (recent), 1 part; mallow ointment, 2 parts. As a friction in glandular enlargements and indurations, as a dressing to fetid ulcers, &c.

Ointment of Cher'ry-Laurel. *Syn.* UNGUENTUM LAURO-CERASI, L. *Prep.* (Soubeiran.) Essential oil of cherry-laurel, 1 dr.; lard, 1 oz. To alleviate the pain in cancer, neuralgia, and other local affections.

Ointment, Chil'blain. *Syn.* UNGUENTUM AD PERNIONES, L. *Prep.* 1. From made mustard (very thick), 2 parts; almond oil and glycerine, of each, 1 part; triturated together. To be applied night and morning.

2. (Cottereau.) Acetate of lead, camphor, and cherry-laurel water, of each, 1 dr.; tar, 1½ dr.; lard, 1 oz.

3. (Devergie.) Creasote and Goulard's extract, of each, 12 drops; extract of opium, 1½ gr.; lard, 1 oz. Twice or thrice daily.

4. (Giacomini). Sugar of lead, 2 drs.; cherry-laurel water (distilled), 2 fl. dr.; lard, 1 oz.

5. (Linnæus.) Balsam of Peru, 1 dr.; hydrochloric acid, 2 drs.; spermaceti ointment, 2½ oz.

Obs. For Swediaur's, Vance's, and Wahler's ointments, see article CHILBLAIN.

Ointment of Chlo″ride of Cal'cium. *Syn.* UNGUENTUM CALCII CHLORIDI, U. CALCIS MURIATIS†, L. *Prep.* (Sundelin.) Chloride of calcium (dry), 1 dr.; strong vinegar, 40 grs.; foxglove (recent, in fine powder), 2 drs.; lard, 1 oz. In bronchocele, scrofulous tumours, &c.

Ointment of Chloride of Lead. *Syn.* UNGUENTUM PLUMBI CHLORIDI, L. *Prep.* (Tuson). Chloride of lead, 1 part; simple cerate, 8 parts; carefully triturated together. In painful cancerous ulcerations and neuralgic tumours. See LEAD (Chloride).

Ointment of Chloride of Lime. See OINTMENT OF HYPOCHLORITE OF LIME.

Ointment of Chloride of Mercury. See OINTMENTS OF CALOMEL and CORROSIVE SUBLIMATE.

Ointment of Chlo″rine. *Syn.* UNGUENTUM CHLORINII, L. *Prep.* (Augustin.) Chlorine water, 1 part; lard, 8 parts; well triturated together. In itch, lepra, ring-worm, fetid ulcers, &c.

Ointment of Chlor-i'odide of Mercury. *Syn.* UNGUENTUM HYDRARGYRI CHLORIODIDI, L. *Prep.* (M. Recamier.) Chloriodide (iodochloride) of mercury, 3 grs.; lard, 5 drs. Recommended as a powerful discutient or resolvent. See OINTMENT OF IODO-CHLORIDE OF MERCURY.

Ointment of Chlo″roform. *Syn.* UNGUENTUM CHLOROFORMI, L. *Prep.* (M. Louis.) Chloro-

form, 1 dr.; simple ointment, 1 oz. In neuralgia and rheumatic pains, &c. It must be kept in a stoppered, wide-mouthed phial.

Ointment of Cin'chona. *Syn.* OINTMENT OF BARK; UNGUENTUM CINCHONÆ, L. *Prep.* (Biett.) Red cinchona bark (in very fine powder) and almond oil, of each, 1 part; beef marrow (prepared), 3 parts. In the variety of scald-head termed porrigo decalvans. A little oil of mace or tar is a useful addition.

Ointment, Cit'rine. See OINTMENT OF NITRATE OF MERCURY.

Ointment of Coc'culus In'dicus. *Syn.* UNGUENTUM COCCULI (Ph. E.), L. *Prep.* (Ph. E.) Kernels of *Cocculus Indicus*, 1 part; beat them to a smooth paste in a mortar, first alone, and next with a little lard; then further add of lard, q. s., so that it may be equal to 5 times the weight of the kernels. *Used* to destroy pediculi, and in scald-head, &c.

Ointment of Cod-liver Oil. *Syn.* UNGUENTUM OLEI MORRHUÆ, U. O. JECORIS ASELLI, L. *Prep.* Cod-liver oil (pale and recent), 7 parts; white wax and spermaceti, of each, 1 part; melted together. In ophthalmia and opacity of the cornea, either alone or combined with a little citrine ointment; as a friction or dressing for scrofulous indurations and sores; in rheumatism, stiff joints, and in several skin diseases. It often succeeds in porrigo or scald-head when all other remedies have failed. Scented with oil of nutmeg and balsam of Peru, it forms an excellent pommade for strengthening and restoring the hair.

Ointment of Col'ocynth. *Syn.* UNGUENTUM COLOCYNTHIDIS, L. *Prep.* (Chrestien.) Colocynth pulp (in very fine powder), 1 part; lard, 8 parts. *Used* in frictions on the abdomen as a hydragogue purgative, in mania, dropsy, &c.

Ointment of Corrosive Sub'limate. *Syn.* OINTMENT OF CHLORIDE OF MERCURY; UNGUENTUM HYDRARGYRI CHLORIDI, L. *Prep.* 1. From corrosive sublimate, 2 to 5 grs.; rub it to powder in a glass or wedgwood-ware mortar; add of rectified spirit, 6 or 7 drops, or q. s.; again triturate; lastly add, gradually, of spermaceti ointment (reduced to a cream-like state by heat), 1 oz., and continue the trituration until the whole concretes. *Used* as a stimulant, detergent, and discutient application in various local affections; in lepra, porrigo, acne, &c., and as a dressing to syphilitic and some other ulcers.

2. (Ph. Chirur.) Corrosive sublimate, 10 grs.; yolk of 1 egg; lard, 1 oz. As a dressing.

3. (POMMADE DE CIRILLO—P. Cod.) Corrosive sublimate, 1 dr.; lard, 1 oz. Caustic; must not be confounded with the preceding.

Ointment, Cosmet'ic. *Syn.* UNGUENTUM COSMETICUM, L.; POMMADE DE LA JEUNESSE, Fr. *Prep.* (Quincey.) Spermaceti, 3 dr. (better, 4½ dr.); oil of almonds, 2 oz.; melt together, and, when cooled a little, stir in of nitrate of bismuth ('white bismuth'), 1 dr.; and, lastly, of oil of rhodium, 6 drops. In itch and some other cutaneous eruptions; but chiefly as a pommade for the hair. Its frequent use is said to turn the latter black.

Ointment of Cre'asote. *Syn.* UNGUENTUM CREASOTI (B. P., Ph. L. E. D. & U. S.), L. *Prep.* 1. (Ph. L.) Creasote, ½ fl. dr.; lard, 1 oz.; triturate together.

2. (Ph. E.) Lard, 3 oz.; melt it by a gentle heat; add of creasote, 1 dr., and stir the mixture until it is nearly cold.

3. (Ph. D.) Creasote, 1 fl. dr.; ointment of white wax, 7 drs.; as the last.

4. (B. P.) Creasote, 1; simple ointment, 8: mix.

Uses, &c. In several skin diseases, especially ring-worm; as a friction in tic-douloureux; a dressing for scalds and burns; an application to chilblains, &c., &c.

Ointment of Cro'ton Oil. *Syn.* UNGUENTUM CROTONIS, L. *Prep.* 1. Croton oil, 15 to 30 drops; lard (softened by heat), 1 oz.; mix well. This is the usual and most useful strength to prepare the ointment. Rubefacient and counter-irritant; in rheumatism and various other diseases. When rubbed repeatedly on the skin, it produces redness and a pustular eruption. It also often affects the bowels by absorption. The only advantage it possesses over other preparations of the class is the rapidity of its action.

2. (RUBEFACIENT POMMADE—Caventou.) White wax, 1 part; lard, 5 parts; melt together, and, when quite cold, mince it small, add of croton oil, 2 parts, and mix by trituration. Stronger than the last.

Ointment of Cy'anide of Mer'cury. *Syn.* UNGUENTUM HYDRARGYRI CYANIDI, L. *Prep.* 1. (Cazenave.) Cyanide of mercury, 8 grs.; lard, 1 oz.; carefully triturated together.

2. (Pereira.) Cyanide of mercury, 10 to 12 grs.; lard, 1 oz. As a dressing for scrofulous and syphilitic ulcers, &c.; as an application in psoriasis, moist tetters, and some other skin diseases, &c. Biett orders the addition of a few drops of essence of lemon.

Ointment of Cyanide of Potas'sium. *Syn.* UNGUENTUM POTASSII CYANIDI, L. *Prep.* (Cazenave.) Cyanide of potassium, 12 grs.; oil of almonds, 2 drs.; triturate, add of cold cream (dry), 2 oz., and mix by careful trituration. As an anodyne in neuralgia, rheumatism, swelled joints, &c.; also as a friction over the spine in hysteria, and over the epigastrium in gastrodynia, &c.

Ointment of Delphin'ine. *Syn.* UNGUENTUM DELPHINIÆ, L. *Prep.* (Dr. Turnbull.) Delphinine or delphinia, 10 to 30 grs.; olive oil, 1 dr.; lard, 1 oz.; mix as the last. *Used* as a friction in rheumatism, and the other cases in which veratrine is employed.

Ointment, Depil'atory. *Syn.* UNGUENTUM DEPILATORIUM, L. See DEPILATORY (Cazenave's).

Ointment, Desic'cative. *Syn.* DRYING OINTMENT; UNGUENTUM DESICCATIVUM, U. EX-

SICCANS, L. See the OINTMENTS OF CALAMINE, LEAD, ZINC, &c.

Ointment, Deter'gent. *Syn.* UNGUENTUM DETERGENS, L. The OINTMENTS OF NITRATE OF MERCURY, NITRIC OXIDE OF MERCURY, TAR, VERDIGRIS, &c., when not too strong, come under this head.

Ointment, Diges'tive. *Syn.* UNGUENTUM DIGESTIVUM, L. *Prep.* 1. (P. Cod.) Venice turpentine, 2 oz.; yolks of 2 eggs; mix, and add of oil of St. John's wort, ½ oz.

2. (DIGESTIF ANIMÉ—P. Cod.) As the last, with an equal weight of liquid styrax.

3. (DIGESTIF MERCURIEL—P. Cod.) As No. 1, with an equal weight of mercurial ointment.

4. (UNG. D. VIRIDE—Dr. Kirkland.) Bees' wax, gum elemi, and yellow resin, of each, 1 oz.; green oil, 6 oz.; melt them together, and, when considerably cooled, add of oil of turpentine, 2 drs.

Ointment, Edinburgh. Two compounds are known under this name:—1. (BROWN.) From black basilicon, 6 parts; milk of sulphur, 2 parts; sal ammoniac, 1 part.

2. (WHITE.) From white hellebore, 3 oz.; sal ammoniac, 2 oz.; lard, 1 lb. Both are used in itch.

Ointment of Eggs. *Syn.* UNGUENTUM OVORUM, L. *Prep.* 1. Yolk of 1 egg; honey and fresh linseed oil, of each, 1 oz.; balsam of Peru, ½ dr.; mix well.

2. (Soubeiran.) Bees' wax, 4 drs.; oil of almonds, 1½ oz.; yolk of 1 egg. As an emollient and soothing dressing to excoriations, irritable ulcers, &c.

Ointment, Egyp'tian. *Prep.* (Giordano.) Burnt alum, 1 part; verdigris, 10 parts; strong vinegar, 14 parts; purified honey (thick), 32 parts; mix by heat and agitation. As a detergent application to foul ulcers. It is a modification of the 'UNGUENTUM ÆGYPTIACUM' of old pharmacy.

Ointment of Elder flowers. *Syn.* WHITE ELDER-OINTMENT; UNGUENTUM SAMBUCI FLORUM, U. SAMBUCI (Ph. L.), L. *Prep.* 1. (Ph. L.) Elder flowers and lard, of each, 1 lb.; boil them together until the flowers become crisp, then strain, with pressure, through a linen cloth. The same precautions must be observed as are necessary in the preparation of the medicated oils, by infusion. Emollient; less white and odorous than the following:—

2. (Wholesale.) Take of lard (hard, white, and sweet), 25 lbs.; prepared mutton suet, 5 lbs.; melt them in a well-tinned copper or earthen vessel, add of elder-flower water, 3 galls., agitate briskly for about ½ an hour, and set it aside; the next day gently pour off the water, re-melt the ointment, and add of benzoic acid, 5 drs.; otto of roses, 20 drops; oil of bergamot and oil of rosemary, of each, 1 dr.; again agitate well, let it settle for 10 minutes, and then pour off the clear portion into pots for sale. Very agreeable, and keeps well.

Obs. The last formula is the one now generally adopted by the large wholesale houses.

Ointment of Elder leaf. *Syn.* ELDER OINTMENT, GREEN E. O.; UNGUENTUM VIRIDE, U. SAMBUCI VIRIDE, U. SAMBUCI (Ph. D. 1826), L. *Prep.* 1. (Ph. D. 1826.) Fresh elder leaves (bruised), 3lbs.; suet, 4 lbs.; lard, 2 lbs.; boil together, as above.

2. (Wholesale.) Good fresh lard, 1 cwt., fresh elder leaves, 56 lbs.; boil till crisp, strain off the oil, put it over a slow fire, add hard prepared mutton-suet, 14 lbs., and gently stir it until it acquires a bright green colour.

Obs. The above ointment is reputed to be emollient and cooling, and has always been a great favourite with the common people. Both elder-flower and elder-leaf ointment are, however, unnecessary preparations. "They are vestiges of the redundant practice of former times." (A. T. Thomson.) The above formulæ are those now almost exclusively employed in trade. The ointment should be allowed to cool very slowly, and after its temperature has fallen a little, and it begins to thicken, it should not be stirred, in order that it may 'grain' well, as a granular appearance is much admired. It is a common practice to add powdered verdigris to deeper the colour, but then the ointment does not keep well. This dangerous fraud may be detected in the manner noticed under SAVINE CERATE (*page* 314).

Ointment of El'emi. *Syn.* BALSAM OF ARCÆUS†, UNGUENTUM ELEMI (B. P., Ph. L. & D.), L. *Prep.* 1. (Ph. L.) Elemi, 3 oz.; suet, 6 oz.; melt them together, remove the vessel from the fire, and stir in of common turpentine, 2½ oz.; olive oil, ½ fl. oz.; lastly, strain the whole through a linen cloth.

2. (Ph. D.) Resin of elemi, 4 oz.; ointment of white wax, 1 lb.; melt them together, strain through flannel, and stir the mixture constantly until it concretes.

3. (B. P.) Elemi, 1; simple ointment, 4; melt and strain.

Uses, &c. Stimulant and digestive. It is frequently employed to keep open issues and setons, and as a dressing for old and ill-conditioned sores. The 'UNG. ELEMI CUM ÆRUGINE' of St. George's Hospital is made by adding 1 dr. of finely powdered verdigris to ezery 6 oz. of the ointment.

Ointment, Escharot'ic. *Syn.* UNGUENTUM ESCHAROTICUM, L. *Prep.* 1. (Sir B. Brodie.) Corrosive sublimate, 1 dr.; nitric oxide of mercury, sulphate of copper, and verdigris, of each, 2 drs. (all in very fine powder); lard, q. s. See ARSENICAL OINTMENT and CERATE.

Ointment, Eye. *Syn.* EYE SALVE; UNGUENTUM OPHTHALMICUM, L. *Prep.* 1. (Dr. Collier.) Burnt alum, ½ dr.; powdered opium, 20 grs.; olive oil, 1 fl. dr.; spermaceti ointment, 2 drs. In inflammation of the eyelids, purulent ophthalmia, &c.

2. (W. Cooley.) Chloride of barium, 6 grs.; calomel, 10 grs.; simple ointment, 1 oz.; otto

of roses, 1 or 2 drops. In scrofulous ophthalmia.

3. (Dessault.) Nitric oxide of mercury, carbonate of zinc, acetate of lead, and dried alum, of each, 1 dr.; corrosive sublimate, 10 grs.; rose ointment, 1 oz. In chronic ophthalmia, profuse discharges, &c.; in general, diluted.

4. (Dupuytren.) Red oxide of mercury, 10 grs.; sulphate of zinc, 20 grs.; lard, 2 oz. For chronic inflammation of the eyelids, chronic ulcers, &c.

5. (Fricke.) Nitrate of silver, 10 grs.; zinc ointment, 2 drs.; balsam of Peru, ½ dr. In ulceration of the cornea, and in acute, purulent, and chronic ophthalmia, &c., employing great caution in its use.

6. (Guthrie.) Spermaceti ointment, 1 dr.; solution of diacetate of lead, 15 drops; nitrate of silver, 2 to 10 grs. As the last, and in cases wherein a direct caustic action is desired. The stronger ointment often occasions intense pain.

7. (Hufeland.) Black oxide of mercury, 2 grs.; spermaceti cerate and walnut oil, of each, 1 dr. In chronic affections of the eyes or eyelids, particularly in those of a syphilitic character.

8. (Janin.) Ammonio-chloride of mercury, 1 dr.; tutty and bole, of each, 2 drs.; lard, 1 oz. In debility of the conjunctiva, in chronic inflammation with excessive secretion, &c.

9. (Marshall.) See CERATE (Marshall's).

10. (Parker.) Iodine, 1 gr.; iodide of potassium, 5 grs.; simple ointment, 3 drs. In scrofulous ophthalmia, thickening of the conjunctiva, opacity of the cornea, &c.

11. (Pellier.) Nitric oxide of mercury and carbonate of zinc, of each, 1½ dr.; tutty, ½ dr.; red sulphuret of mercury, 20 grs.; lard, 2 oz.; balsam of Peru, 15 drops. In specks in the eye arising from small ulcers which have healed up; in excessive defluxions, &c.

12. (Ratier.) Liquor of diacetate of lead, ½ dr.; wine of opium, 1 dr.; lard, 5 drs. In excoriations, and the variety of chronic ophthalmia popularly termed 'blear eye.'

13. (Regent.) Acetate of lead and red precipitate, of each, 1 dr.; camphor, 6 grs.; washed fresh butter, 2½ oz. As the last, and in chronic ulcerations.

14. (Singleton's GOLDEN OINTMENT.) According to Dr. Paris, this compound consists of lard medicated with orpiment (native yellow sulphuret of arsenic). There appears, however, to be some mistake in this, as that sold us under the name had nearly the same composition as the OINTMENT OF NITRIC OXIDE OF MERCURY of the Pharmacopœia. It did not contain even a trace of either arsenic or sulphur. The action of this nostrum, and the reputation which it has acquired, fully justify this conclusion.

15. (Smellome.) From verdigris (levigated), ½ dr.; olive oil, 1 fl. dr.; triturate together, add of yellow basilicon, 1 oz., and again triturate until it begins to concrete. A popular nostrum, sometimes useful in chronic inflammation and ulcerations of the eyelids, &c., especially in those of a scrofulous character.

16. (Spielmann.) Acetate of lead, 20 grs.; spermaceti cerate, 5 drs.; compound tincture of benzoin, 40 grs. Cooling; dessicative. In inflamed eyelids, excoriations, &c.

17. (St. Yve.) Fresh butter (washed), 1 oz.; white wax, 1 dr.; camphor, 15 grs.; melt by a gentle heat, and, when cooled a little, add of red precipitate (levigated), ½ dr.; oxide of zinc, 20 grs. In chronic inflammation of the coats of the eye, or of the eyelids, specks on the cornea, &c.

18. (Thomson.) Levigated oxide of zinc, 1 dr.; lard, 9 drs.; wine of opium, 20 drops. In chronic ophthalmia depending on want of tone in the vessels and integuments of the eye.

19. (Velpeau.) Precipitated sesquioxide of iron (recent, but dry), ½ dr.; lard, 5 drs.; oil of almonds, 1 fl. dr.; balsam of Peru, 15 drops. As the last, especially in 'blear eye.'

20. (Ware.) Wine of opium, 1 fl. dr.; simple ointment, 3 drs. In ophthalmia, after the inflammatory symptoms have subsided, and the vessels remain red and turgid.

Obs. The ingredients entering into the composition of all the above ointments must be reduced to the state of impalpable powder before mixing them; and the incorporation should be made by long trituration in a wedgwood-ware mortar, or, preferably, for those that contain substances that are very gritty, by levigation on a porphyry slab, with a muller. The most serious consequences, even blindness, have resulted from the neglect of these precautions. They should all be employed in exceedingly small quantities at a time, and they should be very carefully applied by means of a camel-hair pencil or a feather; and, in general, not until acute inflammation has subsided. The stronger ones, in most cases, require dilution with an equal weight to twice their weight of lard or simple ointment, and should only be used of their full strength under proper medical advice. Various other formulæ for OPHTHALMIC OINTMENTS will be found under the names of their leading ingredients.

Ointment of Fig'wort. See OINTMENT OF SCROPHULARIA.

Ointment of Fox'glove. *Syn.* UNGUENTUM DIGITALIS, L. *Prep.* 1. From fresh foxglove, as ointment of hemlock—Ph, L. As an application to chronic ulcers, glandular swellings, &c.

2. (Rademacher.) Extract of foxglove, 2 drs.; lard, 1 oz. In croup; spread on lint, and applied as a plaster to the throat.

Ointment of Fu'ligoka'li. See FULIGOKALI.

Ointment of Galls. *Syn.* UNGUENTUM GALLÆ (B. P., Ph. D.), L. *Prep.* 1. (Ph. D.), Gall-nuts (in very fine powder), 1 dr.; ointment of white wax, 7 drs.; rub them together until a uniform mixture is obtained.

2. (B. P.) Galls, in very fine powder, 80 grs.; benzoated lard, 1 oz.; mix. An excellent application to piles, either alone or mixed with an equal quantity of zinc ointment; also highly useful in ring-worm of the scalp.

Ointment of Galls and Opium. UNGUENTUM GALLÆ CUM OPIO (B. P.); UNGUENTUM GALLÆ OPIATUM, U. GALLÆ COMPOSITUM —Ph. L., U. GALLÆ ET OPII,—(Ph. E.)—*Prep.* 1. (Ph. L.) Gall-nuts (very finely powdered), 6 drs.; powdered opium, 1½ dr.; lard, 6 oz.; rub them together.

2. (Ph. E.) Galls, 2 drs.; opium, 1 dr.; lard, 1 oz.; as the last.

3. (B. P.) Ointment of galls, 1 oz.; opium (in powder), 32 grs.; mix.

Uses, &c. A most valuable astringent and anodyne in blind piles, slight cases of prolapsus ani, &c. Some practitioners add 1 dr. of camphor. The ointment of the Ph. E. is much the strongest.

OINTMENT OF GALLS WITH MORPHIA. UNGUENTUM GALLÆ ET MORPHIÆ—Dr. Paris.) Morphia, 2 grs.; olive oil (hot), 2 fl. drs.; triturate, add of zinc ointment (Ph. L.), 1 oz.; powdered galls, 1 dr.; and mix thoroughly. In piles. The quantity of galls should be doubled.

Ointment of Garlic. *Syn.* UNGUENTUM ALLII, L. *Prep.* 1. Fresh garlic (bruised), 2 parts; lard, 3 parts; simmer together for ½ an hour, and then strain with expression. Rubbed on the abdomen in chronic diarrhœa and colic, and over the chest and spine in hooping-cough.

2. (Beasley.) Fresh garlic and lard, equal parts; beaten together. Applied to the feet in hooping-cough.

Ointment, Giacomini's. See CHILBLAIN OINTMENT.

Ointment of Gold. *Syn.* UNGUENTUM AURI, L.; POMMADE D'OR, Fr. *Prep.* 1. (Legrand.) Gold (in powder), 12 grs.; lard, 1 oz. As a dressing for syphilitic ulcers, and as a friction in glandular indurations, &c.; also endermically.

2. (Magendie.) Amalgam of gold, 1 dr.; lard, 1 oz. For endermic use, chiefly. When the surface becomes dry, the ointment of terchloride of gold is to be substituted as a dressing. In rheumatic pains, neuralgia, &c.

Ointment, Gold'en. See EYE OINTMENT, CITRINE O., &c.

Ointment, Gondret's. See AMMONIACAL OINTMENT.

Ointment, Goulard's. *Syn.* UNGUENTUM GOULARDI, U. LITHARGYRI ACETATIS, L. *Prep.* (Ph. Chirur.) Goulard's extract, 1 dr.; simple ointment, 2 oz. See CERATE (Lead).

Ointment Green. See ELDER OINTMENT.

Ointment of Hel'lebore. *Syn.* OINTMENT OF WHITE HELLEBORE; UNGUENTUM VERATRI, L. *Prep.* 1. (Ph. L. 1836.) White hellebore (in very fine powder), 2 oz.; lard, 8 oz.; oil of lemons, 20 drops. In itch, lepra, ring-worm, &c.; and to destroy insects in the hair of children. It should be used with caution, and, preferably, diluted with an equal weight of lard.

2. (Compound; UNGUENTUM VERATRI COMPOSITUM.)—*a.* (Rayer.) White hellebore, 1 oz.; sal ammoniac, ½ oz.; lard, 8 oz. *Used* as the last.

b. See SULPHUR OINTMENT (Compound)—Ph. L.

Ointment of Hem'lock. *Syn.* UNGUENTUM CONII (Ph. L.), L. *Prep.* 1. (Ph. L.) Fresh hemlock leaves and lard, of each, 1 lb.; boil them together (very gently) until the leaves become crisp, then strain through linen, with pressure. See OILS (Medicated.)

2. Extract of hemlock, 1 dr.; lard, 9 drs.; triturate together.

Uses, &c. As a local anodyne in neuralgic and rheumatic pains, glandular enlargements, painful piles, &c.; and as a dressing to painful and irritable ulcers, cancerous sores, &c.

Ointment of Hen'bane. *Syn.* UNGUENTUM HYOSCYAMI, L. *Prep.* 1. Fresh henbane leaves, 1 lb.; lard, 2 lbs.; boil until nearly crisp.

2. (Taddei.) Extract of henbane, 1 dr.; lard, 1 oz. Anodyne; in painful piles, sores, &c., as the last.

Ointment, Holloway's. See PATENT MEDICINES.

Ointment of Hops. *Syn.* UNGUENTUM LUPULI, L. *Prep.* (Swediaur.) Hops (commercial), 2 oz.; lard, 10 oz.; as extract of hemlock, Ph. L. In painful piles and cancerous sores.

Ointment of Hydri'odate of Ammo"nia. *Syn.* UNGUENTUM AMMONIÆ HYDRIODATIS, L. *Prep.* From hydriodate of ammonia (iodide of ammonium), ½ dr.; simple ointment, 1 oz. *Used* chiefly as an applicatien to scrofulous tumour and ulcers, in irritable subjects.

Ointment of Hydrochlo"ric Acid. *Syn.* UNGUENTUM ACIDI HYDROCHLORICI, L. *Prep.* (Dr. Corrigan.) Hydrochloric acid, 1 dr.; simple ointment, 1 oz. As a dressing for scald-head, after the scabs have been removed by emollient liniments or poultices.

Ointment of Hypochlo"rite of Lime. *Syn.* OINTMENT OF CHLORIDE OF LIME; UNGUENTUM CALCIS HYPOCHLORITIS, U. C. CHLORINATÆ, L. *Prep.* 1. From chlorinated lime (chloride of lime), 1 dr.; lard, 1 oz.; carefully triturated together. In scrofulous swellings, goitre, chilblains, indolent glandular tumours, &c.

2. Chlorinated lime, 1 dr.; powdered foxglove, 2 drs.; simple ointment, 2 oz. As an application to fetid and malignant ulcers, &c.

Ointment of Hypochlo"rite of Sul'phur. *Syn.* UNGUENTUM SULPHURIS HYPOCHLORITIS, L. *Prep.* (Dr. Copland.) 'Hypochlorite of sulphur,' 1 dr.; simple ointment, 1 oz. It is generally scented with oil of almonds. *Used* in psoriasis inveterata, and some other skin diseases.

Ointment of I'odide of Ar'senic. *Syn.* UN-

GUENTUM ARSENICI IODIDI, L. *Prep.* (Biett.) Iodide of arsenic, 2 to 3 grs.; lard, 1 oz.; carefully triturated together. In lepra, psoriasis, &c.; and in corroding tubercular diseases. It should be used with caution, and not more than ½ dr. applied at once.

Ointment of Iodide of Ba″rium. *Syn.* UNGUENTUM BARII IODIDE, L. *Prep.* (Magendie.) Iodide of barium, 3 to 4 grs.; lard, 1 oz. As a friction to scrofulous swellings and indurations. The usual proportions are now 5 gr. to the oz.

Ointment of Iodide of Lead. *Syn.* UNGUENTUM PLUMBI IODIDI (B. P., Ph. L. & D.), L. *Prep.* 1. (Ph. L.) Iodide of lead, 1 oz.; lard, 8 oz.; rub them together.

2. (Ph. D.) Iodide of lead (in fine powder), 1 dr.; ointment of white wax, 7 drs.

3. (B. P.) Iodide of lead, in fine powder, 62 grs.; simple ointment, 1 oz.; mix. An excellent application to scrofulous tumours and swelled glands, especially when accompanied with pain.

Ointment of Green Iodide of Mer'cury. *Prep.* 1. (OINTMENT OF SUBIODIDE OF MERCURY, O. OF PROTIODIDE OF M.*; UNGUENTUM HYDRARGYRI IODIDI—Ph. L.) *a.* (Ph. L. White wax, 2 oz.; lard, 6 oz.; melt them together, add of iodide (green iodide) of mercury, 1 oz., and rub them well together.

2. (Magendie.) Green iodide of mercury, 23 grs.; lard, 1½ oz.

Uses, &c. In tubercular skin diseases, as a friction in scrofulous swellings and indolent granular tumours, and as a dressing for ill-conditioned ulcers, especially those of a scrofulous character.

Ointment of Red Iodide of Mercury. UNGUENTUM HYDRARGYRI IODIDI RUBRI, B. P., O. OF BINIODIDE OF M.*; UNGUENTUM HYDRARGYRI BINIODIDI,* U. H. IODIDI RUBRI—Ph. D.)—1. (Ph. D.) Red iodide of mercury, 1 dr.; ointment of white wax, 7 drs.; mix by careful trituration.

2. (Soubeiran.) Red iodide of mercury, 20 grs.; lard, 1½ oz.

3. (B. P.) Red iodide of mercury (in very fine powder), 16 grs.; simple ointment, 1 oz.; mix.

Uses, &c. Similar to those of the preceding, but it is much more stimulant, and is regarded as better adapted for obstinate syphilitic sores, Largely diluted with lard or almond oil, it is applied to the eyes in like cases.

Ointment of Iodide of Potas'sium. *Syn.* UNGUENTUM POTASSII IODIDI (B. P., Ph. L. & D.). L. *Prep.* 1. (Ph. L.) Iodide of potassium, 2 drs., dissolved in boiling distilled water, 2 fl. drs.; lard (softened by heat), 2 oz.; triturate together until united.

2. (Ph. D.) Iodide of potassium, 1 dr.; distilled water, ½ fl. dr.; ointment of white wax, 7 drs.; as before.

3. (Magendie.) Iodide of potassium, 1 dr.; lard, 12 drs.

4. (Le Gros.) Iodide, ½ dr.; lard, 1 oz.

5. (B. P.) Iodide of potassium, 64 grs.; carbonate of potash, 4 grs.; distilled water, 1 dr.; prepared lard, 1 oz.; dissolve the carbonate and the iodide in the water, and mix thoroughly with the lard.

Uses, &c. As a friction in scrofula, bronchocele, glandular enlargements, indurations, &c.; as a dressing to scrofulous ulcers, as an application in scrofulous ophthalmia, and in most of the other applications in which the employment of iodine is indicated. The last formula has been successfully employed by M. Le Gros in itch.

Obs. The strength of this ointment, as prescribed by different parties, varies greatly, the proportions of the iodide ranging from $\frac{1}{32}$ to ⅛ of the whole, to adapt it to particular cases. When other ingredients are added, the iodide must be used in a perfectly dry state, and in fine powder, instead of being dissolved in water. This is particularly necessary when it is to be mixed with mercurial ointment.

Ointment of Iodide of Sulphur. *Syn.* UNGUENTUM SULPHURIS IODIDI (B. P., Ph. L., L. *Prep.* 1. (Ph. L.) Iodide of sulphur (in fine powder, ½ dr.; lard, 1 oz.; mix by trituration.

2. (Cazenave.) Iodide of sulphur, 12 to 15 grs.; lard, 1 oz.

3. (B. P.) Iodide of sulphur, 1; lard, 16; mix.

Uses, &c. As a local stimulant and alterative, in the chronic forms of lepra, lupus, porrigo, psoriasis, itch, &c.; also a remedy for acne punctata. A few drops of oil of cloves or nutmeg are commonly added.

Ointment of Iodide of Zinc. *Syn.* UNGUENTUM ZINCI IODIDI, L. *Prep.* 1. From iodide of zinc, 12 grs.; simple ointment, 1 oz. In scrofulous excoriations, and in the chronic ophthalmia of scrofulous subjects, arising from a relaxed state of the tissues and vessels.

2. (Dr. Ure.) Iodide of zinc, 1 dr.; lard, 1 oz. As a friction to glandular tumours and indurations, and as a dressing to flabby and obstinate scrofulous ulcers.

Ointment of I'odine. *Syn.* UNGUENTUM IODI (B. P.), UNGUENTUM IODINII (Ph. U. S.). *Prep.* 1.—(B. P.) Iodine, 32 grs.; iodide of potassium, 32 grs.; proof spirit, 1 dr.; rub together and add prepared lard, 2 oz. See OINTMENT OF IODINE (Compound).

2. (Ph. U. S.) Iodine, 20 grs.; rectified spirit, 20 drops; rub them together, then add of lard, 1 oz.

Ointment of Iodine (Compound). *Syn.* OINTMENT OF IODURETTED IODIDE OF POTASSIUM; UNGUENTUM POTASSII IODIDI IODURETUM, U. IODINII COMPOSITUM—Ph. L. & D., U. IODINII—Ph. E.—*a.* (Ph. L.) Iodine of potassium (in very fine powder), 1 dr.; lard, 2 oz.; mix, then add of iodine, ½ dr., dissolved in rectified spirit, 1 fl. dr., and mix all together. See OINTMENT OF IODINE (B. P.)

b. (Ph. E.) Iodine, 1 dr.; iodide of potassium, 2 drs.; rub them together, then gradually add of lard, 4 oz.

c. (Ph. D.) Pure iodine, ½ dr.; iodide of

potassium, 1 dr.; rub them well together in a glass or porcelain mortar, then gradually add of ointment of white wax, 14½ drs., and continue the trituration until a uniform ointment is obtained.

Uses, &c. The compound ointment is an excellent friction in goitre, and in enlarged or indurated glands or tumours, more especially those of a scrofulous character; in the quantity of ½ to 1 dr., night and morning. It may be advantageously combined with extract of belladonna in the incipient bubo of scrofulous subjects, and in the early stages of cancer; and, with an equal weight of mercurial ointment, as a friction in cases of enlarged liver and spleen, and ovarian dropsy. The simple ointment of the Ph. U. S. is generally regarded as weaker and less efficacious than the compound.

Ointment of Iodo-chlo″ride of Mercury. *Syn.* UNGUENTUM HYDRARGYRI IODO-BICHLORIDI*, L. *Prep.* From iodo-chloride of mercury, 16 grs.; simple ointment, 1 oz. Discutient; probably one of the most powerful known in syphilitic cases complicated with scrofula. See OINTMENT OF CHLORIODIDE OF MERCURY.

Ointment of Iodo-hydrar'gyrate of Potassa. *Syn.* UNGUENTUM POTASSÆ IODO-HYDRARGYRATIS, L. *Prep.* 1. (Lamothe.) Iodo-hydrargyrate of potassa, 20 grs.; lard, 1 oz.

2. (Puche.) Red iodide of mercury and iodide of potassium, of each, 8 grs.; lard, 1 oz. As a powerful stimulant discutient; in tumours, inflammatory sore throat, &c.

Ointment, Iodo-narcot'ic. *Syn.* UNGUENTUM IODO-NARCOTICUM, L. *Prep.* (Purvis.) Iodine, 20 grs.; iodide of potassium, 2 drs.; oil of tobacco (by infusion), 1½ dr.; lard, 3 drs. To relax rigid muscles.

Ointment of Ipecacuan'ha. *Syn.* UNGUENTUM IPECACUANHÆ, L. *Prep.* (Dr. Turnbull.) Ipecacuanha (in fine powder), 2 drs.; olive oil, 2 fl. drs.; lard or simple ointment, 4 drs. Counter-irritant; when frequently employed as a friction, it occasions an eruption, but one of a milder character than that from either croton oil or tartar emetic.

Ointment, Is'sue. *Syn.* UNGUENTUM ADFONTICULOS, L. *Prep.* (Golding Bird.) Ointment of cantharides (Ph. L.), 1½ oz.; tartar emetic (in impalpable powder), 8 grs.; spermaceti ointment, 2 oz. As a stimulating application to issues, to promote the discharge. See ELEMI OINTMENT, CERATE, PLASTER, &c.

Ointment, Itch. *Syn.* UNGUENTUM ANTIPSORICUM, L. Several excellent formulæ for itch ointments will be found under the names of their leading ingredients. The following are additional ones, including some nostrums:—

1. (Bailey.) From alum, nitre, and sulphate of zinc, of each, in very fine powder, 1½ oz.; vermilion, ½ oz.; mix, add gradually of sweet oil, ½ pint; triturate together until perfectly mixed, then further add of lard (softened by heat), 1 lb., with oils of aniseed, lavender, and origanum, q. s. to perfume.

2. (Bateman.) Carbonate of potassa, ½ oz.; rose water, 1 fl. oz.; red sulphuret of mercury, 1 dr.; oil of bergamot, ½ fl. dr.; sublimed sulphur and hog's lard, of each, 11 oz.; mix them. (Bateman, 'Cutan. Diseases.') The nostrum vended under the name is made as follows:—Carbonate of potash, 1 oz.; vermilion, 3 drs.; sulphur, 1 lb.; lard, 1½ lb.; rose water, 3 fl. oz.; oil of bergamot, 1½ dr.

3. (French Hosp.) Chloride of lime, 1 dr.; rectified spirit, 2 fl. drs.; sweet oil, ½ fl. oz.; common salt and sulphur, of each, 1 oz.; soft soap, 2 oz.; oil of lemon, 20 drops. Cheap, effectual, and inoffensive.

4. (De La Harpe.) Sulphur, 2 oz.; powdered white hellebore, ½ oz.; sulphate of zinc, ½ do.; soft soap, 4 oz.; lard, 8 oz.

5. (Jackson.) From palm oil, flowers of sulphur, and white hellebore, of each, 1 part; lard, 2 parts.

6. (Nugent.) From white lead, 2 oz.; orris root, 1 oz.; corrosive sublimate, in very fine powder, ½ oz.; palm oil, 4 oz.; lard, 1½ lb.

7. (Ph. E. 1744.) Elecampane root and sharp-pointed dock (*Rumex acutus*—Linn.), of each, bruised, 3 oz.; water, 1 quart; vinegar, ¾ pint; boil to one half, add of water-cress, 10 oz.; lard, 4 lbs.; boil to dryness, and strain with expression; to the strained liquid add of bees' wax and oil of bays, of each, 4 oz.; and stir the mixture until nearly cold.

8. (UNG. A. COMP.—Ph. E. 1744.) To each lb. of the last, add of strong mercurial ointment, 2 oz.

9. (Robertson.) Soft soap, 1 oz.; rum, 1 table-spoonful; chloride of lime (dry and good), ½ oz.; mix, and add of lard, 2 oz.

10. (Swediaur.) Stavesacre (in powder), 1 oz.; lard, 3 oz.; digest with heat for 3 hours, and then strain. The formula of the Ph. Bruns. is nearly similar. Very useful in itch; also to destroy pediculi.

11. (Thomson.) Chloride of lime and common salt, of each, in fine powder, 1 dr.; soft soap, 1 oz.; rectified spirit, 2 fl. drs.; mix, add of lard, 1 oz.; and, lastly, of strong vinegar, 3 fl. drs. Very cleanly and effective; but should not be made in quantity, as it does not keep well.

12. (Voght.) Chloride of lime (dry), 2 drs.; burnt alum, 3 drs.; lard, 9 drs. To be mixed with an equal quantity of soft soap at the time of fusing it.

Obs. The products of the preceding formulæ are used by well rubbing them into the part affected, night and morning, as long as necessary, the number of applications required depending greatly on the manner in which this is done.

Ointment of I'vy. *Syn.* UNGUENTUM HEDERÆ, L. *Prep.* From the leaves of common ivy, by infusion, as ointment of henbane. Used as an application to soft corns, in itch,

and as a dressing to indolent ulcers and issues.

Ointment of Ju"niper-tar. *Syn.* UNGUENTUM OLEI PYROLIGNI JUNIPERI, U. CADINUM, L. *Prep.* (Eras. Wilson.) Lard and suet, of each, 6 parts; bees' wax, 4 parts; liquefy by heat, and add of pyroligneous oil of juniper ('huile de cade') 16 parts; with a few drops of any fragrant essential oil, to conceal the smell. In ring-worm, and as a stimulant ointment in some other skin diseases.

Ointment, Kirkland's. See LEAD OINTMENT (Compound).

Ointment of Lard. *Syn.* UNGUENTUM ADIPIS, L. *Prep.* (Ph. L. 1788.) Prepared lard, 2 lbs.; melt, add of rose water, 3 fl. oz.; beat the two well together, then set the vessel aside, and when the whole is cold, separate the congealed fat. A simple emollient. See ELDER OINTMENT.

Ointment of Lau'rel. *Syn.* LAURINE OINTMENT; UNGUENTUM LAURINUM, U. LAURI NOBILIS, L. *Prep.* 1. (Ph. Lusit.) Suet (softened by heat), 8 oz.; laurel oil (expressed oil of bay), 1 lb.; oil of turpentine, 1½ oz. This is the 'nervine balsam' and 'nervine ointment' of the shops in the Peninsula, and in some other parts of Southern Europe. The Ph. Bat. 1805 added ½ oz. of rectified oil of amber.

2. (P. Cod.) Fresh bay leaves and berries (bruised), of each, 1 lb.; lard, 2 lbs.; as hemlock ointment—Ph. L. Highly esteemed on the Continent as a stimulating friction, in bruises, strains, stiff joints, &c.; and in deafness.

3. (Trade.) From fresh bay leaves, 2 lbs.; bay berries, 1 lb.; neat's-foot oil, 5 pints; boil as last; to the strained oil add, of lard suet, 3 lbs.; true oil of bay, ¼ lb., and allow it to cool very slowly, in order that it may 'grain' well. Sold for laurel ointment and common oil of bay.

Ointment of Lead. *Prep.* 1. (UNGUENTUM PLUMBI, U. LITHARGYRI—P. Cod.) *Prep.* 1. Litharge, 3 oz.; distilled vinegar, 4 oz.; olive oil, 9 oz.; mix with heat, and stir until they combine. Camphor, morphia, and opium, are common additions to lead ointment, when an anodyne effect is desirable.

2. (Compound; NEUTRAL OINTMENT, HIGGIN'S O., KIRKLAND'S O.; UNGUENTUM NEUTRALE, U. PLUMBI COMPOSITUM—Ph. L.) Lead plaster, 2 lbs.; olive oil, 18 fl. oz.; mix by a gentle heat, and add of prepared chalk, 6 oz.; lastly, add of dilute acetic acid, 6 fl. oz., and stir well until the mass has cooled. As a dressing in indolent ulcers, "but its utility is doubtful." (Dr. Garrod.)

Obs. It will be observed that the College has already modified the old formula of this ointment. The vinegar is now the last ingredient added to the mass. "Gradually add the chalk, separately mixed with the vinegar, the effervescence being finished, and stir," &c. (Ph. L. 1836.) See ACETATE OF LEAD, CARBONATE OF L., CHLORIDE OF L., IODIDE OF L.; EYE, GOULARD'S, LE MORT'S, and other OINTMENTS containing lead.

Ointment, Le Mort's. Carbonate of lead, corrosive sublimate, litharge, and Venice turpentine, of each, 1 oz.; alum, ½ oz.; lard, ½ lb.; vermilion, q. s. to colour.

Ointment of Lu'puline. *Syn.* UNGUENTUM LUPULINÆ, L. *Prep.* (Soubeiran.) Lupuline, 1 part; lard, 3 parts; digest by the heat of a water bath for 5 or 6 hours, and strain. As an anodyne dressing to cancerous ulcers, and as a friction to swollen and painful joints.

Ointment of Lycopo'dium. *Syn.* UNGUENTUM LYCOPODII, L. *Prep.* Lycopodium, 1 dr.; balsam of Peru, ½ dr.; simple ointment, 1 oz. In chaps and excoriations.

Ointment of Mace. *Syn.* UNGUENTUM MACIDIS, L. *Prep.* From mace (beaten to a paste) and palm oil, of each, 1 lb.; purified beef-marrow, 3 lbs.; gently melted together, and strained. Emollient and stimulant; chiefly used as a pommade for the hair. Sold for 'common oil of mace.'

Ointment of Marsh-mal'low. *Syn.* UNGUENTUM ALTHÆÆ, DIALTHÆÆ, L. *Prep.* 1. (Ph. L. 1746.) Oil of mucilages, 2 lbs.; bees' wax, ½ lb.; yellow resin, 3 oz.; melt them together, then add of Venice turpentine, ½ oz., and stir the mixture until it concretes.

2. (Wholesale.) From palm oil, ½ lb.; yellow resin, 1¼ lb.; bees' wax, 2¼ lbs.; pale linseed oil, 9 lbs. (say 1 gall.); melt together, and stir until it is nearly cold.

Uses, &c. Emollient and stimulant; seldom used in regular practice, but in great repute amongst the common people. Linseed oil is now almost universally substituted for the oil of mucilages.

Ointment of Master-wort. *Syn.* POMMADE ANTI-CANCÉREUSE DE MILIUS; UNGUENTUM IMPERITORIÆ, L. *Prep.* (Beasley.) Powdered master-wort (*Imperatoria Ostruthium*), 1½ oz.; tincture of master-wort, 1 oz.; lard, 2 oz.

Ointment, Mercu"rial. *Prep.* 1. (STRONG MERCURIAL OINTMENT, BLUE O., NEAPOLITAN O.; UNGUENTUM HYDRARGYRI—B. P., Ph. L. E. & D., U. H. FORTIUS, U. CÆRULEUM.) *Prep.* 1. (B. P.) Mercury, 16; prepared lard, 16; prepared suet, 1; rub together until metallic globules cease to be visible. (See also MERCURIAL OINTMENT (Compound).

2. (Ph. L. & E.) Mercury, 1 lb.; lard, 11½ oz.; suet, ½ oz.; rub the mercury with the suet and a little of the lard, until globules are no longer visible; then add the remaining lard, and triturate all together.

3. (Ph. D.) Pure mercury and lard, of each, 1 lb.; as before.

Pur., &c. The 'stronger mercurial ointment' of the shops is usually made with a less quantity of mercury than that ordered by the Colleges, and the colour is brought up with finely ground blue black or wood charcoal. This fraud may be detected by its infe-

rior sp. gr., and by a portion being left undissolved when a little of the ointment is treated, first with ether or oil of turpentine, to remove the fat, and then with dilute nitric acid, to remove the mercury. When made according to the instructions of the Ph., its sp. gr. is not less than 1·781 at 60° Fahr. It "is not well prepared so long as metallic globules may be seen in it with a magnifier of 4 powers." (Ph. E.) When rubbed on a piece of bright copper or gold, it should immediately give it a coating of metallic mercury, and a silvery appearance.

The *Ung. hyd. fort.* of the wholesale houses is generally made of mercury, 12 lbs., suet, 1½ lb., and lard, 16½ lbs. It thus contains only ⅛ instead of ⅓ its weight of mercury. That of the same houses labelled '*Ung. hyd. partes æquales,*' is prepared with mercury, 12 lbs.; suet, 1½ lb.; lard, 13½ lbs.

Uses. This ointment is chiefly used to introduce mercury into the system when the stomach is too irritable to bear it; in syphilis, hepatic affections, hydrocephalus, &c. For this purpose, ½ to 1 dr. is commonly rubbed into the inside of one of the thighs until every particle of the ointment disappears. This operation is repeated night and morning, until the desired effect is produced, and should be, if possible, performed by the patient himself. During its administration the patient should avoid exposure to cold, and the use of fermented or acidulous liquors, and his diet should consist chiefly of toast, broth, gruel, milk-and-water, and other inoffensive matters. This ointment has been employed to prevent the 'pitting' in smallpox; and, diluted with 3 or 4 times its weight of lard, in several skin diseases, as a dressing for ulcers, to destroy pediculi, &c. Camphor is often added to this ointment, to increase its activity. With the addition of a little extract of belladonna, or hydrochlorate of ammonia, it forms an excellent anodyne and resolvent friction in painful syphilitic tumours and glandular enlargements.

Obs. The preparation of mercurial ointment according to the common plan is a process of much labour and difficulty, and usually occupies several days. The instructions in the Pharmacopœias are very meagre and unsatisfactory, and, so far as details go, are seldom precisely carried out. Employers grumble, and operatives become impatient, when they find the most assiduous trituration apparently fails to hasten the extinction of the globules. To facilitate matters, various tricks are resorted to, and various contraband additions are often clandestinely made. Among the articles referred to, sulphur and turpentine are those which have been longest known, and, perhaps, most frequently employed for the purpose; but the first spoils the colour, and the other the consistence, of the ointment; whilst both impart to it more or less of their peculiar and respective odours. On the Continent, oil of eggs was formerly very generally used for the purpose, and is even now occasionally so employed. Nearly half a century ago Mr. W. Cooley clearly showed that the difficulty might be satisfactorily overcome by simply triturating the quicksilver with ⅛ to ¼ of its weight of old mercurial ointment, before adding the lard; and that the effective power of this substance was in direct proportion to its age, or the length of time it had been exposed to the air. His plan was to employ the 'bottom' and 'scrapings' of the store pots for the purpose. At a later period (1814-5), Mr. Higginbottom, of Northampton, repeated this recommendation, and at length the plan has been imported into the Pharmacopœia Borussica. About twenty years since, "we reopened an investigation of the subject, which extended over several months, during which we satisfied ourselves of the accuracy of the assertion of M. Roux, that the mercury in mercurial ointment exists entirely, or nearly so, in the metallic state, and not in the form of oxide, as was generally assumed. We succeeded in preparing an excellent sample of mercurial ointment by agitating washed suet and quicksilver together *in vacuo*. The quantity of oxide present at any time in this ointment is variable and accidental, and is largest in that which has been long prepared; but in no case is it sufficient to materially discolour the fat after the metallic mercury is separated from it. We were led to conclude that the property alluded to, possessed by old ointment, depends solely on the peculiar degree of consistence or viscidity of the fat present in it, and on the loss of much of the thoroughly greasy, 'anti-attritive' character, possessed by the latter in a recent state. In practically working out this idea, we obtained pure fats (MAGNETIC ADEPS; SEVUM PRÆPARATUM), which, without any addition, were capable of reducing, in a few minutes, 8, 16, 32, and even 48 times their weight of mercury. We also found that the formula of the Pharmacopœia might be adopted, and that a perfect ointment might be readily obtained by skilful management in from ½ an hour to an hour, even without these resources. All that was necessary was to employ a very gentle degree of heat, by either performing the operation in a warm apartment or by allowing the mortar to remain filled with warm water for a short time before using it. Suet or lard, reduced either by gentle warmth or by the addition of a little almond oil to the consistence of a thick cream, so that it will hang to the pestle without running from it, will readily extinguish 7 or 8 times its weight of running mercury by simple trituration. The exact temperature must, however, be hit upon, or the operation fails. This fact was afterwards noticed in the 'Ann. de Chim.,' and some other journals." (A. J. Cooley.)

M. Pomonti has proposed a method of preparing strong mercurial ointment, which, modified to suit the English operator, is as fol-

lows:—Fresh lard, 8 parts; solution of nitre (see *below*), 1 part; mix by trituration, add of mercury, 32 parts, and again triturate. The globules disappear after a few turns of the pestle, but reappear in a few minutes, and then again disappear to return no more. When this happens, the trituration is to be continued for a few minutes longer, when lard, 24 parts, is to be rubbed in, and the ointment at once put into pots. It is said that the globules are so completely extinguished as to escape detection, even when the ointment is examined by a microscope of low power. The SOLUTION.—Nitre, 100 grs.; water, 1 fl. oz.; dissolve. This quantity is sufficient for a kilogramme of mercury. See OINTMENT OF OXIDE OF MERCURY.

Ointment, Mercurial (Milder), MILDER BLUE OINTMENT, TROOPER'S O., UNCTION; UNGUENTUM HYDRARGYRI MITIUS, U. CÆRULEUM MITIUS. *Prep.* 1. Stronger mercurial ointment, 1lb.; lard, 2 lbs.

Uses, &c. In the itch and several other cutaneous diseases, as a dressing to syphilitic ulcers, to destroy pediculi on the body, &c. Each drachm contains 10 grs. of mercury. That of the shops generally contains considerably less.

2. (With SOAP; UNGUENTUM HYDRARGYRI SAPONACEUM; SAVON MERCURIEL).—*a.* (Draper.) Mercurial ointment (softened by a gentle heat), 1 oz.; hydrate of potassa, 1 dr., dissolved in water, ½ fl. oz.; triturate them together until the mass solidifies.

b. (Swediaur.) Milder mercurial ointment, 8 parts; soft soap, 2 parts; camphor, 1 part. In periostitis, engorgements of the testicles, soft corns, &c. See OINTMENT OF NITRATE OF MERCURY, &c.

Ointment, Mercurial (Compound), B. P. Mercurial ointment, 6; yellow wax, 3; olive oil, 3; camphor, 1½. Melt the wax and oil, and when the mixture is nearly cold, add the camphor in powder and the mercurial ointment, and mix.

Oint'ment of Meze'reon. *Syn.* UNGUENTUM MEZEREI, L. *Prep.* 1. (Hamb. Cod.) Alcoholic extract of mezereon, 2 drs.; dissolve in rectified spirit, q. s.; add it to white wax, 1 oz., lard, 8 oz., and mix by a gentle heat.

2. (P. Cod.) Mezereon (dried root-bark), 4 oz.; moisten it with rectified spirit, bruise it well, and digest it for 12 hours, at the heat of boiling water, in lard, 14½ oz.; then strain with pressure, and allow it to cool slowly; lastly, separate it from the dregs, remelt it, and add of white wax, 1½ oz. *Used* as a stimulating application to blistered surfaces and indolent ulcers.

Ointment of Mustard. *Syn.* UNGUENTUM SINAPIS, L. *Prep.* 1. Flour of mustard, ¾ oz.; water, 1 fl. oz.; mix, and add, of resin cerate, 2 oz.; oil of turpentine, ½ oz. Rubefacient and stimulant. As a friction in rheumatism, &c.

2. (Frank.) Flour of mustard, 3 oz.; oil of almonds, ½ fl. oz.; lemon juice, q. s. In sunburn, freckles, &c.

Ointment of Naph'thalin. *Syn.* UNGUENTUM NAPHTHALINÆ, L. *Prep.* (Emery.) Naphthalin, ½ dr.; lard, 7½ drs. In dry tetters, lepra, psoriasis, &c.

Ointment, Neapolitan. See MERCURIAL OINTMENT.

Ointment, Nervine. *Syn.* BALSAMUM NERVINUM, UNGUENTUM N., L.; BAUME NERVAL, Fr. *Prep.* (P. Cod.) Expressed oil of mace and ox-marrow, of each, 4 oz.; melt by a gentle heat, and add, of oil of rosemary, 2 drs.; oil of cloves, 1 dr.; camphor, 1 dr.; balsam of tolu, 2 drs.; (the last two dissolved in) rectified spirit, 4 drs. In rheumatism, &c. A somewhat similar preparation was included in the Ph. E. 1744.

Ointment, Neu'tral. See COMPOUND LEAD OINTMENT.

Ointment of Ni'trate of Mercury. *Syn.* CITRINE OINTMENT, YELLOW O., MERCURIAL BALSAM; UNGUENTUM HYDRARGYRI NITRATIS (B. P., Ph. L. & D.), U. H. N., or U. CITRINUM (Ph. E.), L. *Prep.* 1. (Ph. L.) Mercury, 2 oz.; nitric acid (sp. gr. 1·42), 4 fl. oz.; dissolve, and mix the solution, whilst still hot, with lard, 1 lb., and olive oil, 8 fl. oz., melted together. (For the MILDER OINTMENT, see *below*.)

2. (Ph. E.) Mercury, 4 oz.; nitric acid (sp. gr. 1·500), 8 fl. oz. 6 fl. drs.; dissolve by a gentle heat, add the liquid to lard, 15 oz.; olive oil, 32 fl. oz.; melted together, and whilst the whole are still hot, and mix them thoroughly. "If the mixture does not froth up, increase the heat a little until this takes place. Keep the ointment in earthenware vessels, or glass vessels, secluded from the air." This admirable formula is a modification of that originally introduced into pharmacy by the late Dr. Duncan, of Edinburgh. (For the milder ointment, see *below*.)

3. (Ph. D.) Mercury, 1 oz.; nitric acid (1·500), 1 fl. oz.; (diluted with) water, ½ fl. oz.; dissolve by a gentle heat, and add the liquid to lard, 4 oz.; olive oil, 8 fl. oz.; melted together, and still hot; next "let the temperature of the mixture be raised so as to cause effervescence, and then, withdrawing the heat, stir the mixture with a porcelain spoon until it concretes on cooling."

4. (P. Cod.) Mercury, 3 parts; nitric acid (1·321), 6 parts; lard and oil, of each, 24 parts; as above.

5. (Ph. U. S.) Mercury, 1 oz.; nitric acid (1·42), 14 fl. oz.; lard, 3 oz.; fresh neat's-foot oil, 9 fl. oz.; mix the mercurial solution with the melted fat and oil at 200° Fahr.

6. (B. P.) Mercury, 4; nitric acid, 12; prepared lard, 15; olive oil, 32; dissolve the mercury in the nitric acid with the aid of a gentle heat; melt the lard in the oil by a steam or water bath in a porcelain vessel capable of holding six times the quantity, and while the mixture is hot add the solution of mercury, also hot, and mix them together thoroughly. If the mixture does not froth up, increase the

heat till this occurs. (The heat required for this is from 170° to 180° Fahr.

Uses, &c. Detergent and stimulant. In ring-worm, herpes, itch, porrigo, psoriasis, and some other chronic skin diseases; in various chronic affections of the eyes, especially chronic inflammation and ulceration of the eyelids, 'blear eye,' &c. It "may almost be regarded as specific in psorophthalmia, in the purulent ophthalmia of infants producing ectropium (eversion of the eyelids), and in ulcerations of the tarsi (edges of the eyelids)." (A. T. Thomson.) As a dressing to old ulcers, more especially those of a syphilitic character, it is superior to all the other ointments containing mercury; in sore legs, assisted by the internal use of the pill of soap with opium (PIL SAPONIS CUM OPIO), it often acts like a charm when all other modes of treatment have failed. For most of these purposes it should be diluted with from twice to seven times its weight of some simple fatty matter. One of the principal reasons why this ointment is in less general use than its merits deserve, is the very inferior quality of that vended in the shops under the name, arising from almost every druggist preparing some mess of his own, instead of adhering to the College formulæ.

Obs. Ointment of nitrate of mercury, faithfully prepared according to the instructions in the Pharmacopœia, possesses a rich golden-yellow colour, and a buttery consistence, and keeps well. Unfortunately, clumsy and careless operators, who regard the Pharmacopœia as a foolish book, which it is quite unnecessary to look into, often fail in their attempts to produce an article of good quality. The difficulty is immediately surmounted by employing pure ingredients, in the proportions ordered, and mixing them at the proper temperature. The acid should be of the full strength, or, if somewhat weaker than that directed, an equivalent quantity should be employed. A slight excess of acid is not injurious, rather the contrary; but a deficiency of acid, in all cases, more or less damages the quality of the product. If, on stirring the mercurial solution with the melted lard and oil, the mixture does not froth up, the heat should be increased a little, as, unless a violent frothing and reaction take place, the ointment will not turn out of good quality, and will rapidly harden and lose its colour. The most favourable temperature for the union of the ingredients is from 185° to 200° Fahr., and in no case should it exceed 212°; whilst below 180° Fahr., the reactions are feeble and imperfect.

Stoneware or glass vessels must alone be employed in the preparation of this ointment, and the stirrers or spatulas should be either of glass or white deal. The best plan is to keep the whole exclusively for the purpose, and when out of use to preserve them from dust and dirt. (See *below*.)

Ointment of Ni'trate of Mercury (Milder). *Syn.* MILDER CITRINE OINTMENT; UNGUENTUM HYDRARGYRI NITRATIS MITIUS (Ph. L.), U. H. N. M., or U. CITRINUM M. (Ph. E.) L. *Prep.* 1. (Ph. L.) Ointment of nitrate or mercury, 1 oz.; lard, 7 oz.; rub them together. "This ointment is to be used recently prepared."

2. (Ph. E.) As the stronger ointment, Ph. E., but using a triple proportion of oil and lard.

Uses, &c. See the STRONGER OINTMENT (*above*).

Ointment of Ni'trate of Sil'ver. *Syn.* UNGUENTUM ARGENTI NITRATIS, L. *Prep.* 1. (M. Jobert.) Nitrate of silver, 2, 4, or 6 parts; lard, 20 parts. These ointments are respectively numbered 1, 2, and 3, and are *used* in white-swelling.

2. (Macdonald.) Nitrate of silver, 1 part; lard, 7 to 8 parts. To smear bougies, in gonorrhœa, &c.

3. (Mackenzie.) Nitrate of silver, 5 grs.; lard, 1 oz. In purulent and chronic ophthalmia, ulcers on the cornea, &c.

4. (Velpeau.) Nitrate of silver, 1 gr.; lard, 1 dr. In acute ophthalmia, &c. The above compounds require to be used with caution.

Ointment of Ni'tric Acid. *Syn.* OXYGENIZED FAT†; UNGUENTUM OXYGENATUM, U. A. NITRICI, L.; POMMADE D'ALYON, Fr. *Prep.* (Ph. D. 1826.) Olive oil, 1 lb.; lard, 4 oz.; melt them together, add, gradually, of nitric acid (sp. gr. 1·500), 5½ fl. drs., and stir the mixture constantly with a glass rod until it concretes.

Uses, &c. In itch, porrigo, and some other chronic skin diseases; and as a dressing for syphilitic and herpetic ulcers, old sores, &c. It is frequently employed as a substitute for the ointment of nitrate of mercury, which it somewhat resembles in appearance; but it is less active and useful.

Ointment of Ni'tric Ox'ide of Mer'cury. *Syn.* OINTMENT OF RED OXIDE OF MERCURY (B.P.), RED PRECIPITATE OINTMENT; UNGUENTUM HYDRARGYRI NITRICO-OXYDI (Ph. L.), U. H. OXYDI (Ph. E.), U. H. O. RUBRI (B. P., Ph. D.), L. *Prep.* 1 (Ph. L.) White wax, 2 oz., lard, 6 oz.; mix, by heat, add of nitric oxide of mercury, in very fine powder, 1 oz., and rub them together.

2. (Ph. E.) Nitric oxide of mercury, 1 oz.; lard, 8 oz.; mix by trituration.

3. (Ph. D.) Red oxide of mercury (nitric oxide), 1 dr.; ointment of white wax, 7 drs.; as the last.

4. (B. P.) Red oxide of mercury, in very fine powder, 62 grs.; yellow wax, ¼ oz.; oil of almonds, ¾ oz.; melt the wax, add the oil, and mix.

Uses, &c. An excellent stimulant application to indolent and foul sores, ulcers, &c.; and, when diluted, as an eye ointment in chronic inflammation and ulceration of the eyes and eyelids, and especially in psorophthalmia; also in specks on the cornea, and the other affections noticed under OINTMENT OF NITRATE OF MERCURY. It forms the basis of

numerous quack medicines. See also OINTMENT OF OXIDE OF MERCURY (*below*).

Obstet'ric Ointment. *Syn.* UNGUENTUM OBSTETRICUM, L.; POMMADE OBSTETRICALE, Fr. *Prep.* 1. (Chaussier.) Extract of belladonna, 1 dr.; water, 2 drs.; lard, 1 oz. To promote the dilation of the os uteri.

2. (POMMADE POUR LE TOUCHER.) From yellow wax and spermaceti, of each, 1 oz.; olive oil, 16 oz.; melt them together, strain, add of solution of caustic soda, 1 fl. oz., and stir until the whole is nearly cold.

Ointment of O'pium. *Syn.* UNGUENTUM OPIATUM, U. OPII (Ph. L.), L. *Prep.* 1. (Ph. L.) Powdered opium, 20 grs.; lard, 1 oz.; mix by trituration. As a simple anodyne friction or dressing.

2. (Augustin.) Opium, 2 drs.; ox-gall, 2 oz.; digest 2 days, strain, and add, of melted lard, 2 oz.; oil of bergamot, 10 drops.

3. (Brera.) Opium, 1 dr.; gastric juice of a calf, ½ oz.; digest 24 hours, and add of melted lard, 1 oz.

Ointment of Oxide of Lead. See LEAD OINTMENT.

Ointment of Oxide of Man"ganese. *Syn.* UNGUENTUM MANGANESII OXYDI, U. M. BINOXYDI, L. *Prep.* 1. Black oxide of manganese (levigated), 1 dr.; lard, 1 oz.; mix by patient trituration. As a friction in scrofulous swellings and indurations; and in itch, scald-head, chilblains, &c.

2. (W. Cooley.) Binoxide of manganese, 1 dr.; sulphur, 2 drs.; lard, 9 drs.; cajeput oil, 15 drops. As the last; also as a friction in rheumatism, swelled joints, &c., and in porrigo, and some other skin diseases.

Ointment of Oxide of Mer'cury. Under this name the two ointments noticed below are often confounded, owing to the different opinions held respecting the atomic weight of mercury:—

1. Ointment of Gray Oxide of Mer'cury. *Syn.* OINTMENT OF SUBOXIDE OF MERCURY, O. OF PROTOXIDE OF M.†; UNGUENTUM HYDRARGYRI OXYDI, U. H. SUBOXYDI, U. H. O. CINEREI, L. *Prep.* 1. (Ph. E. 1817.) Gray oxide of mercury, 1 oz.; lard, 3 oz.; triturate together. Formerly proposed as a substitute for mercurial ointment, but in practice it has been found useless as a friction, owing to the unctuous matter only being absorbed, whilst the oxide is left on the surface. This objection does not apply to the following preparations:—

2. (Donovan.) Gray oxide of mercury, 20 grs.; lard, 1 oz.; mix, and expose them to the temperature of 320° Fahr. for 2 hours, constantly stirring. Gray coloured. It may also be made from the nitric- or red-oxide in the same way, by keeping the ointment heated to about 300° for some hours. Cleaner and stronger than Ung. hyd. fort.—Ph. L.

3. (Tyson.) Black oxide of mercury (prepared by decomposing precipitated calomel with liquors of potassa and ammonia), 2 oz.; lard, 1 lb.; triturate together. Inferior in activity to the last. It closely resembles in appearance a fine sample of mercurial ointment.

2. Ointment of Red Oxide of Mercury. *Syn.* UNGUENTUM HYDRARGYRI BINOXIDI†, U. H. OXYDI RUBRI, L. *Prep.* (Cazenave.) Red oxide of mercury, 30 grs.; camphor, 5 grs.; lard, 1 oz. Closely resembles ointment of nitric oxide of mercury, over which it, perhaps, possesses some advantage from the oxide being in a more minutely divided state.

Ointment of Oxide of Sil'ver. UNGUENTUM ARGENTI OXYDI, L. *Prep.* (Serre.) Oxide of silver, 16 to 20 grs.; lard, 1 oz. As a dressing for scrofulous and syphilitic sores, &c.

Ointment of Oxide of Zinc. *Syn.* ZINC OINTMENT; NIHIL ALBUM OINTMENT†; UNGUENTUM ZINCI (B. P., Ph. L. E. & D.), U. OXYDI ZINCI, L. *Prep.* 1. (Ph. L.) Oxide of zinc, 1 oz.; lard, 6 oz.; mix them together.

2. (Ph. E.) Oxide of zinc, 1 oz.; simple liniment (Ph. E.), 6 oz.

3. (Ph. D.) Ointment of white wax, 12 oz.; melt it by a gentle heat, add of oxide of zinc, 2 oz.; and stir constantly until the mixture concretes.

4. (B. P.) Oxide of zinc, in very fine powder, 1; benzoated lard, 5½; mix.

Uses, &c. Astringent, desiccative, and stimulant; in excoriations, burns, various skin diseases attended by profuse discharges, in chronic inflammation of the eyes depending on relaxation of the vessels, in sore nipples, indolent sores, ring-worm of the scalp, &c. It is an excellent and very useful preparation. See TUTTY OINTMENT (*below*).

Ointment of Pep'per. *Syn.* UNGUENTUM PIPERIS NIGRI, L. *Prep.* 1. Black pepper (bruised), 1 oz.; lard, 2 oz.; suet, 1 oz.; digest together in a covered vessel, by the heat of a water bath, for six hours, then strain, with pressure, add of expressed oil of mace, 2 drs., and stir until the mixture concretes. In piles, itch, as a friction in rheumatism, &c.

2. (Ph. D. 1826.) Black pepper (in fine powder), 4 oz.; lard, 1 lb.; mix. In scald-head, &c.

Ointment of Phosphor'ic Acid. *Syn.* UNGUENTUM ACIDI PHOSPHORICI, L. *Prep.* (Soubeiran.) Phosphoric acid, 1 dr.; lard (softened by heat), 1 oz.; triturate carefully together. As a friction in caries, osseous tumours, &c.

Ointment of Phos'phorus. *Syn.* UNGUENTUM PHOSPHORI, U. PHOSPHORATUM, L. *Prep.* (P. Cod.) Phosphorus, 1 dr.; lard, 6 oz. 3 drs.; melt together (in a wide-mouthed bottle) by the heat of a water bath, remove the vessel from the heat, and shake it briskly until the ointment concretes. As a friction in gout, chronic rheumatism, and several skin diseases.

Ointment of Picrotox'in. *Syn.* UNGUENTUM PICROTOXINÆ, L. *Prep.* (Jäjer.) Picrotoxin, 10 grs.; lard, 1 oz. In ring-worm of

the scalp, and to destroy pediculi. It should be used with care.

Ointment for Piles. *Syn.* UNGUENTUM HÆMORRHOIDALE, U. ANTI-HÆMORRHOIDALE, L. *Prep.* 1. Burnt alum and oxide of zinc, of each, ½ dr.; lard, 7 drs.

2. (Bories.) Acetate of lead, 15 grs.; freshly burnt cork, ½ oz.; washed fresh butter, 2 oz.; triturate well together.

3. (W. Cooley.) Morphia, 8 grs.; melted spermaceti ointment, 1 oz.; triturate together until solution is complete, then add, of galls (in impalpable powder), 1½ dr., essential oil of almonds (genuine crude), 12 to 15 drops, and stir until the mass concretes. In painful piles, prolapsus, &c. It is not only very effective, but does not soil the linen so much as most other ointments.

4. (Dr. Gedding.) Carbonate of lead, 4 drs.; sulphate of morphia, 15 grs.; stramonium ointment, 1 oz.; olive oil, q. s. When there is much pain and inflammation.

5. (Sir H. Halford.) Ointment of nitrate of mercury and oil of almonds, equal parts, triturated together.

6. (Mazzini.) Nitrate of morphia, 15 grs.; citrine ointment, 1 dr.; fresh butter, 1 oz. As the last.

7. (Vallez.) Extract of elder leaves, ½ dr.; burnt alum, 16 grs.; poplar ointment, 1 oz. For other formulæ, see the respective names of their leading ingredients.

8. (Ware.) Camphor, 1 dr.; simple ointment, 1 oz.; dissolve by heat, add of powdered galls, 2 drs.; mix well, further add of tincture of opium, 2 fl. drs., and stir until the whole is cold. In flabby mucous and painful piles.

9. (Zanin.) Spermaceti ointment, 1 oz.; powdered galls, 1 dr.; powdered opium, 18 grs.; solution of diacetate of lead, 1 fl. dr. When there is both pain and inflammation.

Ointment of Pitch. *Syn.* BLACK BASILICON, OINTMENT OF BLACK PITCH; UNG. PICIS (B.P., Ph. L.), U. PICIS NIGRÆ, L. *Prep.* 1. (Ph. L.) Black pitch, resin, and bees' wax, of each, 11 oz.; olive oil, 1 pint; melt together, strain through a linen cloth (and stir until the mass concretes).

2. (B. P.) Tar, 5; yellow wax, 2; melt together, and stir till cold.

Uses, &c. Stimulant and detergent; very useful in indolent ulcerations, scald-head, and various foul eruptions. In itch and psoriasis, and other scaly skin diseases, a little sulphur is commonly added to it.

Oil of Plat'inum. *Syn.* UNGUENTUM PLATINI, L. *Prep.* (Hœfer.) Bichloride of platinum, 15 grs.; extract of belladonna, ½ dr.; lard, 1 oz. As a dressing for painful indolent ulcers.

Ointment of Plumbago. *Syn.* OINTMENT OF GRAPHITE; UNGUENTUM GRAPHITIS, U. PLUMBAGINIS, L. *Prep.* From pure plumbago ('black-lead'), 1½ dr.; lard, 1 oz. As a dressing to ulcers, and in certain skin diseases.

Plunket's Ointment. *Prep.* (Original formula.) Crowsfoot, 1 handful; dog's fennel, 3 sprigs; pound well, add of flowers of sulphur and white arsenic, of each, 3 thimblefuls; beat them well together, form the mass into boluses, and dry them in the sun. For use, powder them; and mix the powder with yolk of egg, spread a little on a small piece of pig's bladder (size of half a crown), and apply it to the sore, where it must remain until it falls off by itself. Poisonous; in cancer; with great caution.

Poma'tum Ointment. See LARD OINTMENT.

Ointment of Pop'lar Buds. *Syn.* UNGUENTUM POPULEUM, L. *Prep.* 1. Fresh poplar buds (bruised), 1 part; lard, 4 parts; boil until crisp, and strain. It never gets rancid. Emollient and stimulant.

2. (Compound—P. Cod.) Poplar buds, 12 oz.; fresh leaves of belladonna, common nightshade (*Solanum nigrum*), henbane, and poppies, of each, 8 oz.; lard, 4½ lbs.; as the last. Emollient, stimulant, and anodyne.

Ointment of Potas'sio-tar'trate of An'timony. *Syn.* ANTIMONIAL OINTMENT, TARTAR EMETIC O.; UNGUENTUM ANTIMONII TARTARATI (B.P.), UNGUENTUM ANTIMONII POTASSIO-TARTARIS (Ph. L.), U. A. TARTARIZATI (Ph. D.), U. ANTIMONIALE (Ph. E.), U. TARTARI EMETICI, L. *Prep.* 1. (Ph. L. & E.) Potassic-tartrate of antimony, rubbed to a very fine powder, 1 oz.; lard, 4 oz.; mix by trituration.

2. (Ph. D.) Tartar emetic, in very fine powder, 1 dr.; ointment of white wax, 7 drs.

3. (B. P.) Tartrated antimony (in fine powder), 1; simple ointment, 4; mix.

Uses, &c. Counter-irritant; in phthisis, chronic rheumatism, certain liver affections, and other deep-seated pains and diseases. A portion, about the size of a nut, is rubbed on the skin night and morning, until a crop of pustules is produced. The part should be well rubbed with a coarse towel, so as to be reddened, before applying the ointment. The product of the Dublin formula is of only half the strength of those of the other Colleges.

Obs. Before adding the tartar emetic to the lard it should be reduced to the state of an impalpable powder. The precipitated salt is the best for this purpose. As the pustules formed by this ointment permanently mark the skin, it should only be applied to those parts of the person which are covered by the dress.

Pur'gative Ointment. See OINTMENT OF COLOCYNTH, WORM O., &c.

Ointment of Quinine'. *Syn.* UNGUENTUM QUINIÆ, U. QUINIÆ SULPHATIS, L. *Prep.* 1. Sulphate of quinine, 1 dr.; lard, 3 drs. In the agues of children.

2. (Beasley *ex* Antonini.) Sulphate of quinine, 1 dr.; alcohol (rectified spirit), 2 drs.; sulphuric acid, 10 drops; dissolve, and mix it with lard, ½ oz. In malignant intermittents; 2 to 4 drs. at a time, rubbed into the groin or axilla.

Ointment of Red Sul'phuret of Mer'cury.

Syn. UNGUENTUM HYDRARGYRI BISULPHURETI, U. H. SULPHURETI RUBRI, L. *Prep.* 1. (Alibert.) Red sulphuret of mercury, 1 dr.; camphor, 20 grs.; simple ointment, 1 oz. In herpes, applied twice a day.

2. (Collier.) Bisulphuret of mercury, 1½ dr.; sal ammoniac, ½ dr.; lard, 1 oz.; rose water, 1 fl. dr. In several skin diseases, to diminish the itching, destroy pediculi, &c.

3. (Radius.) As the last, with 1 oz. more lard.

Ointment of Res'in. *Syn.* YELLOW BASILICON; UNGUENTUM RESINÆ (Ph. D.), U. RESINOSUM (Ph. E.), L. *Prep.* 1. (Ph. D.) Yellow wax, ¼ lb.; yellow resin, in coarse powder, ½ lb.; prepared lard, 1 lb.; melt them together by a gentle heat, strain the mixture, whilst hot, through flannel, and stir it constantly until it concretes.

2. (Ph. E.) Bees' wax, 2 oz.; resin, 5 oz.; lard, 8 oz.

Obs. A useful stimulant dressing to foul and indolent ulcers. For the corresponding preparation of the Ph. L., see RESIN CERATE (page 314).

Ointment, Resol'vent. See DISCUTIENT OINTMENT.

Ointment, Ring'-worm. UNGUENTUM CONTRA-TINEAM, L. *Prep.* 1. Carbonate of soda, 1 part; fresh-slaked lime, 4 parts; lard, 120 parts.

2. Ointment of nitrate of mercury, 1 dr.; tar ointment and lard, of each, ½ oz.

3. (Henke.) Hydrochloric acid, 1 fl. dr.; juniper-tar ointment, ½ oz.; marsh-mallow do., 1 oz.

4. (Pereira.) Tar, 3 drs.; lard, 1½ oz.; melt them together, and stir in of acetic acid (Ph. L.), 2 fl. drs.

5. (Thompson.) Carbonate of soda and sulphuret of potassium, of each, 1 dr.; creasote, ½ dr.; lard, 1½ oz.

Obs. The hair must be cut off close, and the part washed clean before each application. For other forms, see *above*.

Ointment of Rose. *Syn.* ROSE POMMADE, ROSE LIP-SALVE; UNGUENTUM ROSÆ, U. ROSATUM, L. *Prep.* 1. (P. Cod.) Washed lard (melted), and roses (centif.), of each, 2 lbs.; mix, and in 2 days remelt the mass, and press out the fat; to this last add of fresh roses, 2 lbs.; and repeat the process; lastly, colour it with alkanet root, if required red.

2. (UNG. AQUÆ ROSÆ—Ph. U. S.) This is spermaceti ointment melted and beaten up with about ⅔rds of its weight of rose water until they congeal. Both the above are simple emollients. The last is an officinal 'cold cream.'

Ointment, Rust's. *Prep.* Calcined alum, 1½ dr.; camphor, ½ dr.; powdered opium, 20 grs.; balsam of Peru, 1 dr.; lead ointment, 5 drs.; triturate together. In chilblains, frostbites, frosted limbs, &c.

Ointment of Sabadil'line. *Syn.* UNGUENTUM SABADILLINÆ, L. *Prep.* (Dr. Turnbull.) Sabadilline, 15 to 20 grs.; lard, 1 oz. Intended as a substitute for ointment of veratrine.

Ointment of Sav'ine. *Syn.* UNGUENTUM SABINÆ (Ph. L. & D.), CERATUM SABINÆ, L. *Prep.* 1. (Ph. L.) White wax, 3 oz.; lard, 1 lb.; melt them together, mix in of fresh savine (bruised), ½ lb., and press through a linen cloth.

2. (Ph. D.) Savine tops, dried and in fine powder, 1 dr.; ointment of white wax, 7 drs.; mix by trituration. For the formula of the Ph. E., the uses, &c., see CERATE.

Ointment of Scrophula''ria. *Syn.* UNGUENTUM SCROPHULARIÆ, L. *Prep.* (Ph. D. 1826.) Green leaves of knotted rooted figwort and lard, of each, 2 lbs.; prepared suet, 1 lb.; boil till crisp, and strain with pressure. In ring-worm, 'burnt holes' (*pemphigus gangrenosus* of children), impetigo, and some other cutaneous diseases; also as an application to piles, painful swellings, &c. In the second it is said to be almost specific.

Ointment, Simple. *Syn.* OINTMENT OF WHITE WAX, SIMPLE DRESSING; UNGUENTUM SIMPLEX (B. P., Ph. E.), U. CERÆ ALBÆ (Ph. D.), L. *Prep.* 1. (Ph. E.) Olive oil, 5½ fl. oz.; white wax, 2 oz.; melted together, and stirred whilst cooling.

2. (Ph. D.) Prepared lard, 4 lbs.; white wax, 1 lb.; as the last.

3. (B. P.) White wax, 2; prepared lard, 3; almond oil, 8; melt together, and stir till it becomes solid.

Obs. The above are mild emollients, useful in healthy ulcers, excoriations, &c.; but chiefly as forming the basis for other ointments. The corresponding preparation of the Ph. L. is spermaceti ointment. See *below*, also LARD OINTMENT, &c.

Ointment, Singleton's. See EYE OINTMENTS.

Ointment, Small-pox. *Syn.* UNGUENTUM ECTROTICUM, L. *Prep.* 1. Mercurial ointment, 1½ oz.; bees' wax and black pitch, of each, ½ oz.; expressed oil of mace, 2 drs.; mixed together by a very gentle heat.

2. (Briquet.) Mercurial ointment, 4 parts; powdered starch, 1 part.

3. (Tourriere.) Iodide of potassium (dry and in fine powder), 1 part; expressed oil of mace, 2 parts; black resin, 4 parts; mercurial ointment, 8 parts. *Used* to prevent the 'pitting' of the pustules. See SMALLPOX.

Ointment, Smellome's. See EYE OINTMENTS.

Ointment of Soap. 1. See CERATE.

2. (Camphorated; UNGUENTUM SAPONIS CAMPHORATUM—Hamb. Cod.) White soap (scraped), 1 lb.; water, ½ lb.; dissolve by heat; add of olive oil, 5 oz.; and when the mixture has partly cooled, further add of camphor, 1 oz., previously dissolved by heat in olive oil, 1 oz.; lastly, stir until the mass concretes. As an anodyne and stimulating friction in various local affections, as chaps, chilblains, rheumatism, &c.

Ointment of So'dio-Chlo''ride of Gold. *Syn.* UNGUENTUM AURI SODIO-CHLORIDI, L.; POM-

MADE DE MURIATE D'OR ET DE SOUDE, Fr. *Prep.* (Magendie.) Sodio-chloride of gold, 10 grs.; lard, 4 drs. In scrofulous and syphilitic swellings, indurations, ulcers, &c.

Ointment of Spermace'ti. *Syn.* EMOLLIENT DRESSING, SIMPLE OINTMENT, WHITE O.; UNGUENTUM CETACEI (B. P., Ph. L. & D.), U. SPERMATIS CETI, L. *Prep.* 1. (Ph. L.) Spermaceti, 5 oz.; white wax, 14 drs.; olive oil, 1 pint, or q. s.; melt them together by a gentle heat, and stir the mixture until cold.

2. (Ph. D.) White wax, ½ lb.; spermaceti, 1 lb.; prepared lard, 3 lbs.; as the last.

3. (B. P.) Spermaceti, 5; white wax, 2; almond oil, 20, or a sufficiency; stir constantly till it cools.

Uses, &c. As an emollient and healing application or dressing to abrasions, excoriations, blistered surfaces, healthy ulcers, chilblains, chaps, &c. In trade, the Dublin formula, with double the amount of lard, is commonly employed. See LARD OINTMENT, SIMPLE O., &c.

Ointment of Squills. *Syn.* UNGUENTUM SCILLÆ, L. *Prep.* 1. (Brera). Squills (in very fine powder), 1 dr.; mercurial ointment, 2 drs.

2. (Hufeland.) Squills, 1 oz.; liquor of potassia, 2 fl. oz.; reduce to a mucilage by boiling, then add of lard, 2 oz. or q. s. As a resolvent friction to indolent tumours and indurations.

Ointment of Stavesa'cre. *Syn.* UNGUENTUM STAPHISAGRIÆ, L. *Prep.* (Swediaur.) Powdered stavesacre, 1 oz.; lard, 3 oz.; melt together, digest 3 or 4 hours, and strain. A very cleanly remedy for itch, and to destroy pediculi on the person. A similar ointment is much used by farriers.

Ointment of Stramo"nium. *Syn.* UNGUENTUM STRAMONII, L. *Prep.* 1. Fresh thorn-apple leaves, 1 part; lard, 4 parts; as ointment of hemlock.

2. (Pereira.) Powdered leaves, 1 oz.; lard, 4 oz.; mix by trituration.

3. (Ph. U. S.) Extract of stramonium, 1 dr.; lard, 1 oz.; as the last.

Uses, &c. To dress irritable ulcers, and as an application to painful piles.

Ointment of Strych'nine. *Syn.* UNGUENTUM STRYCHNIÆ, L. *Prep.* 1. (Bouchardat.) Strychnine, 16 grs.; lard, 1 oz.; carefully triturated together.

2. (Wendt.) Nitrate of strychnine, 6 grs.; lard, 1 oz.; as last. Both are used as a friction in paralysed parts, &c. From the extremely poisonous character of strychnine, it should be used with caution.

Ointment of Subac'etate of Cop'per. See VERDIGRIS OINTMENT.

Ointment of Subacetate of Lead (Compound). *Syn.* UNGUENTUM PLUMBI SUBACETATIS COMPOSITUM (B. P.). *Prep.* Solution of subacetate of lead, 6; camphor, ½; white wax, 8; almond oil, 20; melt the wax with 16 of the oil on a steam- or water-bath; remove the vessel, and as soon as the mixture begins to thicken, gradually add the solution of subacetate of lead, and stir the mixture constantly until it cools; then add the camphor, dissolve in the rest of the oil, and mix thoroughly.

Ointment of Subchloride of Mercury. See OINTMENT OF CALOMEL.

Ointment of Subsul'phate of Mercury†. *Syn.* UNGUENTUM HYDRARGYRI SUBSULPHATUS, L. *Prep.* 1. (Albert.) Turpeth mineral, ½ dr.; lard, 1 oz.

2. (Biett.) Turpeth mineral, 1 dr.; sulphur, 2 drs.; lard, 2 oz.; oil of lemons, 15 drops. In herpes, porrigo, and the scaly skin diseases.

Ointment of Sul'phate of I'ron. *Syn.* UNGUENTUM FERRI SULPHATIS, L. *Prep.* (Velpeau.) Sulphate of iron, 1½ dr.; simple ointment, 1 oz. In erysipelas.

Ointment of Sul'phate of Man"ganese. *Syn.* UNGUENTUM MANGANESI SULPHATIS, L. *Prep.* From sulphate of manganese, 1 dr.; lard or simple ointment, 1 oz. Alterative and discutient; in similar cases to those in which MERCURIAL OINTMENT is employed.

Ointment of Sulphate of Zinc. *Syn.* UNGUENTUM ZINCI SULPHATIS, L. *Prep.* (Scarpa.) Sulphate of zinc (in very fine powder), 1 dr.; lard, 1 oz. In some chronic skin diseases attended with a lax state of the tissues, and as a dressing to scrofulous tumours after they have separated and the abscess has been discharged.

Ointment of Sul'phur. *Syn.* UNGUENTUM SULPHURIS (B. P., Ph. L. E. & D.). *Prep.* 1. (Ph. L.) Sulphur, ½ lb.; lard, 1 lb. In the Ph. L. 1836 oil of bergamot, 40 drops, were added. (See 4, Compound.)

2. (Ph. E.) Sulphur, 1 oz.; lard, 4 oz.

3. (Ph. D.) Sulphur, 1 lb.; lard, 4 lbs.

4. (B. P.) Sublimed sulphur, 1; benzoated lard, 4; mix.

Uses, &c. In itch, scald-head, &c., in the first of which it is specific. It should be well rubbed in every night until the disease is cured; "but not more than one fourth part of the body should be covered with it at a time." (A. T. Thomson.)

5. (Compound; ITCH OINTMENT; UNGUENTUM SULPHURIS COMPOSITUM—Ph. L.)—*a.* (Ph. L.) Nitrate of potassa (powdered), 40 grs.; white hellebore (powdered), 10 drs.; sulphur and soft soap, of each, 4 oz.; lard, 1 lb.; rub them together.

b. (P. Cod.) Alum and sal ammoniac, of each, ½ oz.; sulphur, 8 oz.; lard, 16 oz.

Uses, &c. In itch, as the simple ointment (1, 2, and 3). They are more efficacious, but, owing to the presence of white hellebore, the Ph. L. preparation is apt to cause irritation in persons with delicate skins. See ITCH OINTMENT.

Ointment of Sul'phuret of Mercury. See OINTMENT OF RED SULPHURET OF MERCURY.

Ointment of Sulphurated Potash. *Syn.* UNGUENTUM POTASSÆ SULPHURATÆ (B. P.). Sul-

phurated potash, 30 grs.; triturate, and add prepared lard, 1 oz.; mix. See also next preparation.

Ointment of Sulphuret of Potas'sium. *Syn.* UNGUENTUM POTASSII SULPHURETI, L. *Prep.* 1. Sulphuret of potassium (dry and in fine powder), 1 dr.; lard, 9 drs. Alibert adds 1 dr. of carbonate of soda.

2. Sulphuret of potassium, 2½ drs.; lard and soft soap, of each, 1 oz.; olive oil, ½ oz. In several chronic skin diseases, as itch, psoriasis, ring-worm, lepra, eczema, &c.

Ointment of Sulphuret of So'dium. *Syn.* UNGUENTUM SODII SULPHURETI, L. *Prep.* (Swediaur.) Sulphuret of sodium, 3 drs.; lard, 1½ oz. In itch, for which it is very cleanly and effective. The last two ointments are most powerful when recently prepared.

Ointment of Sulphuric Ac'id. *Syn.* UNGUENTUM ACIDI SULPHURICI, L. *Prep.* 1. (Dr. Duncan.) Sulphuric acid, 1 dr.; lard, 2 oz.

2. (Ph. D. 1826.) Sulphuric acid, 1 dr.; lard, 1 oz.; mix.

Uses, &c. Black, fetid; in itch. It is now seldom used. With oil of turpentine, it has been used as a stimulating liniment in rheumatism. An ointment made of 1½ dr. of dilute sulphuric acid to 1 oz. of lard is a good application in prurigo.

Ointment, Sulta'na. Spermaceti and white wax, of each, ¼ oz.; oil of almonds and butter of cacao, of each, ½ lb.; melt together, add of balsam of Peru, 1 dr., stir constantly for a few minutes, and after it has settled pour off the clear portion; to this add of orange-flower water, 2 fl. drs., and stir the mixture constantly until it concretes. A very agreeable species of cold cream.

Ointment of Tan'nate of Lead. *Syn.* UNGUENTUM PLUMBI TANNATIS, L. *Prep.* 1. Tannate of lead, 1½ drs.; powdered camphor, 20 grs.; spermaceti ointment, 7 drs. In inflamed piles, &c.

2. (Sundelin.) Decoction of oak bark, 6 fl. oz.; solution of diacetate of lead, 1½ oz.; mix, collect and drain the precipitate, and mix it, whilst still moist, with lard, 1 oz.; camphor, 10 grs. In bed-sores.

Ointment of Tan'nin. *Syn.* UNGUENTUM TANNINI, U. ACIDI TANNICI, L. *Prep.* (Richard.) Tannin, 2 drs.; water, 2 fl. drs.; triturate them together, then add of lard, 1½ oz. Astringent and hæmostatic. In piles, prolapsus, &c. It is a very cleanly and effective application.

Ointment of Tar. *Syn.* UNGUENTUM PICIS LIQUIDÆ (Ph. L. E. & D.), L. *Prep.* 1. Ph. L.) Tar and suet, of each, 1 lb.; melt them together, and press the mixture through a linen cloth.

2. (Ph. E.) Tar, 5 oz.; bees' wax, 2 oz.; melt together, and stir the mixture briskly until it concretes.

3. (Ph. D.) Tar, ½ pint; yellow wax, 4 oz.; as the last.

Uses, &c. As a detergent application in ring-worm, scald-head, scabby eruptions, foul ulcers, &c. It should be, in general, at first diluted with half of its weight of lard or oil. See also OINTMENT OF PITCH.

Ointment of Tartar Emet'ic. See OINTMENT OF POTASSIO-TARTRATE OF ANTIMONY.

Ointment of Tobac'co. *Syn.* UNGUENTUM TABACI, L. *Prep.* 1. (Chippendale.) Extract of tobacco, 1 dr.; lard, 1 oz. As a friction in neuralgia.

2. (Ph. U. S.) Fresh tobacco leaves, 1 oz.; lard, 12 oz.; as ointment of hemlock. As an anodyne application in irritable ulcers, ring-worm, prurigo, and some other skin diseases.

Ointment, Tripharm'ic. *Syn.* OINTMENT OF THREE THINGS; UNGUENTUM TRIPHARMACUM, L. *Prep.* From lead plaster, 4 oz.; olive oil, 2 fl. oz.; distilled vinegar, 1 fl. oz.; melt together, and stir until they combine, and a proper consistence is obtained. Cooling and desiccative; formerly greatly esteemed as a dressing.

Ointment, Trooper's. See MERCURIAL OINTMENT.

Ointment of Turpentine. *Syn.* UNGUENTUM TEREBINTHINÆ (B. P.). *Prep.* 1. (Guy's Hosp.) Camphor, 1 dr.; oil of turpentine, 1 to 2 fl. drs.; dissolve, and add of resin cerate, 1 oz. As a stimulant and anodyne friction in nephritic and rheumatic pains, engorgements, &c.

2. (Ph. Austr.) Turpentine, 2 lbs.; simple ointment, 1 lb.; mix by a gentle heat. As a stimulant dressing.

3. (B. P.) Oil of turpentine, 16; camphor, 1; soft soap, 2; dissolve the camphor in the turpentine, add the soap, and rub till thoroughly mixed.

Ointment of Tut'ty. *Syn.* UNGUENTUM ZINCI OXYDI IMPURI, U. TUTIÆ, L. *Prep.* From prepared tutty, 1 part; simple ointment, 5 parts; mix by trituration. Formerly in great repute in ophthalmic practice, more particularly in inflammation, &c., of the eyelids. See OINTMENT OF OXIDE OF ZINC.

Ointment of Vera'trine. *Syn.* UNGUENTUM VERATRIÆ (B. P.); POMMADE DE VERATRINE, Fr. *Prep.* 1. (Magendie.) Veratrine, 4 grs.; lard, 1 oz.; mixed by careful trituration.

2. (Pereira.) Veratrine, 30 grs.; lard, 1 oz.

3. (Turnbull.) Veratrine, 10 to 20 grs.; olive oil, 1 dr.; triturate, and add of spermaceti ointment, 1 oz.

4. Veratria, 8 grs.; prepared lard, 1 oz.; olive oil, ½ dr.; rub the veratria and the oil together, then mix thoroughly with the lard.

Uses, &c. As a friction in neuralgia, neuralgic rheumatism, gout, dropsy, &c. A piece, about the size of a hazel nut, is to be rubbed for 10 or 15 minutes over the seat of pain, twice a day. It must not be applied where the skin is unsound, nor to a large surface at a time; and the greatest caution must be used, on

account of the extremely poisonous character of veratrine.

Ointment of Ver'digris. *Syn.* OINTMENT OF SUBACETATE OF COPPER; UNGUENTUM ÆRUGINIS (Ph. E.), U. CUPRI SUBACETATIS (Ph. D.), L. *Prep.* 1. (Ph. E.) Resinous ointment, 15 oz.; melt by a gentle heat, sprinkle into it of verdigris (in very fine powder), 1 oz., and stir the mixture briskly until it concretes.

2. (Ph. D.) Prepared subacetate of copper, ½ dr.; ointment of white wax, 7½ drs.; mix by trituration.

Uses, &c. Detergent and escharotic; as an occasional dressing to foul and flabby ulcers, to keep down fungous flesh, and, diluted with oil or lard, in scrofulous ulceration and inflammation of the eyelids.

Ointment of Vin'egar. *Syn.* ACETIC OINTMENT; UNGUENTUM ACETI, U. ACIDI ACETICI, L. *Prep.* 1. (Dr. Cheston.) Olive oil, 1 lb.; white wax, 4 oz.; melt them together by a gentle heat, add of strong vinegar, 2 fl. oz., and stir until the mixture concretes. As a cooling astringent dressing, and as an application in chronic ophthalmia.

2. (W. Cooley.) Acetate of morphia, 6 grs.; acetic acid (Ph. L.) and water, of each 1½ fl. dr.; dissolve, add the solution to simple ointment (melted), 1½ oz., and stir the mixture briskly until nearly cold. In chronic ophthalmia, painful inflamed piles, &c.; also to remove freckles, and to allay itching and irritation in several skin diseases.

Ointment, White. Both SPERMACETI OINTMENT and OINTMENT OF CARBONATE OF LEAD were formerly so called, but the name is now obsolete. The CAMPHORATED WHITE OINTMENT of the Ph. L. of 1746 (UNG. ALBUM CAMPHORATUM) was spermaceti ointment to which a little camphor had been added.

Ointment of White Precipitate. *Syn.* OINTMENT OF AMMONIATED MERCURY; UNGUENTUM HYDRARGYRI AMMONIATI (B. P.). Ammoniated mercury, 62 grs.; simple ointment, 1 oz.; mix. See OINTMENT OF AMMONIO-CHLORIDE OF MERCURY.

Ointment of White Wax. See SIMPLE OINTMENT.

Ointment of Wolfsbane. See OINTMENT OF ACONITE.

Ointment for Worms. *Syn.* UNGUENTUM ANTHELMINTICUM, U. VERMIFUGUM, L. *Prep.* 1. (Boerhaave.) Aloes and ox-gall, of each, 1 part; marsh-mallow ointment, 8 parts.

2. (Fr. Hosp.) Aloes and oil of tansy, of each, 1 part; dried ox-gall, 2 parts; (both in fine powder;) lard, 8 parts.

3. (Ph. Bat.) Aloes, 1 dr.; dried ox-gall and petroleum, of each, 1½ dr.; lard, 1½ oz.

4. (Soubeiran.) Powdered aloes, 2 drs.; lard, 1 oz.

Uses, &c. The above are purgative and vermifuge, applied as frictions to the abdomen. They are chiefly employed for children and delicate females. See COLOCYNTH OINTMENT.

Ointment of Yel'low Wax. *Syn.* UNGUENTUM CERÆ FLAVÆ, L. *Prep.* (Ph. D. 1826.) Bees' wax, 1 lb.; lard, 4 lbs.; melt them together. A mild emollient dressing. Some parties regard it as more 'healing' than the OINTMENT OF WHITE WAX.

Ointment of Zinc. 1. See OINTMENT OF OXIDE OF ZINC.

2. (Compound; UNGUENTUM ZINCI COMPOSITUM, L.)—*a.* (Hufeland.) Oxide of zinc and lycopodium, of each, 1 dr.; simple ointment, 1 oz. In excoriations and simple ulcerations, especially those of the eyelids, nipples, &c.

b. (Thomson.) Oxide of zinc, ½ dr.; powdered opium, 5 grs.; lard, 1 oz. As the last, when there is much pain.

OINTMENTS (Flower of). *Syn.* FLOS UNGUENTORUM, L. *Prep.* From resin, thus, wax, and suet, of each, ½ lb.; olibanum and Venice turpentine, of each, 2½ oz.; myrrh, 1 oz.; wine, ½ pint; boil them together, and, lastly, add of camphor, 2 drs. Suppurative; warming.

O'LEFIANT GAS. C_2H_4. *Syn.* ETHYLENE, HEAVY CARBONETTED HYDROGEN, HEAVY CARBURETTED H., ELAYL, ETHENE. A substance discovered by some associated Dutch chemists, in 1795, and composed of carbon and hydrogen in the proportions expressed by C_2H_2 or C_4H_4.

Prep. 1. A mixture of alcohol (rectified spirit), 1 part, and oil of vitriol, 6 parts, is heated in a retort until it blackens, and sulphurous acid begins to be evolved; the product is then passed first through a wash-bottle containing a solution of caustic potassa or milk of lime, and next through a bottle containing concentrated sulphuric acid, the last being furnished with a tube dipping into the water of the pneumatic trough.

2. The vapour of boiling alcohol is passed into a mixture of oil of vitriol diluted with rather less than one half its weight of water, and so heated as to be in a state of tranquil ebullition (320° to 330° Fahr.); the gaseous product is chiefly olefiant gas, and the vapour of water, from which it may be separated as above. No sulphurous acid is formed, nor does the acid blacken as in the last process.

Prop., &c. Colourless; neutral; nearly odourless; nearly insoluble in water; alcohol, ether, and the volatile and fixed oils, absorb a portion of it; burns with a brilliant white flame; at a full red heat it suffers decomposition, with deposit of carbon and liberation of light carburetted hydrogen gas; mixed with twice its volume of chlorine and inflamed, hydrochloric acid is formed, and the carbon of the gas is precipitated in the form of dense black soot; if the mixture (best in equal volumes), instead of being kindled, be left standing over water, it soon condenses into a heavy oily liquid (chloride of olefiant gas, Dutch liquid). Sp. gr. ·981; 100 cubic inches weigh 30·57 grs.

Olefiant Gas, Bromide of. *Syn.* BROMIDE OF ETHYLENE. From bromine and olefiant gas,

as Dutch liquid. A colourless liquid, with an ethereal odour, boiling at 265°, and solidifying at 0° Fahr. Sp. gr. 2·16.

Olefiant Gas, Chlo″ride of. *Syn.* DUTCH LIQUID, CHLORIDE OF ETHYLENE. This substance, referred to above, may be easily prepared in any quantity by the following process:—Chlorine and olefiant gas (the latter a little in excess) are conveyed by separate tubes (passing through the same cork) into a glass globe, having a narrow funnel-shaped neck at its lower part, dipping into a small bottle destined to receive the product of their mutual reaction; the newly formed liquid trickles down the sides of the globe into the receiver, and when a sufficient quantity is collected, it is purified by agitating it first with water, and then with sulphuric acid, and, lastly, submitting it to distillation.

Prop., &c. Colourless; sweet-tasted; agreeably fragrant, the odour approaching that of oil of caraway; slightly soluble in water; freely so in alcohol and ether; it sinks in water; boils at 180° Fahr.; burns with a smoky greenish flame; is unaffected by oil of vitriol; but decomposed by solution of caustic potassa. It combines with chlorine, forming new compounds. See CHLORIDES OF CARBON (page 294).

O'LEIC ACID. $HC_{18}H_{33}O_2$. *Syn.* ELAIC ACID. One of the fatty acids discovered by Chevreul, and produced by saponifying oils, and then separating the base from the resulting soap by means of a dilute acid. It now forms an important secondary product in the manufacture of stearic acid. Perfectly pure oleic acid may be obtained as follows:—

1. By saponifying olein, as just noticed.

2. Pure almond or olive oil soap is decomposed by a dilute acid, and the resulting oily acid is digested in a water bath with half its weight of litharge (in very fine powder) for some hours, constantly stirring; the mixture is then agitated with twice its volume of ether in a close vessel, and in 24 hours the clear ethereal solution is decanted, and decomposed with dilute hydrochloric acid; the oleic acid separates, and the ether mixed with it is expelled by evaporation. To render it colourless, the acid is again saponified with caustic soda, and the soap thus obtained is repeatedly dissolved in a solution of soda, and as often separated by adding common salt; this soap is, lastly, decomposed by dilute hydrochloric acid, as before.

Prop. &c. A colourless oily acid, insoluble in water, soluble in alcohol, ether, and oil; with the bases, it forms salts called oleates.

O'LEIN. $C_{57}H_{104}O_6$. *Syn.* ELAIN; HUILE ABSOLUE, Fr. The liquid portion of the fixed oils and fats. By saponification, it yields oleic acid.

Prep. 1. Olive oil or almond oil is digested for 24 hours with a quantity of caustic soda lye, only sufficient to saponify one half of the oil, and the undecomposed oily portion (olein) is then separated from the alkaline solution and newly formed stearine soap.

2. The saponified mixture of oil and alkali (see No. 1) is digested with proof spirit until all the soap is dissolved out, and the olein separates and floats on the surface; the latter, after repose, is decanted.

3. Almond or olive oil is agitated in a stout bottle with 7 or 8 times its weight of strong alcohol (sp. gr. ·798), at nearly the boiling-point, until the whole is dissolved; the solution is next allowed to cool, after which the clear upper stratum is decanted from the stearin which has been deposited, and, after filtration, the spirit is removed by distillation at a gentle heat; by exposure at a very low temperature, it deposits any remaining stearin, and then becomes pure.

Prop., &c. The products of the last two formulæ have only a very slight yellow colour, but may be rendered quite limpid and colourless by digestion for 24 hours with a little pure, freshly burnt animal charcoal, and subsequent filtration. In this state the olein is perfectly neutral to test paper, does not in the slightest degree affect metallic bodies immersed in it, and does not thicken by exposure to the greatest cold. Olein is used by watchmakers for their fine work. Some years ago the product of the last formula was sold, by a certain metropolitan house, as 'watchmaker's oil,' at 1s. 6d. a drachm. Commercial olein is generally lard oil. The refined oleic acid of the stearin works also commonly passes under the name. Olein burns well in lamps; but oleic acid does not do so unless when well refined and when the wick-tube is so formed as to remain cool. See LARD OIL and OLEIC ACID.

OLEOM'ETER. *Syn.* ELAÏOMETER, ELÆOMETER, OIL-BALANCE. A delicate areometer or hydrometer, so weighted and graduated as to adapt itself to the densities of the leading fixed oils. As the differences of the specific gravities of these substances are inconsiderable, to render it more susceptible the bulb of the instrument is proportionately large, and the tube or stem very narrow. The scale of the oleometer in general use (Gobby's) is divided into 50 degrees, and it floats at 0 or zero in pure poppy oil, at 38 or 38½ in pure almond oil, and at 50 in pure olive oil. The standard temperature of the instruments made in this country is now 60°; those made on the Continent, 54·5 Fahr. The oil must therefore be brought to this normal temperature before testing it, by plunging the glass cylinder containing it into either hot or cold water, as the case may be; or a correction of the observed density must be made. The last is done by deducting 2 from the indication of the instrument for each degree of the thermometer above the normal temperature of the instrument, and adding 2 for every degree below it. Thus; suppose the temperature of the oil at the time of the experiment is 60° Fahr., and the oleometer indicates 61°; then—

60·0° Actual temperature.
54·5 Normal temperature.

5·5 Difference.

Indication of the oleometer . . 61·0
The difference 5·5 × 2 = . . 11·0

Real density . . . . 50·0

Suppose the temperature observed at the time of the experiment is 52°, and the oleometer indicates 45°; then—

54·5 Normal temperature.
52·0 Actual temperature.

2·5 Difference.

Indication of the oleometer . . 45·0
The difference 2·5 × 2 = . . 5·0

Real density . . . . 50·0

The oil is, therefore, presumed to be pure. See HYDROMETER, OILS (Fixed), and SPECIFIC GRAVITY.

O'LEO-PHOSPHOR'IC ACID. An acid compound found by Fremy in the brain and nervous matter.

OLEO-RES'INS. The natural compounds of resin and essential oil forming the vegetable balsams and turpentines. Copaiba, Canada balsam, and Venice turpentine, are examples. Certain extracts prepared with ether, as the fluid extracts of cubebs and pepper in the Ph. U. S., may be regarded as oleo-resins. See EXTRACT.

OLEOSAC'CHARUM. *Syn.* ELÆOSACCHARUM. Sugar aromatised or medicated by being rubbed up with an essential oil. The oleosacchara of aniseed, caraway, cinnamon, peppermint, pennyroyal, and the other like essential oils, are made by rubbing 15 to 20 drops of the respective oils with white sugar, 1 oz.—The Ph. Græca 1837 prescribes 1 part of oil to 20 parts of sugar.—The Ph. Austr. 1836 and Ph. Bor. order the same proportions, or 3 drops of oil to the dr., and 24 drops to the oz., of powdered sugar. When intended for making extemporaneous distilled waters, 1 dr. of magnesia is a common addition. The oleosacchara of citrons, lemons, oranges, &c., are made from the peels, as follows:—After cleaning off any specks in the outer rind of the fruit, rub a large piece of loaf sugar on it until the yellow rind is completely removed. Those parts of the sugar which are impregnated with the essence are, from time to time, to be cut away with a knife, and put into an earthen pot. The whole being thus taken off, the sugared essence (oleosaccharum) is to be closely pressed down in the pot, tied over with bladder, and preserved in a cool place for use.

OLIB'ANUM. *Syn.* OLIBAN, INDIAN OLIBANUM, FRANKINCENSE. A gum resin obtained from *Boswellia thurifera* or *serrata*. It is stimulant, astringent, and diaphoretic. It is burnt as incense in the temples of India and in Roman Catholic churches. African or Arabian olibanum is produced by *Boswellia floribunda*. (Royle.) This substance must not be confounded with the resin noticed at page 541.

OL'IVE. *Syn.* OLEA, OLIVA, L. The *Olea Europæa* (Linn.), a native of the South of Europe. The unripe fruit is preserved in brine (SPANISH OLIVES, FRENCH OLIVES); the ripe fruit furnishes olive oil; the bark is bitter, astringent, and febrifuge, and has been used as a substitute for cinchona bark; it yields a gum-like substance (OLIVE GUM), which was formerly reported vulnerary, and contains olivile. The olive tree has in all ages been held in peculiar estimation, as the bounteous gift of heaven to man. Some authors have styled it "a mine on earth." It is remarkable for yielding a fixed oil from the pericarp, instead of from the seed.

OLLIVIER'S BISCUITS. See PATENT MEDICINES.

OM'ELET. *Syn.* OMELETTE, Fr. A variety of pancake or fritter made of eggs and other ingredients. Omelets may contain bacon, ham, herbs, fish, shell-fish, cold meat, cold game, fruit, or anything else at hand at the pleasure of the cook. 'Spirit omelets' are made by pouring a little brandy, rum, or whisky over them on serving them up, and setting it on fire for a moment just before placing the dish on the table. "Where is the man or woman cook but says they know how to make an omelette, and that to perfection? But this is rarely the case. It is related of Sarah, the Duchess of Marlborough, that no one could cook a 'fraise,' as it was then called, for the great duke but herself. The great point is, if in an iron pan, it should be very clean and free from damp, which sometimes comes out of the iron when placed on the fire. The best plan is to put it on the fire, with a little fat, and let it get quite hot, or until the fat burns; remove it, and wipe it clean with a dry cloth, and then you will be able to make the omelette to perfection." (Soyer.)

The following formula for a plain omelet is by the above culinary authority:—"Break four eggs into a basin, add ½ teaspoonful of salt, and ¼ do. of pepper, and beat them up well with a fork; put into the frying-pan 1½ oz. of butter, lard, or oil, place it on the fire, and, when hot, pour in the eggs, and keep on mixing them quickly with a spoon until they are delicately set; then let them slip to the edge of the pan, laying hold by the handle, and raising it slantways, which will give an elongated form to the omelette; turn in the edges, let it rest a moment, to set, turn it over on to a dish, and serve." "It ought to be of a rich-yellow colour, done to a nicety, and as light and delicate as possible." "2 table-spoonfuls

of milk and 1 oz. of the crum of bread, cut into thin slices, may be added."

MIXED and FANCY OMELETS are made by simply dropping the ingredients, cut into dice or fragments, into the above. ANCHOVY, OYSTER, and SHRIMP OMELETS are generally prepared by placing a few spoonfuls of the respective sauces in the centre of each, when nearly dressed.

ONGUENT (de la Mere). A stimulant and digestive ointment, very popular in French pharmacy.

Prep. (P. Cod.) Black pitch, 1 part; butter, lard, litharge, suet and yellow wax, 4 parts; olive oil, 8 parts.

ON'ION. *Syn.* CEPA, L. The bulb of *Allium Cepa*. The onion is diuretic, expectorant, rubefacient, and stimulant. The juice, made into a syrup with sugar (SYRUPUS CEPÆ), has been given in chronic catarrh, diarrhœa, croup, dropsy, and calculus. Roasted and split open, onions have been applied as poultices to suppurating tumours, and applied to the pubes to relieve suppression of urine in children. According to Dr. Cullen, "onions are acrid and stimulating, and possess little nutrient power. In bilious constitutions they generally produce flatulence, thirst, headache, and febrile symptoms; but where the temperament is phlegmatic, they are of infinite service, by stimulating the system, and promoting the excretions, particularly expectoration and urine." They also possess antiscorbutic and soporific properties.

O'NYX. A sub-species of quartz often wrought into small ornamental articles. Among jewellers, any stone exhibiting layers of two or more colours, strongly contrasted, is called an 'onyx.' A regularly and richly banded agate of this class is much prized for cameos. See GEMS.

O'PAL. A mineral allied to agate and chalcedony, but distinguished by its peculiar resinous lustre. The variety most admired as a gem is the precious or noble opal, which is remarkable for its beautiful play of colours. See GEMS and PASTES.

OPHTHAL'MIA. *Syn.* OPHTHALMITIS, L. Inflammation of the eye. In ordinary cases this disease is confined to the external membrane of the globe of the eye, or to the eyelids; but it occasionally attacks the sclerotica, cornea, choroid coat, and retina.

The common causes of ordinary or conjunctival ophthalmia are the sudden exposure of the organ to a cold easterly wind, to dust, gritty particles, or to any external irritation or injury.

The symptoms are, in part, those common to local inflammation. The eye or eyelids become more or less bloodshot, swollen, and tender, and a sensation resembling that induced by the presence of particles of sand or some gritty substance, accompanied by much heat and a pricking pain, is almost constantly experienced. The secretion becomes yellowish and glutinous, and during the night frequently glues, as it were, the lids together. Sometimes only one eye is attacked, but after 2 or 3 days the disease extends to the other.

The treatment of mild cases of conjunctival ophthalmia is extremely simple. In general, it may be relieved by fomentations of warm water or decoction of poppy-heads and the use of aperient medicines, to which leeches and cupping may often be added with advantage. Severe cases should be treated by the medical practitioner only.

O''PIATES. *Syn.* OPIATA, L. Preparations containing opium. The word is often applied in a general sense to anodynes and soporifics. In French pharmacy, the name is commonly used synonymously with confections, as in the following preparations:—

ANTI-DYSENTERIC OPIATE—Quarin. Purified opium, 4 grs.; ipecacuanha, ¼ dr.; tormentilla, 1 dr.; syrup of whortleberries and conserve of red roses, of each, 6 drs.—*Dose.* A teaspoonful every hour.

ANTI-HYSTERICAL OPIATE—Trousseau and Reveil. Powdered indigo, 1 oz.; white honey, 3 oz.—*Dose.* 1 table-spoonful daily, gradually increased until the whole is taken in a day. In hysteria, epilepsy, and nervous affections of an epileptic character.

BALSAMIC OPIATE—Trousseau and Reveil. Oleo-resin (balsam) of copaiba, 1 oz.; cubebs (in powder), 3 oz.; potassio-tartrate of iron, 2½ drs.; syrup of quince, q. s. In gleet.—*Dose.* 3 boluses the size of a nut, thrice daily.

CHARCOAL OPIATE—Ratier. Willow charcoal (recent), 1 oz.; prepared chalk, 1 dr.; powdered white sugar, 2 oz.; rose water, q. s. to form an electuary. In diarrhœa and incipient cholera, in dysentery with fetid stools, and in gastralgia, flatulence, &c. By substituting calcined magnesia for chalk, it becomes an excellent remedy for habitual constipation.

CUBEB OPIATE—Deyeaux. Powdered cubebs, 4 drs.; powdered camphor, 1 dr.; mix, and divide it into 18 powders.—*Dose.* One, 3 or 4 times daily, in gleet, painful and scalding micturition, &c.

O''PIUM. *Syn.* OPIUM (B. P., Ph. L. E. & D.), L. The juice inspissated by spontaneous evaporation, obtained by incision from the unripe capsules of the *Papaver somniferum*, grown in Asia Minor.

Var.—1. EGYPTIAN; in roundish flattened lumps; inferior to Turkish opium.—2. ENGLISH; often equal to the best Smyrna.—3. FRENCH; resembles the last.—4. GERMAN; similar to English opium.—5. INDIAN;—*a.* BENARES, in large balls;—*b.* MALWA, in roundish flattened cakes, of 9 or 10 oz. in weight each;—*c.* PATNA, in balls or square cakes; inferior to Turkey opium.—6. LEVANT; same as Smyrna opium.—7. PERSIAN; in rolls or sticks, 6 × 1 inch; inferior; resembles hepatic aloes in appearance.—8. SMYRNA; in irregular, rounded, flattened

pieces, varying in weight from 2 or 3 lbs. to only as many oz. It forms the best variety of Turkey opium, and is particularly rich in morphia. It is the only one adapted for the manufacture of the salts of morphia, as it contains on the average from 7 to 9½ of that alkaloid, and usually yields about 12 to 12·5½ of hydrochlorate of morphia, which is more than can be obtained from any other variety of opium.—9. TURKEY; of which two varieties are known in commerce, viz., Constantinople opium and Levant or Smyrna opium, noticed above. Constantinople opium is generally in small, flattened, roundish cakes, 2 to 2½ inches in diameter, and covered with poppy leaves. It is more mucilaginous and less esteemed than Smyrna opium, from which it may be distinguished by the last being always covered with the reddish capsules of a species of Rumex.

Pur. The opium of commerce is not unfrequently adulterated with extract of poppies, extract of lettuce, lactucarium, mucilage of gum tragacanth, dried leaves, starch, water, clay, sand, gravel, and other substances, in order to increase its weight. This fraud is readily detected by inspection, by chemical analysis, and the microscope; and indirectly, with the greatest certainty, by a simple assay of the sample for its morphia (morphiometry). This may be effected by one or other of the following methods:—

1. (Couerbe.) Opium, 4 parts, and quicklime, 1 part, made into a milk with water, q. s., are boiled together, and the solution filtered whilst hot; dilute hydrochloric acid is then added, to saturation, and the morphia precipitated by the addition of ammonia, any excess of the latter being expelled by heat; the precipitate is then collected, dried, and weighed. If 100 grs. have been operated on, the given weight will represent the per-centage richness of the sample in morphia (nearly).

2. (Guilliermond.) 100 grs. of opium are triturated for some time in a mortar along with 4 times its weight of rectified spirit, and the tincture strained through linen, with expression, into a wide-mouthed bottle; the marc is triturated a second time with about 3 times its weight of alcohol, and the tincture strained into the bottle as before; to the mixed tincture is added a fl. dr. of liquor of ammonia, and the whole is agitated for a short time. In about 12 hours the morphia spontaneously separates, accompanied with some narcotina and meconate of ammonium; the morphia covering the interior of the vessel with large, coloured, and gritty crystals, feeling like sand, and the narcotina crystallising in very light, small, white, and pearly needles. These crystals are washed with water, either through a paper filter or linen, to free them from the meconate of ammonia which they contain; after which the narcotina is separated from the morphia by decantation in water, which removes the narcotina, which is the lighter of the two. According to M. Mialhe, however, the morphia is more effectually removed by washing the crystals with 1 to 1½ fl. dr. of ether, by triturating the two together, when the morphia is left in an insoluble state, and may then be dried and weighed.

3. (Ph. E.) Macerate 100 grs. of opium for 24 hours in 2 fl. oz. of water, filter, and strongly squeeze the residue; then precipitate the infusion with carbonate of sodium, ½ oz., dissolved in cold water, 2 fl. oz.; gently heat the precipitate until it shrinks and fuses, then cool and weigh it. It should weigh at least 10 grs., and, when powdered, be entirely soluble in a solution of oxalic acid. See also Watts' 'Dic. of Chemistry,' article, OPIUM.

Tests. These depend chiefly on the chemical and physical characters of morphia and meconic acid, the tests for which have been already noticed. In operating upon the contents of the stomach, or upon solid organs, in cases of suspected poisoning, the best method of proceeding is that already described under ALKALOID.

Another method is to boil the substances in water slighily acidulated with acetic acid, next to evaporate the solution to the consistence of a thick syrup, and then to treat it twice with boiling rectified spirit; the tincture thus obtained is to be filtered when cold, and again evaporated to the consistence of syrup; it is now re-dissolved in distilled water, the filtrate treated with solution of subacetate of lead, and the precipitate of meconate of lead, separated by filtration, and carefully preserved. A current of sulphuretted hydrogen is then passed through the solution, to precipitate excess of lead, and after again filtering it the liquid is evaporated, at first in a water bath, and afterwards under the receiver of an air-pump. The shapeless mass of crystals thus obtained present all the characters of morphia, if the substance examined contained opium. In the mean time the precipitate of meconate of lead is to be boiled with water acidulated with sulphuric acid, and the insoluble sulphate of lead separated by filtration; the filtered liquid, by evaporation, furnishes meconic acid, either under the form of crystals or an amorphous powder, the solution of which precipitates ferric salts of a deep blood-red.

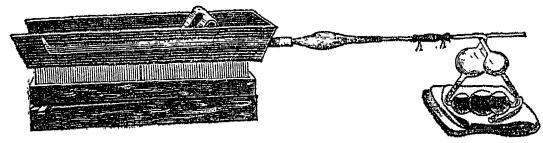
The following are additional tests to those already noticed:—

1. From the peculiar odour of opium, often perceptible when the drug has been taken only in very small quantities.

2. A solution containing crude opium is turned of a deep red colour, or, if coloured, it is turned of a reddish-brown, and is darkened, by tincture of ferric chloride.

3. (Hare.) A portion of the suspected liquid is poured into a beaker glass, and a few drops of solution of acetate of lead are added to it; the whole is stirred frequently for 10 or 12

now usually employed instead of charcoal.) The firing is so regulated that the gas enters the potassa apparatus in bubbles easily counted, without any violence or inconvenience, and it is kept up as long as gas is extricated. As soon as the operation is complete, and the



slightest retrogade action is observed, the charcoal is removed from the combustion tube, and the extreme point of this last is broken off. A little air is then sucked through the apparatus in order to seize on any remaining carbonic-acid gas and moisture. The potash-apparatus and the chloride of calcium tube are, lastly, detached, and again accurately weighed. The increase in the weight of the first gives the weight of the carbonic acid formed during the combustion; that of the second, the weight of the water.

		Gr.		Gr.	
1 gr. of	*Carbonic acid* =	0·27273	of *Carbon* +	0·72727	of *Oxygen.*
1 „	*Water* =	9·11112	„ *Hydrogen* +	0·88888	„
2 . .	less . . .	0·38385	. . equal to	1·61615	„

The numbers equivalent to any given number of grains, found as above, are converted into the proportions per cent. by simply dividing them by the weight of the organic substance which has been employed in the experiment, and moving the decimal point of the result two figures to the right.

b. In applying the preceding method to volatile liquids, it is necessary to enclose them in a small bulb with a narrow neck, instead of mixing them directly with the protoxide of copper. The bulb with its contents is introduced into the combustion tube, and after some 6 or 8 inches of the protoxide is heated to redness, a hot coal is applied near where the bulb is situated, so that the liquid which it contains may be slowly volatilised and passed through the heated mass in the state of vapour, and be thus completely burned.

2. *Estimation* of the NITROGEN.—*a.* Several methods are employed for this purpose, but the only one of general application, and adapted to the non-scientific operator, is that of MM. Varrentrap and Will, described under GUANO. To ensure correct results, the caustic soda must be pure, and the lime of good quality and well burnt. The last, having been properly slaked with a little water holding the former in solution, the mixture is thoroughly dried in an iron vessel, and then heated to full redness in an earthen crucible. The ignited mass is rubbed to powder in a warm dry mortar, and either used at once or carefully preserved from the air. The best quantity of the organic substance to operate on is, in this case, about 10 grs., which must be dried, and accurately weighed with the usual precautions. Bodies very rich in either nitrogen or hydrogen are best mixed with about an equal weight of pure sugar before triturating them with the soda-lime. MM. Varrentrap and Will weigh the nitrogen under the form of double chloride of platinum and ammonium, dried at 212° Fahr. This salt contains 6·272% of nitrogen.

b. M. Péligot has modified the preceding plan by conducting the gaseous matter extricated during the operation into a three-bulb tube charged with a standard solution of sulphuric acid. This he subsequently pours into a beaker-glass, and after tinging it with a single drop of tincture of litmus, he tests it with either a standard aqueous solution of soda or one of lime in sweetened water, after the common method of alkalimetry. The difference between the saturating power of the acid in its normal condition and after its exposure in the condenser indicates the amount of ammonia formed. (See GUANO.) Each grain of ammonia contains ·82353 gr. of nitrogen.

Concluding remarks. The successful application of the above processes requires considerable care and some aptitude in manipulating, as well as the employment of a very delicate balance for determining the weights. A greater error in the weighings than the $\frac{1}{250}$ gr. cannot be tolerated when exact results are desired. The method of MM. Varrentrap and Will for the determination of nitrogen answers admirably for all organic compounds containing it, except those in which it exists under the form of hyponitrous, nitrous, and nitric acids; for which, however, it is not required. When extreme accuracy is aimed at, the atmospheric air in the apparatus, and that absorbed during the preliminary operations by the substances employed, must be expelled before the application of heat to the combustion tube.

OR-MOLU'. [Fr.] This name is given to gold-coloured brass or bronze, so finished off as to have the appearance of gold, or of being gilt; but it is often applied in a more general sense. The French more particularly excel in working in or-molu, and the products of this branch of their industry hold an im-

portant position in the art manufactures of France.

To give or-molu its richest appearance, "it is not unfrequently brightened up after 'dipping' (that is cleaning in acid) by means of a scratch-brush (a brush made of very fine brass wire), the action of which helps to produce a very brilliant gold-like surface. It is protected from tarnish by the application of lacquer." (Ure.)

ORMSKIRK MEDICINE. A nostrum supposed to prevent hydrophobia, so named after the residence of its inventor, Mr. Hill, of Ormskirk. It is said to have consisted of the ingredients named below, but nothing certain is known on the subject, as the inventor died without revealing its secret:—Chalk, ½ oz.; Armenian bole, 3 drs.; elecampane root, 1 dr.; alum, 10 grs.; oil of aniseed, 5 or 6 drops; all in fine powder. For a dose, to be taken for 6 successive mornings, in a glass of weak milk-and-water.

OR'PIMENT. Native yellow sulphide of arsenic. The finest samples used by artists (golden orpiment) come from Persia. See ARSENIC (Tersulphuret).

OR'RIS. *Syn.* ORRIS ROOT, FLORENTINE R.; RADIX IRIDIS, L. The dried rhizome of *Iris Florentina, pallida,* and *Germanica.* Sialogogue, irritant, subacrid, and errhine. Chiefly employed to impart a violet odour to oils, tooth powder, snuffs, spirits, &c.; and when cut into peas, to keep open issues.

ORSE'DEW. Dutch leaf-gold.

ORSEL'LIC ACID. Two compounds pass under this name—ALPHA-ORSELLIC ACID and BETA-ORSELLIC ACID. They closely resemble each other, and are obtained in a similar manner; the first from the South American variety of *Rocella tinctoria,* the last from that grown at the Cape.

ORSELLIN'IC ACID. *Syn.* LECANORIC ACID. A compound formed along with picroerythrine, by boiling erythric acid for some time with water. It is also formed by boiling alpha-orsellic acid with water. In both cases, if the ebullition is too long continued, the new acid is wholly or in part converted into orcin.

Prop., &c. Crystallisable; bitter-tasted; soluble in water; its aqueous solution, by exposure to the air, assumes a beautiful purple colour.

ORTHOPÆ'DIA. In surgery, the straightening, correcting, or curing deformities of children. See SURGERY.

OS'MAZOME. The substance on which the peculiar odour and flavour of boiled meat and broth were formerly supposed to depend.

Prep. From lean meat, minced, and digested in cold water, with occasional pressure; the filtered infusion is gently evaporated nearly to dryness, and then treated with alcohol; the alcoholic tincture is, lastly, evaporated. The product has a brownish-yellow colour, is soluble in water, and its aqueous solution is precipitated by infusion of galls and the mineral astringent salts.

OS'MIUM. Os. A rare metal found associated with the ores of platinum by M. Tennant, in 1803.

OSTEOCOL'LA. A rough sort of glue or gelatin obtained from bones by digestion in dilute hydrochloric acid, to remove their earthy matter, and afterwards acting on the residuum with water at a high temperature, until it is wholly dissolved.

OTAL'GIA. Pain in the ear. See EARACHE.

O'THYL. In chemistry, a radicle having the formula C_2H_3O, assumed by Professor Williamson to exist in acetic acid.

OT'TO OF ROSES. See OILS (Volatile).

OVALBU'MEN. White of egg; to distinguish it from seralbumen, or the albumen of the serum of the blood.

O'VENS. A very ingenious and useful improvement in the apparatus for baking was introduced some years ago by Mr. Schiller, of Carlisle. It consists in causing the articles to be baked to traverse a heated earthenware tube. This tube forms the oven. It is of considerable length, and the biscuits or other articles are slowly traversed through it, from end to end, at such a rate as will allow of the baking being completed during the passage. The biscuits are carried on trays, set on travelling chains; or the trays are made into an endless web or chain. The oven is thus entirely self-acting, and the articles demand no attention whatever from the attendants, whilst the system combines superior economy with the best results. A 'pyrometer,' or heat indicator, is attached externally, so that the attendant can regulate the heat with great facility. The object of these improvements is to reduce the cost of baking, and to improve the appearance of the baked articles. The apparatus is applicable as well to the baking of articles of clay or earthenware as to bread or biscuits.

Of the ovens now in common use by the bakers, that known as the 'hot-water oven' is perhaps the best; not merely in reference to economy, but also with reference to its superior cleanliness, and the ease with which the articles operated on may be turned out of that delicate yellowish-brown tint for which the bread of the Viennese and Parisian bakers is so celebrated. See BAKING, BREAD, &c.

OX. The *Bos Taurus* (Linn.), one of the ruminantia. In its more limited sense, the word is restricted to the emasculated animal. The flesh, milk, skin, horns, bones, and blood of this animal are all serviceable to man. Gold-beater's skin is prepared from the peritoneal membrane of its cæcum. Its blood, fat, horns, and excrement were among the simples of the Ph. L. 1618. See BEEF, GALL, MILK, and *below.*

Ox-Gall. *Syn.* OX-BILE; FEL BOVINUM, F. BOVIS, F. TAUBI, L. Crude ox-gall is noticed at page 552. Refined ox-gall

(*Fel bovinum purificatum*) is prepared as under:—

1. Fresh ox-gall is allowed to repose for 12 or 15 hours, after which the clear portion is decanted, and evaporated to the consistence of a thick syrup by the heat of a water bath; it is then spread thinly on a dish, and exposed in a warm situation near the fire, or to a current of dry air, until nearly dry; it is, lastly, put into wide-mouthed bottles or pots, and carefully tied over with bladder. In this state it will keep for years in a cool situation. For use, a little is dissolved in water.

2. Fresh gall, 1 pint; boil, skim, add powdered alum, 1 oz.; boil again till the alum is dissolved, and when sufficiently cool, pour it into a bottle, and loosely cork it down. In a similar manner boil and skim another pint of gall, add to it 1 oz. of common salt, and again boil, cool, and bottle it, as above. In three months decant the clear from both bottles, and mix them in equal quantities; the clear portion must then be separated from the coagulum by subsidence or filtration.

Uses, &c. Both the above are employed by artists to fix chalk and pencil drawings before tinting them, and to remove the greasiness from ivory, tracing paper, &c. The first is also used in medicine.

OX'ALATE. *Syn.* OXALAS, L. A salt of oxalic acid. The soluble oxalates are easily formed by directly neutralising a solution of oxalic acid with a metallic hydrate, carbonate, or oxide; and the insoluble oxalates, by double decomposition. See OXALIC ACID and the respective bases.

OXAL'IC ACID. $H_2C_2O_4$. *Syn.* ACIDUM OXALICUM, L. This substance was discovered by Bergman, in 1776. It occurs both in the mineral and organic kingdoms, and is produced artificially by the action of nitric acid on sugar, starch, woody fibre, &c. It abounds in wood-sorrel, in which it exists in combination with a little potassa. With the exception of gum and sugar of milk, all starchy and saccharine substances yield oxalic acid when treated with nitric acid at a somewhat elevated temperature.

Prep. 1. From sugar:—

a. Nitric acid (sp. gr. 1·42), 5 parts, diluted with water, 10 parts, is poured on sugar, 1 part, and the mixture is digested at a gentle heat, as long as gaseous products are evolved; the liquid is then concentrated by evaporation until it deposits crystals on cooling; the crystals, after being drained and freed from superfluous moisture, are redissolved in the smallest possible quantity of boiling water, and the solution is set aside to crystallise. The residuary 'mother-water' is treated with a little fresh nitric acid (say 1½ part) at a gentle heat, after which it is evaporated, as before, for a second crop of crystals. This process is repeated until the solution is exhausted. The brownish-coloured crystals thus obtained are allowed to effloresce by exposure to dry air, and are then redissolved and recrystallised. By repeating this treatment they yield pure colourless oxalic acid at the third crystallisation.

b. (Schlesinger.) Sugar (dried at 257° Fahr.), 4 parts, and nitric acid (sp. gr. 1·38), 33 parts, are digested together, as before, and as soon as the evolution of gas ceases the liquid is boiled down to one sixth of its original volume, and set aside to crystallise. The whole process may be completed in about 2 hours, and in 1 vessel, and yields of beautifully crystallised oxalic acid, at the first crystallisation, a quantity equal to 56 to 60% of the weight of the sugar employed.

c. (Ure.) Nitric acid (sp. gr. 1·4), 4 parts, and sugar, 1 part, are digested together by the heat of a water bath, and as soon as gas ceases to be extricated the vessel is removed from the heat, and set aside to cool and crystallise. The use of a little sulphuric acid along with the nitric acid contributes to increase the product.

2. From POTATO- or DEXTRIN-SUGAR:—(Nyren.) From the washed pulp of potatoes, boiled for some hours with water, q. s., in a leaden vessel, with about 2% of oil of vitriol, until the fecula of the pulp is converted into saccharine matter, shown by the liquid being no longer turned blue by iodine; the whole is then filtered through horse-hair bags or strainers, and the filtrate is evaporated until its density is such that a gallon of it weighs 14 to 14½ lbs.; in this state it is converted into oxalic acid by treatment with nitric acid in the way already described. A similar process was patented some years ago by Messrs. Davy, Macmurdo, and Co.

3. From SAWDUST:—

(Roberts, Dale, & Co., Patent.) This process is the one now usually employed for the manufacture of oxalic acid on the large scale. It is based on Gay-Lussac's discovery, that wood and similar substances are converted into oxalic acid by fusion with caustic alkali. The practical details of the process are thus given by Dr. Murray Thomson, of Edinburgh:—(1) Hydrate of sodium and hydrate of potassium, mixed in the proportion of 2 equivalents of the former to 1 equivalent of the latter, are dissolved, and solution evaporated until of specific gravity 1·35; sawdust is now stirred in until a thick paste results. (2) This paste is then heated on iron plates, during which it is constantly stirred; water is first given off; the mass then swells; inflammable gases, hydrogen and carburetted hydrogen, are evolved, along with a peculiar aromatic odour. When the temperature has been maintained at 400° for one or two hours, this stage of the process is complete; the mass has now a dark colour, and contains only 1 to 4 per cent. of oxalic acid, and about ·5 per cent. of formic acid. The bulk, therefore, of the mass at this stage consists of a substance whose nature is not yet known, but which is intermediate between the cellulose and oxalic acid. (3) The next stage

consists in a simple extension of the last, in which the mass is heated till quite dry, care being taken that no charring takes place. It now contains the maximum quantity of oxalic acid, 28 to 30 per cent. (4) This oxalic acid now exists as oxalate of potassium and sodium in the gray powder resulting from stage 3. This powder is now washed on a filter with solution of carbonate of sodium, which seems to have the singular and unexpected power of decomposing the oxalate of potassium, and converting it into oxalate of sodium. At all events, it is quite true that all traces of potassa are washed out with the solution of carbonate of sodium. The only explanation that occurs to account for this unusual decomposition is that oxalate of sodium is a more insoluble salt than oxalate of potassium, and therefore may be formed by preference. (5) This oxalate of sodium is now decomposed by boiling milk of lime. Oxalate of calcium falls as a precipitate, and soda remains in solution. This soda is boiled down, and again made use of with fresh sawdust. This recovery of alkali is also practised with the potassium salt which filters through in the last stage. (6) The oxalate of calcium is now decomposed in leaden vessels with sulphuric acid. Sulphate of calcium is precipitated, and oxalic acid is in solution, which is now evaporated, and the acid separates in crystals, which now need only to be recrystallised to make them quite pure, and fit the acid for all the purposes for which it is employed. *Prod.* By this ingenious process 2 lbs. of sawdust are made to yield 1 lb. of oxalic acid.

Prop., &c. Colourless, transparent, prismatic crystals, possessing a powerfully sour taste and acid reaction; these effloresce in warm dry air, with loss of 28% (2 eq.) of water, and then form a white powder, which may be sublimed in part, without decomposition; the crystals are soluble in 8 parts of water (9 parts, "and form a solution of sp. gr. 1·045," —Ure) at 60° Fahr., in their own weight or less of boiling water, and in about 4 parts of alcohol; with the acids, it forms salts called oxalates.

Tests.—1. Solution of chloride of barium occasions a white precipitate in neutral solutions of oxalic acid (oxalates), which is soluble in both nitric and hydrochloric acid.—2. Solution of nitrate of silver, under like circumstances, gives a white precipitate, which is soluble in nitric acid and in ammonia, and which, when heated to redness, yields pure silver.—3. Lime water and solutions of all the soluble salts of calcium produce white precipitates, even in highly dilute solutions of oxalic acid or of the oxalates, which is freely soluble in both nitric and hydrochloric acid, but is nearly insoluble in either acetic or oxalic acid, and is converted into carbonate of calcium upon ignition.—4. Oxalic acid (or an oxalate), when heated, in the dry state, with oil of vitriol in excess, is converted into carbonic anhydride and carbonic oxide; the former produces a white precipitate with lime water, and the latter, when kindled, burns with a faint blue flame. Of the above tests, solution of sulphate of calcium (*vide* No. 3) is the most delicate and characteristic.—5. It is distinguished from Epsom salt by its acid reaction, its solubility in rectified spirit, its complete dissipation by heat, and by emitting a slight crackling noise during its solution in water. See MAGNESIA (Sulphate).

Uses, Pois., &c. Oxalic acid is chiefly used in the arts of calico printing and bleaching; to remove ink-spots and iron-moulds from linen, and to clean boot-tops. It is extremely poisonous. The treatment, in cases of its having been swallowed, is to promote vomiting, and to administer chalk, whiting, or magnesia, mixed up with water, in considerable quantities. The use of the alkalies or their carbonates must be avoided, as the compounds which these form with oxalic acid are nearly as poisonous as the acid itself. The remaining treatment is noticed under ACIDS. In poisoning by oxalic acid, the nervous system is almost always affected, and the patients experience numbness, formication of the extremities, and sometimes convulsions, so that the symptoms somewhat approach those produced by strychnia, from which it is distinguished by its corrosive action on the tissues, and its effect upon the heart and circulatory system.

Concluding remarks. The manufacture of oxalic acid is an important one. The process of Roberts, Dale, and Co., has so much cheapened the price of oxalic acid, that in 1851 it sold for 16d. per lb., and now, in 1864, it only costs from 8d. to 9d. per lb. More than half the amount of oxalic acid used all over the world is now made from sawdust. In manufacturing the acid from sugar, on the large scale, the first part of the process is either conducted in salt-glazed stoneware pipkins of the capacity of 3 to 5 quarts each (which are about two thirds filled and set in a water bath), or in wooden troughs lined with lead, and heated by means of a coil of steam-pipe. On the small scale, a glass retort or capsule is commonly employed. The most appropriate temperature appears to be about 125° Fahr. and the best evidence of the satisfactory progress of the decomposition is the free but not violent evolution of gas, without the appearance of dense red fumes, or, at all events, any marked quantity of them. When these are disengaged with violence and rapidity, a greater quantity of the newly formed acid suffers decomposition, and flies off in a gaseous form. The sp. gr. of the nitric acid commonly used on the large scale ranges from 1·22 to 1·27, equivalent quantities being taken. The evaporation is preferably conducted by the heat of steam. The evolved nitrous vapours are usually allowed to escape, but this loss may be in part avoided by conveying them into a chamber filled with cold damp air, and

containing a little water, when they will absorb oxygen, and be recondensed into fuming nitric acid. Various modifications of this plan have been patented. That of Messrs. McDougall and Rawson, which is one of the simplest and best, consists in passing the mixed nitrous fumes through a series of vessels containing water, and connected together by tubes, so that the fumes which collect at the top of one vessel are conveyed to nearly the bottom of the next one, and then, bubbling up through the water, mix with the air, a supply of which is provided for the purpose. The nitrous fumes are thus brought alternately into contact with air and water, and by the time they reach the last vessel are reconverted into nitric acid. Another plan is to pass the mixed nitrous vapours through a vessel stuffed with some porous substance, as pumice-stone or pounded glass, conjointly with a supply of steam from a boiler and a supply of oxygen by a blowing machine.

The products obtained by skilful manipulation are—from good dry sugar, 128%; from good treacle, 107%.—"One cwt. of good treacle will yield about 116 lbs. of marketable oxalic acid, and the same weight of good brown sugar may be calculated to produce about 140 lbs. of acid." "As a general rule, 5 cwt. of saltpetre, or an equivalent of nitrate of soda, with 2½ cwt. of sulphuric acid, will generate sufficient nitric acid to decompose 1 cwt. of good sugar, and yield, as above, 140 lbs. of fair marketable oxalic acid, free from superfluous moisture." (Ure.) On the small scale, 5 parts of sugar yield nearly 6 parts of crystallised acid.

Chemically pure oxalic acid is best prepared by precipitating a solution of binoxalate of potassium with a solution of acetate of lead, washing the precipitate with water, decomposing it, whilst still moist, with dilute sulphuric acid or sulphuretted hydrogen, and gently evaporating the filtrate so that crystals may form as it cools.

OXIDA'TION. *Syn.* OXYDATION. The combination of bodies with oxygen, forming oxides; the operation or process adopted to induce or facilitate such conversion.

OX'IDE. *Syn.* OXYD; OXYDUM, L. A compound formed by the union of oxygen with another body.

OXYCHLO''RIDE. *Syn.* OXICHLORIDE; OXYCHLORIDUM, L. A term often loosely applied to compounds of an oxide and chloride, whether in definite or variable proportions. See ANTIMONY (Oxychloride), &c.

OX'YCRATE. *Syn.* OXYCRATUM, L. The old name of a mixture of vinegar and water, dulcified with honey.

OXYCRO'CEUM. See PLASTERS.

OX'YGEN. O. *Syn.* OXYGEN GAS, DEPHLOGISTICATED AIR†, EMPYREAL A., VITAL A.†; OXYGENIUM, L. An elementary body discovered by Scheele and Priestley in 1744. It is remarkable that, although this substance forms a large proportion of our atmosphere (nearly one fourth), and confers upon it the power of supporting respiration and combustion, and also constitutes the principal portion of the water of our rivers and seas (eight ninths), and enters largely into the composition of the majority of the various mineral bodies that form the bulk of our globe, its existence should have remained unsuspected, or at least undetermined, until a comparatively recent date. Oxygen is an essential constituent of all living organisms. It is absorbed by animals during respiration, and evolved in a free state by growing vegetables when exposed to sunlight. The oxygen gas of the atmosphere is mechanically mixed, not chemically combined, with the nitrogen.

Prep. 1. From red oxide of mercury, heated over a spirit lamp or a few pieces of ignited charcoal. The operation is usually performed in a small green-glass retort, or in a short tube of hard Bohemian glass, closed with a perforated cork furnished with a piece of bent glass tube of small bore, to convey the liberated gas to the vessel arranged to receive it. Pure. 1 oz. yields about 100 cubic inches.

2. From chlorate of potassium, as the last. Pure. 100 grs. yield nearly 100 cubic inches (Brande; 115—Ure). This is the plan adopted in the P. Cod. The decomposition occurs with both the above substances at a heat below that of redness.

3. From a mixture of chlorate of potassium (in coarse powder), 3 parts; powdered binoxide of manganese, 1 part; both by volume. Pure. 100 grs. of the mixture yield about 110 cubic inches of oxygen. This method, which has received the approval of Faraday, is exceedingly convenient. The gas is evolved with a rapidity which is entirely at the command of the operator, by simply increasing or lessening the heat. The residuum in the retort may be kept for another operation, if not exhausted; or it may be at once washed out with a little warm water, and the manganese, which is uninjured by the process, reserved for future use. Red lead, black oxide of copper, red oxide of iron, and several other substances, answer nearly as well as binoxide of manganese.

4. From a mixture of bichromate of potassium, 3 parts; oil of vitriol, 4 parts; gently heated, as before. Yields pure oxygen very freely, and with a rapidity entirely at the will of the operator. (Balmain.)

5. From binoxide of manganese and oil of vitriol, equal parts; as the last. 44 grs. of pure binoxide of manganese yield 8 grs., or 24 cubic inches, of oxygen; 1 oz. yields 88 grs., or 256 cubic inches. (Liebig.)

6. (On the large scale.)—*a.* From nitre exposed to a dull red heat in an iron retort or gun-barrel. 1 lb. yields about 1200 cubic inches of gas, contaminated, more or less, with nitrogen. (Ure.)

b. From binoxide of manganese, as the last. 1 oz. of the pure binoxide yields 44 grs., or 128 cubic inches, of oxygen (Liebig); 1 lb. of good commercial binoxide yields from 1500 to 1600 cubic inches, or from 5 to 6 galls.

c. M. Boussingault has reinvestigated a process, long known, although not usefully applied, by which pure oxygen gas may be obtained from the atmosphere at a trifling cost, so as to enable it to be collected in unlimited quantities and preserved in gas-ometers, like coal-gas, for application in the arts, manufactures, and sanitation. This process depends upon a peculiar property possessed by the earth baryta, of absorbing atmospheric oxygen at one temperature and evolving it at another; or rather, the ready conversion of hydrate of barium into peroxide of barium by a current of atmospheric air at a dull red heat, and the decomposition of this peroxide, by steam, at a lower temperature, even at 212° Fahr., with reproduction of hydrate of barium, the process being in reality a continuous one. The baryta is mixed with a portion of hydrate of calcium or of magnesium, and the mixture being placed in an appropriate earthen tube heated to dull redness, is oxidised by passing a current of dry atmospheric air over it. As soon as the oxidation is complete, the tube is connected with the gas-holder, and a jet of steam allowed to act upon it; this reconverts the peroxide of barium into hydrate of barium, the excess of oxygen being given off and collected in the gas-holder. The baryta is then again oxidised by a fresh current of air and deoxidised by steam, and the whole process is repeated as frequently as required. One ton of baryta, thus treated, is capable of yielding 2500 cubic feet of pure oxygen every 24 hours; and this, as it does not waste or lose its properties, at the mere cost of the fuel and labour required in the process.

d. From ferrate of potassium, prepared on the large scale. When exposed to moisture or thrown into water, pure oxygen is evolved. This method has been successfully adopted to maintain the air of diving-bells, and of other confined spaces, in a state fit for respiration.

7. OXYGEN GAS AT THE ORDINARY TEMPERATURE. Boettger states that when a mixture is made of equal weights of the peroxides of lead and barium, and dilute HNO_3 of a strength of 9° Beaumé is poured thereon, a current of pure O, free from ozone and antozone, is given off abundantly. This mixture of the two peroxides may be kept dry in a stoppered bottle for any length of time.

Prop. Oxygen gas is colourless, tasteless, inodorous, and incombustible; the sp. gr. is 1·057 (Dumas; 1·1026—Berzelius & Dulong; 1·111—Thomson); 100 cubic inches at 60° Fahr., and 36 inches of the barometer, weigh 34·29 grs. (Dumas; 34·109 grs.—Berz.; 34·6 grs.—Brande; 33·85 grs.—Ure). Its density to that of atmospheric air is, therefore, as about 11 to 10. It is a powerful supporter of combustion, and its presence is essential to the existence of both animal and vegetable life. It forms 21% (20·81%) by volume, and 23% by weight, of the atmosphere. (M. Dumas.) Water dissolves about 5% by volume of oxygen, and by pressure a much larger quantity, forming oxygenated water (AQUA OXYGENII).

Tests. 1. It is distinguished from other gases by yielding nothing but pure water when mixed with twice its volume of hydrogen and exploded, or when a jet of hydrogen is burnt in it.—2. A recently extinguished taper, with the wick still red-hot, instantly inflames when plunged into this gas.—3. A small spiral piece of iron wire ignited at the point, and suddenly plunged into a jar of oxygen, burns with great brilliancy and rapidity. Charcoal does the same.

Estim. The estimation of the quantity of oxygen in an organic compound has already been described. For determining the quantity present in atmospheric air, and other like gaseous mixtures, Dobereiner has proposed the use of pyrogallic acid. The air under examination (freed from moisture) is measured into an accurately graduated tube over mercury, capable of holding about 30 cubic centimètres, and which it should $\frac{2}{3}$rds fill. A solution formed of 1 part of dry hydrate of potassium and 2 parts of water, and in volume about $\frac{1}{5}$th that of the air, is next introduced by means of a pipette with a curved point, and is gently agitated therewith in the gas for a short time; the decrease of volume gives the proportion of carbonic anhydride present. A solution of pyrogallic acid (1 gramme in 5 or 6 centimètres of water), equal in volume to one half that of the solution of potassa already used, is then introduced by means of another pipette, and the mixed liquids are cautiously shaken together over the inner surface of the tube. When absorption ceases (which it does in a few midutes), the quantity of residual gas (nitrogen) is read off from the graduations; the difference in volume before and after the introduction of the pyrogallic acid indicates the proportion of oxygen. This is a mere modification of Prof. Liebig's method. 1 gramme of pyrogallic acid in combination with hydrate of potassium is capable of absorbing about 188 cubic centimètres of oxygen. (Dobereiner.) Other methods employed for the analysis of air, depending on the increase or loss of weight when the air is passed over finely divided copper heated to redness, the loss of volume when the air is exploded in a eudiometer with half its bulk of hydrogen, or when a stick of phosphorus is left in it for some hours, are well known, and described at length in every elementary work on chemical analysis. The last method, although less accurate than the others, has the advantage of extreme simplicity.

Uses. Hitherto the trouble and expense of

preparing oxygen has precluded its direct use on the large scale. It has been employed to increase the illuminative and heating power of lamps, and to render vitiated air respirable, &c.; and when largely diluted with atmospheric air, or condensed in water, as a remedial agent in asphyxia arising from the inhalation of carbonic acid and carbonic oxide.

Concluding remarks. Oxygen gas may be collected in the usual way, either over water, mercury, or in bags; or, on the large scale, in gasometers. The purity of the products of the several processes given above depends on the substances from which the gas is obtained being themselves pure. For particular experiments, the first portion of gas should be allowed to escape, or be received apart, as with this, as with the other gases, it is contaminated with the atmospheric air of the apparatus. The gas procured from manganese or nitre may be purified by passing it through milk of lime or a solution of caustic potassa; it will still, however, retain some traces of nitrogen. See ORGANIC SUBSTANCES, OZONE, &c.

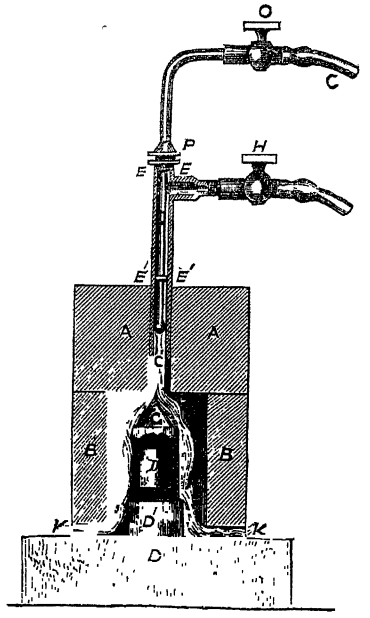
OXYGENA'TION. *Syn.* OXYGENISEMENT. The act or process of combining with oxygen. It is of more general application than the word 'oxidation,' which is frequently confounded with it, but which is only correctly applied when an oxide is formed.

OXYGENI'SED LARD. *Syn.* OXYGENATED AXUNGE; AXUNGIA OXYGENATA, L. *Prep.* (Ph. Bat. 1805.) From prepared lard, 16 parts, melted over a slow fire, and then mixed with nitric acid, 1 part; the combination being promoted by constant stirring with a glass rod, until it ceases to affect litmus paper. It should be extremely white, and should be kept in the dark. See OINTMENT OF NITRIC ACID.

OXYHYDROGEN BLOWPIPE. See BLOWPIPE. Deville and Debray ('Ann. Ch. Phys.' [3], lvi, 385) employ the oxyhydrogen blowpipe in the following manner for effecting the fusion of platinum and the refractory metals which accompany it. The apparatus consists of the blowpipe *C* (see *below*), a furnace *ABD*, and a crucible *GHI*. The blowpipe is composed of a copper tube about half an inch in diameter, terminating below in a slightly conical platinum jet about 1½ inch long. Within this tube, which is supplied with hydrogen or coal gas through the stop-cock *H*, is a second copper tube *C'* for supplying oxygen, terminated also by a platinum nozzle with an aperture of about a twelfth of an inch in diameter.

The furnace *ABD* consists of three pieces of well-burnt lime of slightly hydraulic quality, which may be turned at a lathe with ease. The cylinder *A* is about 2½ inches thick, and is perforated by a slightly conical hole into which the blowpipe fits accurately, passing about half-way through the thickness of the mass. A second somewhat deeper cylinder of lime, *B*, is hollowed into a chamber wide enough to admit the crucible, and leave an interval of not more than a sixth of an inch clear around it. *KK* are four apertures for the escape of the products of combustion.

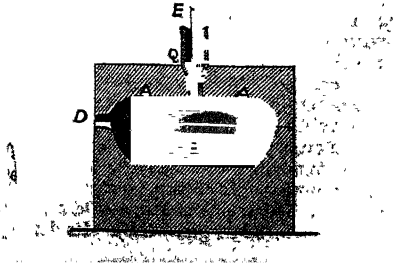
The outer crucible *HH* is also made of lime, but it contains a smaller crucible *I* of gas-coke, provided with a cover of the same material; and in this the substance to be fused is placed, the crucible resting on the lime support *D'*. The conical cover *G* is made



of lime, and its apex should be placed exactly under the blowpipe jet, at a distance from it of ¾ to 1½ inch.

The different pieces of the furnace must be bound round with iron wire to support them when they crack. The oxygen is admitted under a pressure of a column of 16 inches of water. The temperature is gradually raised to the maximum, and in about eight minutes from this time the operation is complete.

By employing a jet of mixed coal-gas and oxygen (*EQ*, see *below*) in a furnace of lime,



Deville and Debray succeeded, at an expense of about 43 cubic feet of oxygen, in melting and refining, in 42 minutes, 25·4 lbs. avoirdupois of platinum, and casting it into an ingot in a mould of gas-coke; and much larger masses have since been melted by this method. Lime is so bad a conductor of heat that if a cup of lime not more than 0·8 inch thick be filled with melted platinum the exterior scarcely rises beyond 300° F. (Miller's 'Elements of Chemistry,' 3rd. ed., pt. ii, p. 825.)

OX'YMEL. *Syn.* OXYMEL, L. An acidulous syrup made of honey and vinegar. There are only two oxymels in the last Ph. L. The ingredients in an oxymel should be of such a character, and in such proportions, as to produce a mixture of the proper consistence without evaporation.

Oxymel of Col'chicum. *Syn.* OXYMEL COLCHICI CORMI, OXYMEL COLCHICI, L. *Prep.* (Ph. D. 1826.) Fresh corms (roots) of meadow saffron, 1 oz.; distilled vinegar, 1 pint (wine measure); macerate for 2 days, press out the liquor, filter, add of clarified honey, 2 lbs., and boil down the mixture to the consistence of a syrup, frequently stirring.—*Dose.* 1 to 3 drs., twice or thrice a day; in gout, rheumatism, dropsy, &c.

Oxymel of Gar'lic. *Syn.* OXYMEL ALII, L. *Prep.* (Ph. L. 1746.) Sliced garlic, 1½ oz.; caraway seed and sweet fennel seed, of each, 2 drs.; boiling vinegar, 8 fl. oz.; infuse, strain, and add of clarified honey, 10 oz. In hooping-cough, chronic diarrhœa, rheumatism, &c.

Oxymel, Pec'toral. *Syn.* OXYMEL PECTORALE, O. INULÆ COMPOSITUM, L. *Prep.* (Ph. Br.) Elecampane, 1 oz.; orris root, ½ oz.; water, 1½ pint; boil to ½ pint, strain, add of honey, 16 oz.; ammoniacum, 1 oz.; (dissolved in) vinegar, 3 fl. oz.; lastly, boil to an oxymel. —*Dose.* 1 spoonful, occasionally; in coughs, humid asthma, &c.

Oxymel, Sim'ple. *Syn.* VINEGAR SYRUP, ACETATED HONEY; OXYMEL (Ph. L. & D.), OXYMEL SIMPLEX, MEL ACETATUM, L. *Prep.* 1. (Ph. L.) Acetic acid (sp. gr. 1·048), 7 fl. oz.; distilled water, 8 fl. oz.; mix, and add them to honey, 5 lbs., previously made hot. This contains only one half the acid ordered in the Ph. L. 1836.

2. (Ph. D.) Clarified honey, 1 lb.; acetic acid (sp. gr. 1·044), 3 oz.; as before. Stronger than the last.

3. Ph. L. 1836.) Honey, 10 lbs.; acetic acid (1·048), 1½ pint; as before. This contains too much vinegar. (See No. 1.)

4. (Wholesale.) From honey (thick and good), 12 lbs.; melt it by a gentle heat, add of distilled vinegar (of fully 5%), 2 quarts, and strain the mixture through flannel. No evaporation is required.

Uses, &c. Demulcent and refrigerant.—*Dose.* 1 to 4 fl. drs., either gradually sucked from the spoon or dissolved through some simple liquid. Dissolved in water, it forms a useful and pleasant cooling drink or gargle in fevers, sore throats, hoarseness, &c.; but in some individuals it occasions griping. It is commonly used as an adjunct, in mixtures, &c.

Oxymel of Squills. *Syn.* HONEY OF SQUILLS; MEL SCILLÆ (Ph. L.), O. SCILLITICUM, L. *Prep.* 1. Vinegar of squills, 2½ pints; gently evaporate it to 12 fl. oz., and add of honey (previously made hot), 5 lbs.

2. (Ph. L. 1836.) Strained honey, 3 lbs.; vinegar of squills, 1½ pint; boil to a proper consistence. The formula of the Ph. D. 1826 was similar.

Uses, &c. Expectorant, and in large doses nauseant.—*Dose.* ½ to 2 fl. drs.; in chronic coughs, hoarseness, humeral asthma, &c.

Oxymel of Ver'digris. See LINIMENT.

OXYR'RHODYNE. *Syn.* OXYRRHODINON. An old compound formed of 1 part of vinegar of roses and 2 parts of oil of roses.

OXYSAC'CHARUM. A syrup acidulated with vinegar. See SYRUP.

OXYSUL'PHIDE. A name given to certain compounds or mixtures of metallic oxides and sulphides. See ANTIMONY, OXYSULPHIDE, &c.

OYS'TER. *Syn.* OSTREA, L. This well-known shell-fish is the *Ostrea edulis* (Linn.)

Oysters are nutritious and easy of digestion, when fresh, but are apt to prove laxative to those unaccustomed to their use. They are in season each month of the year the name of which contains the letter R. The best British oysters are found at Purfleet; the worst near Liverpool. Colchester, and other places in Essex, are the great nurseries or feeding-grounds for supplying the metropolis, and, indeed, the whole of England, with the most esteemed variety (NATIVES) of this shell-fish. The shells (TESTÆ PREPARATÆ, T. OSTREARIÆ) were formerly used in medicine as an absorbent. See SHELL-FISH, SAUCES, &c.

OZONE (Greek, ὄζω, I smell) is a peculiar variety of oxygen, characterised by its greater weight, its peculiar chlorous smell, its intensely active oxidising powers, and, finally, by the ease with which it passes into common oxygen. The history of ozone may be summed up as follows:—In 1785 Van Marum observed the production of a peculiar smell when electric sparks were passed through oxygen. This smell, which every one who has worked with an electric machine must have noticed, Van Marum regarded as the "smell of electricity," thinking that electricity was a substance. In 1840, Schönbein, of Basle, proved the existence of a definite substance, to which he assigned the name of ozone, and discovered several modes of producing it, a delicate test for it, and several of its most striking properties. He subsequently added many new facts, but to the time of his death never held a correct theory in regard to its nature. Later researches by Marignac and Dedalline, Becquerel and Fremy, Andrews and Tait, Soret, Brodie, and others, have established the true nature of this remark-

able body. It is now generally admitted that it only differs from common oxygen in containing three atoms of oxygen in each molecule instead of two. In fact, as the formula for oxygen is O_2, that of ozone is O_3. It follows that ozone is half as heavy again as oxygen, and it has accordingly been demonstrated that its specific gravity is 24 (H=1), that of oxygen being 16. All the known reactions of ozone are easily explained in accordance with this view.

Ozone may be generated in several ways. (1) By the action of electricity on oxygen or air, sparks are far less efficacious than the silent or "slow" discharge; but the best apparatus is the induction-tube of Siemens. This consists of two tubes, one inside the other. The inner side of the inner and the outer side of the outer tube are coated with tinfoil, and these coatings are connected with the terminals of a powerful induction-coil. Dry air or oxygen streams between the tubes and passes out, strongly charged with ozone. (2) During certain processes of oxidation a piece of phosphorus, half covered with water in a bottle of air, absorbs a portion of the oxygen, while another portion becomes partially ozonised. It has been recently shown that ozone is formed in small quantity during the burning of hydrogen at a jet, and in several analogous reactions. (3) During the liberation of oxygen at low temperatures, when barium dioxide is moistened with sulphuric acid, the odour of ozone is at once apparent, and the evolution proceeds for a considerable time. (4) In the electrolysis of water the oxygen evolved consists partly of ozone, especially if the poles are small.

Ozone has never been isolated. By the use of Siemens' apparatus, oxygen containing, as a maximum, twenty volumes per cent. of ozone may be obtained. This represents a contraction of about 1-11th during formation. But it is at present impossible to separate the one from the other. Ozone is entirely converted into oxygen by a temperature of 270° C. The conversion is effected more slowly at lower temperatures. Silver, mercury, iodine, and many other substances, are oxidised immediately, at ordinary temperatures, by ozone. One of the most delicate tests for it is potassium iodide, either alone or mixed with starch. A brown colour in the former case, a blue in the latter, indicates the liberation of iodine. In the best form of *ozonometer* strips of paper saturated with starch and potassium iodide are exposed to the action of a definite volume of air in a dark chamber. The comparative quantities of ozone in different samples of air are judged of by the intensity of the colour compared with a fixed scale on which 1 is the lightest and 10 generally the darkest shade.

Ozone acts as a *reducing* agent in certain curious cases. Thus, hydrogen peroxide and ozone reduce one another, water and oxygen being the sole products; and some substances, such as platinum black and manganese peroxide, convert it into oxygen without suffering change themselves, being probably oxidised and reduced alternately. Ozone is a powerful bleaching and disinfecting agent, from the ease with which it gives up its third atom of oxygen.

Ozone is frequently present in the atmosphere, formed by atmospheric electricity, and perhaps by other means. Its function in nature is not yet well known; but as it readily converts ammonia into ammonium nitrite, it is probable that nitrites, and so ultimately nitrates, are among its ultimate products.

OZONOM'ETER. This name has been given to paper prepared with a mixed solution of starch and iodide of potassium. It is white, but is turned blue by ozonised air, when exposed to it in a slightly moistened state.

PACK'FONG. *Syn.* PAKFONG, CHINESE WHITE COPPER. An alloy formed by fusing together, in a covered crucible, arsenic, 2 parts, and copper clippings, 4½ to 5 parts, arranged in alternate layers, and covered with a capping of common salt. The product contains about 10% of arsenic.

Prop., &c. White, slightly ductile, and permanent at ordinary temperatures; at a temperature below that of redness it suffers decomposition, with the extrication of fumes of arsenious acid. Formerly much used for the scales of thermometers and other instruments, dial plates, candlesticks, &c. It is now almost superseded by the alloy of nickel and copper called German silver, to which the name is also applied by some recent writers.

PACK'ING. As there is considerable art in packing brittle, hollow-ware, as glass, china, &c., in such a way that it will stand exposure to the jolting, blows, and agitation of land carriage, it is better, when it is of much value, or in quantity, to employ a person qualified for the job. A man, accustomed to packing such articles, may be readily procured at any glass-works, or china warehouse, for a trifling consideration. When this cannot be done, it must be recollected that the great secret of safe packing consists in the articles being carefully preserved from undue pressure or contact with each other, yet so firmly arranged, and so surrounded with some material, as hay, straw, sawdust, &c., that they cannot be shaken into such a condition by the ordinary contingencies of transport. Loose packing must always be avoided.

PAD'DING. Amongst calico printers this term is applied to the operation of impregnating the pores of their cloth with a mordant. It is now almost exclusively performed by means of a simple piece of machinery (padding machine), which essentially consists of—a 'large reel,' around which the unprepared cloth is wound—a 'guide roller,' over which it passes to smooth and adjust it before entering the liquor—a copper cylinder or 'dip-roller,' nearly at the bottom of the mordant-trough,

under which it is carried from the guide-roller—a half-round polished 'stretched-bar,' to give it equal tension—a pair of 'padded cylinders,' to remove superfluous moisture—and, lastly, a 'reel' to receive the mordanted ('padded') cloth. The degree of tension is regulated by a weight suspended on a lever, and motion is given to the whole by an endless band from the driving shaft. This machine is also applicable to many of the operations of dyeing, bleaching, and starching textile fabrics.

PAINT'ER'S CREAM. *Prep.* Take of pale nut oil, 6 oz.; mastic, 1 oz.; dissolve, add of sugar of lead, ¼ oz., previously ground in the least possible quantity of oil; then further add of water, q. s., gradually, until it acquires the consistence of cream, working it well all the time. *Used* by painters to cover their work when they are obliged to leave it for some time. It may be washed off with a sponge and water.

PAINT'ING. The art or employment of laying on colour. In the fine arts, the production of a picture or a resemblance in colours on a flat surface. The artistic and mechanical consideration of this subject does not come within the province of our volume; but notices of the leading materials employed by both artists and house painters are given under the respective names. See the various pigments, COLOURS, OILS, VARNISHES, &c., and *below*.

Painting, Distem'per. A method of painting generally adopted by the ancients. Water was the principal medium, but various gelatinous and albuminous 'binders' were added to fix the pigments. Of these the most important were glue, size, and white of egg. In modern distemper, as executed by the painters of theatrical scenery, panoramas, &c., spirit of turpentine is largely employed as a medium.

Painting, Elydor'ic. A method of painting invented by M. Vincent, of Montpelier, having for its object to combine the fresh appearance and finish of water colours with the mellowness of oil painting. The liquid employed as a vehicle for the pigments is an emulsion formed of oil and water by the intervention of certain portion of gum or mucilage.

Painting, Enam'el. In this variety of painting, vitrifiable colours are laid on thin plates of metal, and fused into it. The outline is first burnt in, after which the parts are filled up gradually, with repeated fusions at an enameller's lamp, to the most minute finishing touches. "The enamel painter has to work, not with actual colours, but with mixtures which he only knows from experience will produce certain colours after the operation of the fire." (Aikin.)

Painting, Encaus'tic. This method is very ancient, but is now seldom practised. According to Pliny, the colours were made up into crayons with wax, and the subject being traced on the ground with a metal point, they were melted on the picture as they were used. A coating of melted wax was then evenly spread over all, and when it had become quite cold was finally polished.

The art of encaustic painting, after lying dormant for about 15 centuries, was revived by Count Caylus, in 1753. In its new form, the wood or canvas to be painted on is first well rubbed over with wax, and then held before the fire, so that the wax may penetrate and fill up all the interstices, and form a perfectly even surface. The coloured pigments are next mixed with the powder noticed below, which is then rubbed smooth with some thick gum water, and applied with brushes in the same manner as ordinary water colours. When the painting is finished, and quite dry, it is brushed over with pure white wax in a melted state, the surface being equalised by the skilful application of heat; it is, lastly, polished off, as before.

The powder.—To white wax, melted in an earthen pipkin, add, in small portions at a time, an equal weight of powdered mastic, stirring continuously until the whole is incorporated; then pour it into cold water, and afterwards reduce it to powder in a wedgwood-ware mortar. A small quantity only of this powder is used with light colours; but more is required with the darker ones, until, on approaching black, the two may be mixed in almost equal proportions.

Painting, Fres'co. This method of painting was known to the ancient Egyptians, and was commonly practised by the Greeks and Romans. It is confined to the decoration of the walls of buildings, and is executed by incorporating the colours with the still moist plaster, or gesso. The pigments employed are entirely mineral or vitreous. As it is extremely difficult to alter the work after the colours are once absorbed, or after the ground has hardened, the whole must be carefully designed before commencing the picture, and no more commenced at once than can be executed during the day.

Of all the varieties of painting, fresco is "undoubtedly the most virile, most sure, most resolute, and most durable" (Vasari), and the one most adapted for the purposes of historical painting in its grandest and most exalted forms. In comparison with it, it has been said that even oil painting is "employment fit only for women and children." (Michael Angelo.)

Painting, Glass. See STAINED GLASS.

Painting, Oil. This well-known and much practised method of painting takes its name from the vehicle employed for the colours. The last may be any of those of a permanent character, and whose natural tint is not altered by admixture with oil. Linseed, nut, and poppy oil, are those which are principally employed. The first requires the addition of 'driers,' and hence is generally used under the form of 'boiled oil.' Spirit of turpentine is

commonly used to thin down the prepared colours, and the finished picture is frequently covered with a coat of varnish.

Painting, Por'celain. See POTTERY, STAINED GLASS, &c.

Painting, Vel'vet. Any of the ordinary non-corrosive pigments or liquid colours, thickened with a little gum, may be employed in this art; preference being, however, given to those that possess the greatest brilliancy, and which dry without spreading. See STAINS, &c.

Painting, Water-colour. In its strictest and modern sense, 'water-colour painting' means the painting on paper with colours diluted with water. The English school of water-colour painting has produced works which bear comparison with the great masterpieces in oil, and even surpass them in the delicacy of atmospheric effects. The old practice of making the entire drawing in light and shade by washes of Indian ink or neutral tints, and then adding the various local colours in transparent washes, has given place to the more healthy system of painting every object in its appropriate local colour at the outset.

PAINTINGS. Many valuable paintings suffer premature decay from the attacks of a microscopic insect, a species of acarus or mite. The best method of preventing this variety of decay, is to add a little creasote (dissolved in brandy or vinegar), or a few grains each of corrosive sublimate and sal ammoniac (dissolved in a little water), to the paste and glue used to line the picture, as well as to add a few drops of pure creasote or of an alcoholic or ethereal solution of corrosive sublimate to the varnish, when any is to be applied. If the destruction alluded to has already commenced, the painting should be at once carefully cleaned and re-lined, observing to employ one or other of the remedies just mentioned.

The most appropriate and only safe situation in which to keep paintings, is where there is a pure and moderately dry atmosphere. Impure air abounds in carbonic acid and sulphuretted hydrogen. It is the presence of the last in the air that blackens the 'lights,' and causes most of the 'middle tints' and 'shades' to fade; and it is exposure to damp that produces mouldiness and decay of the canvas. For this reason valuable paintings should not be kept in churches, nor suspended against heavy walls of masonry, especially in badly ventilated buildings. Excess of light, particularly the direct rays of the sun, also acts injuriously on paintings, since it bleaches some colours and darkens others.

The blackened lights of old pictures may be instantly restored to their original hue by touching them with peroxide of hydrogen, diluted with 6 or 8 times its weight of pure water. The part must be afterwards washed with a clean sponge and water. The most astonishing results have been produced in this way, See PEROXIDE OF HYDROGEN (pag 610).

PAINTS. In trade, this term is commonly applied to pigments ground with oil to a thick paste, ready to be 'thinned down' with oil or turpentine to a consistence adapted for application with a brush.

Paints are prepared on the small scale by grinding the dry pigments with the oil by means of a stone-and-muller; on the large scale they are ground in a colour mill. There are several pigments, as King's yellow, Scheele's green, verdigris, white lead, &c., which from their poisonous character cannot be safely ground by hand, except in very small quantities at a time, and then only by the exercise of extreme caution.

In mixing or thinning down paints for use, it may be useful to mention that—for out-door work, boiled oil is principally or wholly employed, unless it be for the decorative parts of houses, when a portion of turpentine and pale linseed oil is often added.—For in-door work, linseed oil, turpentine, and a little 'driers,' are generally used in the same way. The smaller the proportion of oil employed for the purpose, the less will be the gloss, and the greater the ultimate hardness of the coating. For 'flatted white,' &c., the colour being ground in oil, requires scarcely any further addition of that article, as the object is to have it 'dead' or dull. The best driers are ground litharge, and ground sugar of lead; the first for dark and middle tints, and the last for light ones.

To preserve mixed paints in pots from 'skinning over' or drying up, they should be kept constantly covered with water; or, what is better, with a thin film of linseed oil.

Brushes, when out of use, may be preserved in a similar manner to mixed paints. When dirty, or required for a paint of another colour, they may be cleaned with a little oil of turpentine, which may be either preserved for the same purpose another time, or may be allowed to deposit its colour, and then used to thin down paints as usual. In no case, however, should it be thrown back into the cistern or pan with the pure 'turps.'

Paints, Flex'ible. *Prep.* Take of good yellow soap (cut into slices), 2½ lbs.; boiling water, 1½ gall.; dissolve, and grind the solution whilst hot with good oil paint, 1½ cwt. *Used* to paint canvas.

Paints, Vitrifi'able. See ENAMEL, GLAZE, STAINED GLASS, &c.

PALLA'DIUM. Pd. A rare metal discovered by Dr. Wollaston in the ore of platinum, in 1803.

Prep. 1. A solution of the ore of platinum in *aqua regia*, from which most of the metal has been precipitated by chloride of ammonium, is neutralised by carbonate of sodium, and then treated with a solution of cyanide of mercury; the white insoluble precipitate (cyanide of palladium) is next washed, dried, and heated to redness; the residuum of the

ignition (spongy palladium) is then submitted to a gradually increased pressure, and welding at a white heat, so as to form a button, in a similar manner to that adopted with platinum. *Prod.* Columbian ore of platinum, 1⅛; Uralian do., ·25 to ·75.

2. The native alloy of gold and palladium (from the Brazils) is submitted to the operations of quartation and parting, the nitric acid employed being of the density of 1·3; the silver is next precipitased from the solution by means of a solution of common salt or dilute hydrochloric acid, and the decanted supernatant liquid, after evaporation to one half, is neutralised with ammonia, and concentrated so that crystals may form; these (chloride of palladium and ammonium) are cautiously washed in a little very cold water, dried, mixed with borax, and exposed in a crucible to the strongest heat of a powerful blast furnace, when a solid button of pure palladium is formed.

Prop., &c. Palladium closely resembles platinum in appearance, fusibility, malleability, and ductility; but it is less dense, and has a rather more silvery colour than that metal; it is freely soluble in aqua regia, and is slowly attacked by nitric acid, but the other acids exert little or no action on it; heated to redness in the air, a very superficial blue or purple film of oxide forms on the surface, which is again reduced at a white heat. It melts at 156° Wedgwood. Sp. gr. 11·3 to 12·1 (11·8—Wollaston; 12·14—Vauquelin). It readily unites with copper, silver, and some other metals, by fusion.

Tests. 1. The neutral solutions of palladium are precipitated in the metallic state by ferrous sulphate, dark brown by sulphuretted hydrogen, olive by ferrocyanide of potassium, and yellowish-white by cyanide of mercury.—2. A drop of tincture of iodine placed on the surface of metallic palladium, and then evaporated by the heat of a spirit lamp, leaves a black spot. By the last two tests palladium is readily distinguished from platinum.

Uses. It has been employed to form the scales of mathematical and astronomical instruments, and is used in dentistry. Its alloy with silver is a very valuable white metal. It is also used for making the smaller divisions of grain and gramme weights. Palladium is not tarnished by sulphuretted hydrogen. An alloy of 1 part of palladium and 100 parts of steel is well adapted for cutting instruments which require to be perfectly smooth on the edge.

PALMIT'IC ACID. $HC_{16}H_{31}O_2$. Prepared from palmitin (*see* next article), by saponification, as stearic acid is prepared from stearin. It forms pearly scales, and melts at 140° Fahr., like margaric acid, which it closely resembles.

PAL'MITIN. *Syn.* TRIPALMITIN. $C_3H_5(C_{16}H_{31}O_2)_3$. The solid portion of palm oil, purified by crystallisation from hot ether. White; soluble in ether and slightly so in hot alcohol; melts at 118° Fahr.; by saponification, it is converted into palmitic acid. (See *above.*)

PALPITA'TION. *Syn.* PALPUS, PALPITATIO CORDIS, L. A violent and irregular beating or action of the heart, either temporary or occasional. When it does not arise from sudden or violent agitation or distress of mind, it may be regarded as a symptom of a disturbance of the nervous functions by disease, in which case attention should be directed to the removal of the primary affection.

PAL'SY. See PARALYSIS.

PANACE'A. A term formerly applied to those remedies which were supposed to be capable of curing all diseases, and still applied to some quack medicines.

PANA'DA. See BREAD JELLY.

PAN'ARY FERMENTA'TION. The vinous fermentation as developed in the dough of bread.

PAN'CAKES. These are essentially fried batter, variously enriched and flavoured, according to the taste of the cook. When they contain fruit, fish, meat, or poultry, or are highly seasoned or ornamented, they are commonly called FRITTERS.

Prep. (M. Soyer.) Break 2 to 4 eggs into a basin, add 4 small table-spoonfuls of flour, 2 teaspoonfuls of sugar, and a little salt; beat the whole well together, adding, by degrees, ½ pint of milk, or a little more or less, depending on the size of the eggs and the quality of the flour, so as to form a rather thick batter; next add a little ginger, cinnamon, or any other flavour at will; lastly, put them into the pan, and when set, and one side brownish, lay hold of the frying-pan at the extremity of the handle, give it a sudden but slight jerk upwards, and the cake will turn over on the other side; when this is brown, dish up with sifted sugar, and serve with lemon. See FRITTERS.

PANIFICA'TION. The changes which occur in flour-dough under the influence of the fermentative process and heat, by which it is converted into bread.

PAPA'VERINE. *Syn.* PAPAVERINA. An alkaloid discovered by Merck in opium. It crystallises in needles; is insoluble in water; is slightly soluble in cold alcohol, and in ether; and forms crystallisable salts with the acids which possess little solubility. The hydrochlorate, one of the most characteristic of these compounds, crystallises in beautiful colourless prisms, which possess a high refractive power, and are only very slightly soluble in dilute hydrochloric acid.

PA'PER. *Syn.* CHARTA, PAPYRUS, L.; PAPIER, Fr. The limits of this work preclude the introduction of a description of the manufacture of this well-known and most useful article, which is now almost exclusively made by machinery of an elaborate and most ingenious description. We must, therefore, content ourselves with a short notice of a few of

the preparations of the manufactured article. (See *below.*)

Good white paper should be perfectly devoid of odour, and when burnt it should leave a mere nominal amount of ash; digested in hot water, the liquid should be neutral to test paper, and not affected by sulphuretted hydrogen or the alkaline sulphurets, or by tincture of iodine. Coloured papers should not contain any deleterious matter.

Paper, Blistering. See VESICANTS.

Paper, Cloth. This is prepared by covering gauze, calico, canvas, &c., with a surface of paper pulp in a 'Foudrinier machine,' and then finishing the compound sheet in a nearly similar manner to that adopted for ordinary paper.

Paper, Col'oured. For those papers which are merely coloured on one side, the pigments, ground up with gum water or size, or the stains thickened with a little of the same, are applied with a brush, after which the sheets are suspended on a line to dry.

For paper coloured throughout its substance, the tinctorial matter is usually mixed with the pulp in the process of manufacture; or the manufactured paper is dipped into a bath of the colouring substance, and then hung up to dry.

Paper, Cop'ying. *Prep.* Make a stiff ointment with butter or lard and black lead or lamp black, and smear it thinly and evenly over soft writing paper, by means of a piece of flannel; the next day wipe off the superfluous portion with a piece of soft rag.

Use, &c. Placed on white paper and written on with a style or solid pen, a copy of the writing is left on the former. By repeating the arrangement, 2, 3, or more copies of a letter may be obtained at once. This paper, set up in a case, forms the ordinary 'manifold writer' of the stationers. The copying or transfer paper used for obtaining fac-similes of letters written with 'copying ink,' is merely a superior quality of bank-post paper.

Paper, Em'ery. See EMERY,

Paper, Glass. *Prep.* From powdered glass, as emery paper. *Used* to polish wood, &c. See GLASS (Powdered).

Paper, Gout. *Syn.* CHARTA ANTI-ARTHRITICA, L.; PAPIER FAYARD, Fr. *Prep.* 1. Euphorbium, 1 part; cantharides, 2 parts; (both in powder;) rectified spirit, 8 parts; ether, 3 parts; digest in a stoppered bottle, with frequent agitation, for a week; to the strained tincture add of Venice turpentine, 1 part; lastly, dip thin white paper into it, and dry the sheets in the air.

2. (Mohr.) Euphorbium, 1 dr.; cantharides, 4 drs.; rectified spirit (strongest), 5 oz.; make a tincture, to which add of Venice turpentine, 1½ oz., previously liquefied with resin, 2 oz.; and spread the mixture, whilst warm, very thinly on paper. *Used* as a counter-irritant in gout, rheumatism, &c.

Paper, Hydrograph'ic. An absurd name given to paper which may be written on with simple water or with some colourless liquid having the appearance of water.

Prep. 1. A mixture of nut-galls, 4 parts, and calcined sulphate of iron, 1 part (both perfectly dry and reduced to very fine powder), is rubbed over the surface of the paper, and is then forced into its pores by powerful pressure, after which the loose portion is brushed off. Writes black with a pen dipped in water.

2. From ferric sulphate and ferrocyanide of potassium, as the last. Writes blue with water.

3. As the last, but using sulphate of copper instead of sulphate of iron. Writes reddish-brown with water.

4. The paper is wetted with a colourless solution of ferrocyanide of potassium, and after being dried is written on with a colourless solution of ferric sulphate. Writes blue.

Obs. The above applications, we need scarcely say, are more amusing than useful. See SYMPATHETIC INK.

Paper, Incombus'tible. See INCOMBUSTIBLE FABRICS.

Paper, Irides'cent. *Prep.* (Beasley.) Sal ammoniac and sulphate of indigo, of each, 1 part; sulphate of iron, 5 parts; nut-galls, 8 parts; gum arabic, ⅛th part; boil them in water, and expose the paper washed with the liquid to (the fumes of) ammonia.

Paper, Issue. *Syn.* CHARTA AD FONTICULOS, L. *Prep.* (Soubeiran.) Elemi, spermaceti, and Venice turpentine, of each, 1 part; white wax, 2 parts; melt them together by a gentle heat, and spread the mixture on paper. *Used* to keep issues open.

Paper, Lithograph'ic. *Prep.* 1. Starch, 6 oz.; gum arabic, 2 oz.; alum, 1 oz.; make a strong solution of each separately, in hot water, mix, strain through gauze, and apply it whilst still warm to one side of leaves of paper, with a clean painting-brush or sponge; a second and a third coat must be given as the preceding one becomes dry; the paper must be, lastly, pressed, to make it smooth.

2. Give the paper 3 coats of thin size, 1 coat of good white starch, and 1 coat of a solution of gamboge in water; the whole to be applied cold, with a sponge, and each coat to be allowed to dry before the other is applied. The solutions should be freshly made.

Use, &c. Lithographic paper is written on with lithographic ink. The writing is transferred by simply moistening the back of the paper, placing it evenly on the stone, and then applying pressure. A reversed copy is obtained, which, when printed from, yields corrected copies, resembling the original writing or drawing. In this way the necessity of executing the writing or drawing in a reversed direction is obviated. See LITHOGRAPHY, INK, &c.

Paper, Oiled. *Prep.* Brush sheets of paper over with 'boiled oil,' and suspend them on a line till dry. Waterproof. Extensively employed as a cheap substitute for bladder and

gut skin, to tie over pots and jars, and to wrap up paste blacking, ground white lead, &c.

Paper, Parch'ment. *Syn.* PAPYRIN, VEGETABLE PARCHMENT. *Prep.* 1. (Poumarède and Figuier.) Dip white unsized paper for half a minute in strong sulphuric acid, sp. gr. 1·842, and afterwards in water containing a little ammonia.

2. (W. E. Gaine, Patent 1857.) Plunge unsized paper for a few seconds into sulphuric acid diluted with half to a quarter its bulk of water (this solution being of the same temperature as the air), and afterwards wash with weak ammonia. This process, now extensively worked by Messrs. De la Rue and Co., produces a much better material than does that of Poumarède and Figuier.

P[illegible]n. A tough substance, resembling animal [illegible]ment, and applicable to the same pur[illegible]s. It is largely *used* for covering pots of pic[illegible] and preserves, and by the chemist for the [illegible]rvening membrane in experiments in diffusion. See DIALYSER, DIALYSIS, &c.

Paper, Ra''zor. Smooth unsized paper, one of the surfaces of which, whilst in a slightly damp state, has been rubbed over with a mixture of calcined peroxide of iron and emery, both in impalpable powder. It is cut up into pieces (about 5 × 3 inches), and sold in packets. *Used* to wipe the razor on, which thus does not require stropping.

Paper, Razor-strop. From emery and quartz (both in impalpable powder), and paper pulp (estimated in the dry state), equal parts, made into sheets of the thickness of drawing paper, by the ordinary process. For *use*, a piece is pasted on the strop and moistened with a little oil.

Paper, Res'in. *Syn.* POOR-MAN'S PLASTER; CHARTA RESINOSA, L. *Prep.* 1. Bees' wax, 1 oz.; tar and resin, of each, 3 oz.; melted together and spread on paper.

2. (Ph. Bor.) Paper, thinly spread over with black pitch. Calefacient, stimulant, and counter-irritant; in rheumatism, chest affections, &c.

Paper, Rheu'matism. See GOUT and RESIN PAPERS.

Paper, Safe'ty. *Syn.* PAPIER DE SURETÉ, Fr. White paper pulp mixed with an equal quantity of pulp tinged with any stain easily affected by chlorine, acids, alkalies, &c., and made into sheets as usual.

Paper, Test. *Syn.* CHARTA EXPLORATORIA, L. Under this head may be conveniently included all the varieties of prepared paper employed in testing. For this purpose sheets of unsized paper or of good ordinary writing paper (preferably the first), are uniformly wetted with a solution of the salt, or with a cold infusion or decoction of the tinctorial substance in distilled water, and are then hung up to dry in a current of pure air; they are, lastly, cut into pieces of a convenient size, and preserved in closed bottles or jars. For *use*, a small strip of the prepared paper is either dipped into or moistened with the liquid under examination, or it is moistened with distilled water, and then exposed to the fumes. A single drop, or even less, of any liquid may be thus tested.

The following are the principal test papers and their applications:—

PAPER, BRAZIL-WOOD. From the decoction. Alkalies turn it purple or violet; strong acids, red.

PAPER, BUCKTHORN. From the juice of the berries. Reddened by acids.

PAPER, CHERRY-JUICE. As the last.

PAPER, DAHLIA, GEORGINA P. From an infusion of the petals of the violet dahlia (*Georgina purpurea*). Alkalies turn it green; acids, red; strong caustic alkalies turn it yellow. Very delicate.

PAPER, ELDERBERRY. From the juice of the berries. As the last.

PAPER, INDIGO. From a solution of indigo. Decoloured by chlorine.

PAPER, IODIDE OF POTASSIUM.—*a.* From the solution in distilled water. Turned blue by an acidulated solution of starch.

b. From a mixture of a solution of iodide of potassium and starch paste. Turned blue by chlorine, ozone, and the mineral acids, and by air containing them.

PAPER, LEAD. From a solution of either acetate or diacetate of lead. Sulphuretted hydrogen and hydrosulphuret of ammonia turn it black.

PAPER, LITMUS. In general, this is prepared from infusion of litmus, without any precaution, but the following plan may be adopted when a superior test paper is desired:—

a. (Blue.) Triturate commercial litmus, 1 oz., in a wedgwood-ware mortar, with boiling water, 3 or 4 fl. oz.; put the mixture into a flask, and add more boiling water until the liquid measures fully ½ pint; agitate the mixture frequently until it is cold, then filter it, and divide the filtrate into two equal portions; stir one of these with a glass rod previously dipped into very dilute sulphuric acid, and repeat the operation until the litmus infusion begins to look very slightly red, then add the other half of the filtrate, and the two being mixed together, dip strips of unsized paper into the liquid, in the usual manner, and dry them. Acids turn it red; alkalies, blue. The neutral salts of most of the heavy metals also redden this, as well as the other blue test papers that are affected by acids.

b. (Red.) The treatment of the whole quantity of the infusion (see *above*) with the rod dipped in dilute sulphuric acid is repeated until the fluid begins to look distinctly red, when the paper is dipped into it as before. The alkalies and alkaline earths, and their sulphides, restore its blue colour; the alkaline carbonates and the soluble borates also possess the same property. Very sensitive. An extemporaneous red litmus paper may be prepared by holding a strip of the blue variety over a pot or ja[illegible]

cessary), roll the mass out, and cut it into squares or lozenges.

Paste, Flour. *Syn.* COLLE DE PÂTE, Fr. From wheaten flour. Paper-hangers, shoemakers, &c., usually add to the flour ⅛ to ¼ of its weight of finely powdered resin. It is then sometimes called 'hard paste.' The addition of a few drops of creasote or oil of cloves, or a little powdered camphor, colocynth, or corrosive sublimate (especially the first two and the last), will prevent insects from attacking it, and preserve it in covered vessels for years. Should it get too hard, it may be softened with water. See CEMENTS.

Paste, Fruit. *Prep.* 1. To each pint of the strained juice add of gum arabic, 1 oz., gently evaporate to the consistence of a syrup, and add an equal weight of bruised white sugar; as soon as the whole is united, pour it out on an oiled slab, and, when cold enough, cut it into pieces.

2. Citric acid, ¾ oz.; gum arabic, 6 oz.; white sugar, 2 lb.; water, q. s.; dissolve, and flavour with any of the fruit essences. It may be coloured with any of the stains used for confectionery or liqueurs.

3. As fruit lozenges (see page 721).

Paste, Fur'niture. See POLISH.

Paste, Glove. See GANTEINE.

Paste of Gum Arabic. *Syn.* PASTA GUMMI, L.; PÂTE DE GOMME, P. DE G. ARABIQUE, Fr. *Prep.* 1. As marsh-mallow paste, omitting the mallow roots.

2. Gum arabic (picked), 1 lb.; water, 1 pint; dissolve, add of white sugar, 1 lb.; evaporate by a gentle heat to a very thick syrup, then add the whites of 3 eggs, previously beaten up with orange-flower water, 1 fl. oz., and strained through muslin, and continue the heat with constant stirring, until of a proper consistence on being cooled. The last two are commonly sold for marsh-mallow paste (pâte de guimauve).

3. (Transparent.) From gum arabic (picked), 1 lb.; cold water, 1 pint; white sugar, 1½ lb.; proceed as the last, adding orange-flower water, 1 fl. oz., towards the end. Often sold under the name of 'white jujubes.'

Paste of Gum Senegal. *Syn.* PÂTE DE GOMME SENEGAL, Fr. As jujube paste, without the fruit.

Paste, Hon'ey. See ALMOND PASTE.

Paste, Ju'jube. *Syn.* JUJUBES, JUJUBE LOZENGES; PASTA JUJUBÆ, L.; PÂTE DE JUJUBES, Fr. *Prep.* (P. Cod.) Jujubes (the fruit), 1 lb.; water, 4 lbs.; boil ½ hour, strain with expression, settle, decant the clear portion, and clarify it with white of egg; add a strained solution of gum arabic, 6 lbs., in water, 8 lbs., and to the mixture add of white sugar, 5 lbs.; gently evaporate, at first constantly stirring, and afterwards without stirring, to the consistence of a soft extract, then add of orange-flower water, 6 fl. oz., and place the pan in a vessel of boiling water. In 12 hours carefully remove the scum, pour the matter into slightly oiled tin moulds, and finish the evaporation (hardening) in a stove heated to 104° Fahr. It is commonly coloured with beet-root, cochineal, or saffron. Expectorant; in coughs, &c. Paste of gum arabic is usually sold for it.

Paste, Li'chen. *Syn.* PASTA LICHENIS, L.; PÂTE DE LICHEN, Fr. *Prep.* (P. Cod.) Iceland moss, 1 lb.; water, q. s.; heat them to nearly the boiling-point, strain with pressure, reject the liquor, and boil the moss in fresh water, q. s., for 1 hour; strain, press, add of gum arabic, 5 lbs.; white sugar, 4 lbs., and evaporate to a proper consistence, as above. Pectoral. With the addition of ½ gr. of extract of opium to each oz., it forms the opiated lichen paste. (P. Cod.)

Paste, Liquorice. *Syn.* LIQUORICE JUJUBES, PASTA GLYCIRRHIZÆ, L.; PATE DE RÉGLISSE, P. DE R. NOIRE, Fr. *Prep.* 1 (P. Cod.) Refined juice and white sugar, of each 1 lb.; gum arabic, 2 lbs.; water, 3 quarts; dissolve, strain, evaporate considerably, and, of finely powdered orris root, ½ oz.; oil of aniseed or essence of cedrat, a few drops, and pour the paste upon an oiled slab, or into moulds, as before.

2. (Brown; PÂSTA G. FUSCA; PÂTE DE R. BRUNE.) Refined juice, 4 oz.; white sugar, 2 lbs.; gum arabic, 3 lbs.; water, 4 pints; proceed as last.

3. (Opiated; PÂTE DE R. OPIACE.—P. Cod.) To the last add of extract of opium, 15 grs.

4. (White; PÂTE DE RÉGLISSE BLANCHE.) As No. 2, substituting the powder of the decorticated root for the extract. All the above are pectoral; the second is also slightly anodyne. They are useful in tickling coughs, hoarseness, &c.

Paste, Marsh-mallow. *Syn.* PASTA ALTHÆÆ, L.; PÂTE DE GUIMAUVE, Fr. *Prep.* (P. Cod. 1816.) Decorticated marsh-mallow root (French), 4 oz.; water, ½ gall.; macerate for 12 hours, strain, add white sugar and gum arabic, of each, 2½ lbs.; dissolve, strain, evaporate without boiling to the thickness of honey, constantly stirring, and add, gradually, the whites of 12 eggs, well-beaten with orange-flower water, 4 fl. oz., and strained; continue the evaporation and constant stirring until the mass is so firm as not to adhere to the fingers, then proceed as before.

Obs. It should be very white, light, and spongy. In the P. Codex of 1839 the marsh-mallow root is omitted, and the name is changed to that of 'pâte de gomme,' a compound long sold for it in the shops. Both are agreeable pectorals. See PASTE OF GUM ARABIC.

Paste, Odontal'gic. *Syn.* PASTA ODONTALGICA, L. *Prep.* 1. Pellitory (in powder), ½ dr.; hydrochlorate of morphia, 3 grs.; triturate; add, of honey, 2 drs.; and oil of cloves, 6 drops.

2. Powdered mastic, pellitory, and white

sugar, of each, 1 dr.; chloroform, q. s. to form a paste. It must be kept in a stoppered bottle. See TOOTHACHE, and *below*.

Paste, Or'ange. *Prep.* From orange flowers, 2 lbs.; bitter and sweet almonds, of each, blanched, 2½ lbs.; beaten to a perfectly smooth paste. An agreeable cosmetic. See ALMOND PASTE.

Paste, Or'geat. *Prep.* From blanched Jordan almonds, 1 lb.; blanched bitter a. and white sugar or honey, of each, ¼ lb.; beaten to a paste, with orange-flower water, q. s. (or neroli, a few drops), and put into pots. As a cosmetic or to make orgeat milk. For use, rub 1 oz. with ½ pint of water, and strain through muslin.

Paste, Pec'toral. *Syn.* PASTA PECTORALIS, L. *Prep.* 1. (PÂTE PECTORALE DE BAUDRY.) Take of gum arabic and white sugar, of each, 7 lb.; water, q. s.; dissolve, add of extract of liquorice, 3 oz.; evaporate, add of extract of lettuce, 2 drs.; balsam of tolu, 1½ oz.; orange-flower water, 4½ fl. oz.; white of 4 eggs; oil of citrons, 5 or 6 drops.

2. (PÂTE PECTORALE BALSAMIQUE DE REGNAULT.) From the flowers of coltsfoot, cudweed, mallow, and red poppy, of each, 1 oz.; water, 1 quart; boil, strain; add, of gum arabic, 30 oz.; white sugar, 20 oz.; dissolve, concentrate, add of tincture of tolu, 3 fl. dr., and pour the mixture on an oiled slab.

3. (ANISATED COLTSFOOT PASTE; PÂTE DE TUSSILAGE À L'ANIS.) From strong decoction of coltsfoot flowers, 1 quart; Spanish juice, ½ lb.; dissolve, strain, evaporate as before, and towards the end add of oil of aniseed, 1 dr. All the above are useful in hoarseness, coughs, &c.

Paste, Pho'sphor. See RATS.

Paste, Pol'ishing. *Prep.* 1. (For copper and brass.) See BRASS PASTE (see page 252).

2. (For iron and steel). From emery (in fine powder) and lard, equal parts.

3. (For pewter.) From powdered Bath brick, 2 parts; soft soap, 1 part; water, q. s. to make a paste. *Used* with a little water, and afterwards well rinsed off.

4. (For furniture.) See POLISH.

Paste, Ra"zor. *Prep.* 1. From jeweller's rouge, plumbago, and suet, equal parts, melted together and stirred until cold.

2. From prepared putty powder (levigated oxide of tin), 3 parts; lard, 2 parts; crocus martis, 1 part; triturated together.

3. Prepared putty powder, 1 oz.; powdered oxalic acid, ¼ oz.; powdered gum, 20 grs.; make a stiff paste with water, q. s., and evenly and thinly spread it over the strop, the other side of which should be covered with any of the common greasy mixtures. With very little friction this paste gives a fine edge to the razor, and its action is still further increased by slightly moistening it, or even breathing on it. Immediately after its use, the razor should receive a few turns on the other side of the strop.

4. Diamond dust, jeweller's rouge, and plumbago, of each, 1 part; suet, 2 parts. Powdered quartz is generally substituted for diamond dust, but is much less effective.

5. (Mechi's.) Emery (reduced to an impalpable powder), 4 parts; deer suet, 1 part; well mixed together.

6. (Pradier's.) From powdered Turkey stone, 4 oz.; jeweller's rouge and prepared putty power, of each, 1 oz.; hard suet, 2 oz.

Obs. The above (generally made up into square cakes) are rubbed over the razor strop, and the surface being smoothed off with the flat part of a knife or a phial bottle, the strop is set aside for a few hours to harden before being used.

Paste, Regnault's. See PECTORAL PASTE.

Paste, Rubefa"cient. *Syn.* PASTA RUBEFACIENS, L. *Prep.* (Clarus.) From acetate of lead, 1 oz.; bisulphate of potassa, 3 oz.; water, q. s. It acts powerfully and quickly on the skin.

Paste, Rust's. *Prep.* From powdered opium and extract of henbane, of each, 10 grs.; powdered pellitory and extract of belladonna, of each, 20 grs.; oil of cloves, 10 drops. In toothache.

Paste, Sha"ving. *Prep.* 1. Naples soap (genuine), 4 oz.; powdered Castile soap, 2 oz.; honey, 1 oz.; essence of ambergris and oils of cassia and nutmegs, of each, 5 or 6 drops.

2. White wax, spermaceti, and almond oil, of each, ¼ oz.; melt, and, whilst warm, beat in 2 squares of Windsor soap previously reduced to a paste with a little rose water.

3. White soft soap, 4 oz.; spermaceti and salad oil, of each, ½ oz.; melt them together, and stir until nearly cold. It may be scented at will. When properly prepared, these pastes produce a good lather with either hot or cold water, which does not dry on the face. The proper method of using them is to smear a minute quantity over the beard, and then to apply the wetted shaving-brush, and not to pour water on them, as is the common practice.

Paste, Swediaur. See CHILBLAIN.

Paste, Tooth. *Syn.* PASTA DENTIFRICIA, ELECTUARIUM DENTIFRICUM, L. Various preparations are known under this name. They consist, for the most part, of the ordinary substances used as dentifrices, reduced to the state of a very fine powder, and mixed with sufficient honey, sugar, or capillaire, to give them the required consistence. Honey of roses is often used for this purpose, with some agreeable perfume at will. A little eau de Cologne or rectified spirit is a useful addition. The following are a few examples:—

1. (CARBON PASTE; OPIAT CARBONIQUE.) The chippings of Turkey stone, cylinder charcoal, and prepared chalk, of each, 2 oz.; cochineal and cloves, of each, 1 dr.; honey, 5

sifted through lawn. The fusion must be carefully conducted and continuous, and the melted mass should be allowed to cool very slowly, after having been left in the fire from 24 to 30 hours, at the least. Hessian crucibles are preferred for this purpose, and the heat of an ordinary pottery or porcelain kiln is sufficient in most cases; but a small wind-furnace, devoted exclusively to the purpose, is, in general, more convenient. It is found that the more tranquil, continuous, and uniform the fusion, the denser and clearer is the paste, and the greater its refractive power and beauty.

All the coloured vitreous compounds noticed under GLASS may be worked up as ornamental stones, in the same way as those just referred to.

The following method of obtaining artificial rubies and emeralds, first pointed out by Boettger, is exceedingly simple and inexpensive, and deserves the serious attention of those interested in this ingenious art:—Recently precipitated and well-washed hydrate of aluminum is moistened with a few drops of neutral chromate of potassium, and kneaded so that the mass assumes a tinge scarcely perceptible; it is then rolled up into small sticks, about the thickness of a finger, and slowly dried, taking the precaution to fill the fissures (if any) that form during desiccation with fresh hydrate of aluminum. When perfectly dry, and after having been submitted to a gentle heat, one end of these sticks is brought into the termination of the flame of an oxy-hydrogen blowpipe, until a portion of the mass is fused into a small globule. After the lapse of a few minutes, several minute balls form, having a diameter of some millimètres, and of such intense hardness that quartz, glass, topaz, and granite, may be easily and perceptibly scratched with them. These, when cut and polished, appear, however, slightly opaque. By employing nitrate of nickel in lieu of chromate of potassium, green-coloured globules, closely resembling the emerald, are obtained.

By the substitution of oxide of chromium for chromate of potassium, Mr. Cooley produced factitious gems of considerable hardness and beauty, though slightly opaque in some portion of the mass. The addition of a very little silica prevented, in a great measure, this tendency to opacity.

It may be observed that the beauty of pastes of factitious gems, and especially the brilliancy of mock diamonds, is greatly dependent upon the cutting, setting up, and the skilful arrangement of the foil or tinsel behind them. See ENAMEL, FOILS, GEMS, GLASS, &c.

PAS'TELS. [Fr.] Coloured crayons.

PAS'TIL. *Syn.* PASTILLE; PASTILLUS, PASTILLUM, L. A lozenge or confection. The pastilles (PASTILLI) of French pharmacy, are merely 'confectionery drops' aromatised or medicated. The name is also given to mixtures or odorous substances made up into small cones and burnt as incense. (See *below*).

Pastils, Explo'sive. Fumigating pastilles, containing a little gunpowder. *Used* to produce diversion, but they often prove far from harmless.

Pastils, Fumiga'ting. *Syn.* AROMATIC PASTILLES, INCENSE P.; PASTILLI FUMANTES, P. ODORATI, L. *Prep.* 1. Benzoin, 4 oz.; cascarilla, ½ oz.; nitre and gum arabic, of each, 3 drs.; myrrh, 1 dr.; oils of nutmeg and cloves, of each, 25 drops; charcoal, 7 oz.; all in fine powder; beat them to a smooth ductile mass with cold water, q. s.; form it into small cones with a tripod base, and dry them in the air.

2. (Henry and Guibourt.) Powdered gum benzoin, 16 parts; balsam of tolu and powdered sandal wood, of each, 4 parts; a light charcoal (Linden), 48 parts; powdered tragacanth and true labdanum, of each, 1 part; powdered nitre and gum arabic, of each, 2 parts; cinnamon water, 12 parts; as above.

3. (P. Cod.) Benzoin, 2 oz.; balsam of tolu and yellow sandal wood, of each, 4 drs.; nitre, 2 drs.; labdanum, 1 dr.; charcoal, 6 oz.; mix with a solution of gum tragacanth, and divide the mass into pastilles, as before.

4. (PASTILLES À LA FLEUR D'ORANGE,) For powdered roses in the next formula substitute pure orange powder, and for the essence of roses use pure neroli.

5. (PASTILLES À LA ROSE.) Gum benzoin, olibanum (in tears), and styrax (in tears), of each, 12 oz.; nitre, 9 oz.; charcoal, 4 lbs.; powder of pale roses, 1 lb.; essence of roses, 1 oz.; mix with 2 oz. of gum tragacanth, dissolved in rose water, 1 quart.

6. (PASTILLES À LA VANILLE.) Gum benzoin, styrax, and olibanum (as last), of each, 12 oz.; nitre, 10 oz.; cloves, 8 oz.; powdered vanilla, 1 lb.; charcoal, 4½ lbs.; oil of cloves, ½ oz.; essence of vanilla, 7 or 8 fl. oz.; as before.

Obs. The products of the above formula are all of excellent quality. They may be varied to please the fancy of the artiste, by the addition or substitution of other perfumes or aromatics. Cheaper pastilles may be made by simply increasing the quantity of the charcoal and saltpetre. The whole of the ingredients should be reduced to fine powder before mixing them. The use of musk and civet, so often ordered in pastilles, should be avoided, as they yield a disagreeable odour when burned. The addition of a little camphor renders them more suitable for a sick chamber. The simplest and most convenient way of forming the mass into cones is by pressing it into a mould of lead or porcelain.

Pastilles are burned either to diffuse a pleasant odour, or to cover a disagreeable one. For this purpose they are kindled at the apex, and set on an inverted saucer or a penny-piece to burn. Persons who use them fre-

quently employ a small china or porcelain toy ('pastille house') sold for the purpose.

Pastils, Mouth. *Syn.* BREATH PILLS, CACHOU LOZENGES; PASTILLI COSMETICI, L.; CACHOU AROMATISÉ, C. AROMATIQUE, C. DE BOLOGNA, GRAINS DE CACHOU, Fr. *Prep.* 1. Soft extract of liquorice, 3 oz.; gum catechu and white sugar, of each, 1 oz.; gum tragacanth (powdered), ½ oz.; oil of cloves, 1 dr.; oil of cassia, ½ dr.; essence of ambergris and oil of nutmeg, of each, 12 drops; make a firm mass with rose or orange-flower water, q. s., and divide it into one-grain pills; when these are dry, cover them with gold or silver leaf.

2. Solazzi juice (dried by a gentle heat and powdered), 4 oz.; lump sugar, 3 oz.; powdered catechu, 2 oz.; powdered tragacanth, 1 oz.; oil of cloves, 2 fl. drs.; oil of cassia, 1 fl. dr.; white of egg or rose water, q. s. to form a pill-mass; as before.

3. Powdered catechu, 1 oz.; Salazzi juice, 4 oz.; lump sugar, 12 oz.; oils of cloves, cassia, and peppermint, of each, 1 fl. dr.; mucilage of tragacanth, q. s. to mix; as before.

4. Extract of liquorice (soft), 2 oz.; white sugar, 3 oz.; powdered tragacanth and cascarilla (or orris root), of each, ½ oz.; oil of cloves. ½ fl. 3r.; oil of cassia, 12 drops; water, q. s. as before.

5. (Chevallier.) Powdered coffee, chocolate and sugar, of each, 1½ oz.; powdered vanilla, and freshly burnt charcoal, of each, 1 oz.; mucilage of tragacanth, q. s.

6. Chloride of lime (dry and good), 1 dr.; white sugar, 3 oz.; powdered tragacanth, 1 oz; oil of cloves, 30 drops; rose water, q. s. To disinfect the breath.

Obs. Almost every maker employs his own forms for these articles. The objects to be aimed at are the possession of rather powerful and persistent odour, and a toughness to prevent their too rapid solution in the mouth. The original Italian formula included liquorice, mastic, cascarilla, charcoal, orris root, oil of peppermint, and the tinctures of ambergris and musk, but is now seldom employed in this country. The flavour of peppermint does not, indeed, appear to be approved of by English smokers. Sometimes, instead of being made perfectly spherical, they are flattened a little.

CACHOU À L'AMBRE GRIS, CACHOU À LA CANELLE, CACHOU À LA FLEURS D'ORANGE, CACHOU MUSQUÉ, CACHOU À LA ROSE, CACHOU À LA VANILLE, CACHOU À LA VIOLETTE, &c., are merely flavoured and scented respectively with the essences or oils of ambergris, cinnamon, neroli, musk, rose, vanilla, violets, &c. See BREATH, CACHOU AROMATISÉ, LOZENGES, PILLS, &c.

PA"STRY. Articles of food made of 'paste' or dough, or of which 'paste' forms a principal and characteristic ingredient. The word is popularly restricted to those which contain puff paste, or such as form the staple production of the modern pastrycook; but it is, in reality, of much more general signification.

Several varieties of paste are prepared for different purposes, of which the following are the principal:—

PUFF PASTE. The production of a first class puff paste is commonly regarded as a matter of considerable difficulty, but by the exercise of the proper precautions it is, on the contrary, an extremely simple affair. This paste, before being placed in the oven, consists of alternate laminæ of butter or fat and ordinary flour dough, the latter being, of course, the thicker of the two. During the process of baking, the elastic vapour disengaged, being in part restrained from flying off by the buttered surfaces of the dough, diffuses itself between these laminæ, and causes the mass to swell up, and to form an assemblage of thin membranes or flakes, each of which is more or less separated from the other. Individually, these flakes resemble those of an ordinary rich unleavened dough when baked; but, collectively, they form a very light crust, possessing an extremely inviting appearance and an agreeable flavour.

The precautions above referred to are—the use of perfectly dry flour, and its conversion into dough with a light hand, avoiding unnecessarily working it,—the use of butter free from water or buttermilk, and which has been reduced to precisely the same degree of plasticity as the dough between which it is to be rolled,—conducting the operation in a cool apartment, and, after the second or third folding of the dough, exposing it to a rather low temperature before proceeding further with the process; and, lastly,—baking the paste in a moderately smart but not too hot an oven. The following are examples:—

1. (Rich.) Take of flour, 1 lb.; butter, ¼ lb.; cold spring water, q. s.; make a moderately soft flexible dough, then roll in (as described above) of dry fresh butter, ½ lb.

2. (Ordinary.) Take of flour, 1 lb.; cold water, q. s.; make a dough, and roll in, as before, of butter, 6 oz.

3. (Rundell.) Take ¼ peck of flour, rub into it 1 lb. of butter, and make a 'light paste' with cold water, just stiff enough to work well; next lay it out about as thick as a crown-piece; put a layer of butter all over it, sprinkle on a little flour, double it up, and roll it out again; by repeating this with fresh layers of butter three or four times, or oftener, a very light paste will be formed. Bake it in a moderately quick oven.

4. (Soyer.) Put 1 lb. of flour upon your pastry slab, make a hole in the centre, into which put a teaspoonful of salt, mix it with cold water into a softish flexible paste with the right hand, dry it off a little with flour until you have well cleared the paste from the slab, but do not work it more than you can possibly help; let it remain for 2 or 3 minutes upon the slab, then take 1 lb. of fresh butter from which you have squeezed all the buttermilk in a cloth, and brought to the same con-

sistency as the paste, upon which place it; press it out flat with the hand, then fold over the edges of the paste so as to hide the butter, and reduce it with the rolling-pin to the thickness of about ½ an inch, when it will be about two feet in length; fold over one third, over which again pass the rolling-pin; then fold over the other third, thus forming a square; place it with the ends top and bottom before you, shaking a little flour both under and over, and repeat the rolls and turns twice again as before; flour a 'baking-sheet,' upon which lay it, on ice, if handy, or otherwise, in some cool place, for about half an hour; then roll it twice more, turning it as before, and again place it upon ice or in the cold for ¼ an hour; next give it two more rolls, making seven in all, and it is ready for use. "You must continually add enough flour while rolling to prevent your paste sticking to the slab."

HALF-PUFF PASTE. As the preceding, using only one half the quantity of butter, and giving the paste only 3 or 4 folds.

SHORT PASTE, SHORT CRUST.—1. Flour (dry and warm), 1 lb.; sugar, 3 oz.; butter, ¼ lb.; 2 eggs; water, ½ pint; make a light dough. If one half of 'Jones's patent flour, be used, no eggs will be required.

2. (Soyer.) Put on the 'paste slab' or 'pie board' 1 lb. of flour, 2 oz. of pounded sugar, 6 oz. of butter, 1 egg, ½ teaspoonful of salt, and ½ pint of water; mix the sugar and butter well together, add them with the water by degrees to the flour, and form a paste, but firmer than puff paste.

PIE PASTE. That commonly used is 'short paste,' varied at will; but at good tables the upper crust of the pie is generally made of 'puff paste,' and the remainder of 'short paste.'

PUDDING PASTE. This, for baked puddings, may resemble the last. For boiled puddings (or indeed for any), the paste may be either ordinary 'short paste,' or one made with 2 to 6 oz. of butter or lard, or 3 to 8 oz. of chopped beef suet, to each lb. of flour, with or without an egg, and a little sugar, according to the means of the parties. The first is most appropriate for those containing fresh fruit, and that with suet for meat puddings, and those containing dried fruit, as grocer's currants, plums, &c. Milk or milk-and-water is often used instead of simple water to make the dough. Ginger, spices, savory herbs, &c., are common additions to the crusts of puddings. Where economy is an object, and especially among the lower classes, kitchen fat is frequently substituted for suet, and lard for butter. When 'Jones's patent flour' is employed, an excellent plain pudding paste may be made by simply mixing it up with very cold water, and immediately putting it into the water, which should be boiling, and kept in that state until the pudding is dressed.

PATENT MEDICINES. *Syn.* MEDICAMENTA ARCANA, L. The majority of the preparations noticed under this head are the nostrums popularly termed 'quack medicines,' and which are sold with a Government stamp attached to them. A few other secret or proprietary remedies are also, for convenience, included in the list. An alphabetical arrangement, based on the names of the reputed inventors or proprietors of the articles, has been adopted, as being the one best suited for easy reference. The composition of a number of them is given from careful personal inspection and analysis (by Mr. Cooley), and that of the remainder on the authority of Gray, Griffith, Paris, Redwood, the members of the Philadelphia College of Pharmacy, and other respectable writers. A variety of articles not included in the following list are noticed along with other preparations of the class to which they belong, or under the names of their proprietors. See BALSAM, CERATE, DROPS, ESSENCE, TINCTURE, OINTMENT, PILLS, &c.

Abernethy's Pills. See ABERNETHY MEDICINES (page 4).

Albinolo's Ointment. See HOLLOWAY'S OINTMENT (*below*).

Ali Ahmed's Treasures of the Desert. There are three preparations included under this name:—

a. (ANTISEPTIC MALAGMA.) From lead plaster, 3 parts; gum thus and salad oil, of each, 2 parts; bees' wax, 1 part; melted together by a gentle heat, and spread upon calico.

b. (PECTORAL, ANTIPHTHISIS, or COUGH PILLS.) From myrrh, 3½ lbs.; squills and ipecacuanha, of each, 1 lb.; (all in powder;) white soft soap, 10 oz.; oil of aniseed, 1¼ oz.; treacle, q. s. to form a pill mass.

c. (SPHAIROPEPTIC or ANTIBILIOUS PILLS.) From aloes, 28 lbs.; colocynth pulp, 12 lbs.; rhubarb, 7 lbs.; myrrh and scammony, of each, 3½ lbs.; ipecacuanha, 3 lbs.; cardamom seeds, 2 lbs.; (all in powder;) soft soap, 9 lbs.; oil of juniper, 7 fl. oz.; treacle, q. s. This, as well as the last, is divided into 3½-gr. pills, which are then covered with tin foil or silver leaf. An excellent aperient pill, no doubt, and one likely to prove useful in all those cases in which the administration of a mild diaphoretic and stomachic purge is indicated. Unlike many of the advertised nostrums of the day, there is nothing in their composition that can, by any possibility, prove injurious; but beyond this they are destitute of virtue.

Anderson's Scot's Pills. See PILLS.

Atkinson's Infant Preservative. From carbonate of magnesia, 6 drs.; white sugar, 2 oz.; oil of aniseed, 20 drops; spirit of sal volatile, 2½ drs.; laudanum, 1 dr.; syrup of saffron, 1 oz.; caraway water to make up 1 pint.

Balm of Rackasiri. See BALSAM (page 262).

Balsam of Life. *Syn.* BAUME DE VIE, Fr. Several compound medicines of this name are noticed on page 261. The following are well-known nostrums:—

1. (Hoffman's)—*a.* Of the oils of cinnamon, cloves, lemon, lavender, and nutmegs, and bal-

sam of Peru, of each, 2 drs.; essence of ambergris, oil of amber, and oil of rue, of each, 1 dr.; cochineal, 12 grs.; strongest rectified spirit, 3½ pints; mix.

b. (Ph. Dan. 1840.) Oils of cinnamon, cloves, lavender, and nutmegs, of each, 20 grs.; purified oil of amber, 10 drops; balsam of Peru, 30 grs.; rectified spirit (tinged with alkanet root), 10 oz.

2. (Gabius's.) Nearly similar to Hoffmann's.

3. (Turlington's.) Benzoin and liquid styrax, of each, 12 oz.; balsam of tolu and extract of liquorice, of each, 4 oz.; balsam of Peru, 2 oz.; aloes, myrrh, and angelica root, of each, 1 oz.; highly rectified spirit of wine, 7 pints; digest, with frequent agitation for 10 days, and filter. Externally, the above are rubefacient and corroborant; internally, stimulant, cordial, and pectoral.

Betton's British Oil. From oil of turpentine, 1 pint; Barbadoes tar, ½ lb.; oil of rosemary, 1 fl. oz.

Blake's Green-mountain Ointment. We are told that the active ingredient in this compound is *Arnica montana*, with a basis of soap cerate. It is very useful as an external application in several affections. The chief objection to its use is that it is a secret preparation.

Blake's Toothache Essence. From alum, in fine powder, 1 dr.; sweet spirit of nitre, 5 dr.

Boerhaave's Odontalgic Essence. From opium, ½ dr.; oil of cloves, 2 dr.; powdered camphor, 5 dr.; rectified spirit, 1½ fl. oz.

Bouchardat's Tasteless Aperient. From phosphate of soda, ¾ oz., placed in a soda-water bottle, which is then filled up with carbonated water, at the bottling machine. For a dose.

Brande's Tooth Tincture. From pellitory of Spain (bruised), 1 oz.; camphor, ⅔ oz.; opium, ¼ oz.; oil of cloves, 1 dr.; digested for 10 days in rectified spirit, ½ pint.

Brodum's Nervous Cordial. *Prep.* 1. "Originally it consisted simply of an infusion of gentian root in English gin, coloured and flavoured with a little red lavender (compound spirit of lavender). After a time the doctor added a little bark to the nostrum, and subsequently made other additions." ('Anat. of Quackery.')

2. (Paris.) Tinctures of gentian, calumba, cardamoms, and cinchona, compound spirits of lavender, and steel wine, of each, equal parts. "It is tonic, stomachic, and stimulant; but, beyond these, possesses no curative properties." ('Anat. of Quackery.')

Chlorodyne. This nostrum, which was first introduced as "a combination of perchloric acid with a new alkaloid," has become a popular anodyne and sedative. Several preparations are sold under this name, and the claims of the rival makers have occasioned some expensive lawsuits. The name was undoubtedly invented by Dr. J. Collis Browne, but Mr. Freeman, pharmaceutical chemist, claims to be the inventor of the preparation. Whether Browne's and Freeman's 'chlorodynes' are essentially the same, we are not able to determine, but we know that there is not the slightest foundation for the statements made by each manufacturer respecting the new vegetable principle contained in his medicine. Chlorodyne, in every one of its forms, is simply a mixture of certain well-known materials, some of which are rather dangerous ingredients for a popular nostrum. According to the analysis of Dr. Ogden, Browne's chlorodyne is composed as follows:—

Chloroform, 6 drs.; chloric ether, 1 dr.; tincture of capsicum, ½ dr.; oil of peppermint, 2 drops; hydrochlorate of morphine, 8 grs.; Scheele's hydrocyanic acid, 12 drops; perchloric acid, 20 drops; tincture of Indian hemp, 1 dr.; treacle, 1 dr. 'Towle's chlorodyne' is prepared according to this formula, the ingredients being named on the label.

Clarke's Conglutinum. (See page 362.)

Cochrane's Cough Remedy. Acidulated syrup of poppies.

Corn Nostrums. (See page 371.)

Cottereau's Odontalgic Essence. A nearly saturated ethereal solution of camphor, mixed with about $\frac{1}{12}$th of its volume of strong liquor of ammonia.

Curtis's Anti-venereal Lotion. A mixture of Beaufoy's solution of chloride of lime, 2 fl. oz., with cold soft water, 8 fl. oz. For *use*, 1 to 2 table-spoonfuls are put into a wine-glassful of water.

Dalby's Carminative. 1. (Dr. Paris.) Carbonate of magnesia, 40 grs.; tincture of castor and compound tincture of cardamoms, of each, 30 drops; tincture of asafœtida and spirit of pennyroyal, of each, 15 drops; laudanum, 5 drops; oil of aniseed, 3 drops; oil of nutmeg, 2 drops; oil of peppermint, 1 drop; peppermint water, 2 fl. oz.—*Dose.* ½ to 1 teaspoonful. The bottle should be well shaken before pouring it out.

2. (Wholesale.) Carbonate of magnesia, 1 oz.; tincture of castor, 5 fl. dr.; tincture of asafœtida, 3 fl. drs.; oils of aniseed and pennyroyal, of each, ¼ fl. dr.; oil of nutmeg, 15 drops; syrup of poppies, 7 oz.; rectified spirit, 3½ fl. oz.; peppermint water, ½ pint; as before.

Davidson's Canoer Remedy. A mixture of arsenious acid and hemlock, both in powder. (Dr. Paris.)

Davis's Calorific. The 'LIQUID' is commercial acetic acid (sp. gr. 1·048), diluted with about an equal volume of water, and coloured with burnt sugar or spirit colouring. The 'SHIELD' consists of a piece of red flannel backed with oil skin, to prevent evaporation. A few drops of calorific are sprinkled on the flannel, which is then bound over the affected part. The heat of the body gradually volatilises the acetic acid, and the escape of the vapour being prevented by the oil skin, a strongly counter-irritant action is set up.

Derbyshire's Embrocation. From opium and mottled soap, of each, 2 oz.; extract of henbane, 2 drs.; and mace, ½ dr.; boiled for 30 minutes in water, 3 pints; to the cold liquor, rectified spirit, 1 quart, and liquor of ammonia, 1 fl. oz., are added, and, after repose, the clear portion is decanted. A preventive of sea-sickness.

Deshler's Cerate. Yellow basilicon. (See page 417.)

Duncan's Gout Medicine. See GOUT.

Dutch Ague Remedy. A mixture formed of Peruvian bark and cream of tartar, of each, 1 oz.; cloves, ½ dr.; reduced to fine powder. —*Dose.* 1½ dr., every 3 hours. (Dr. Paris.)

Godfrey's Cordial. 1. (Original formula.) Opium (sliced), ¼ oz.; sassafras chips, 1 oz.; English brandy, 1 quart; macerate for 4 or 5 days, then add, of water, 1 quart, treacle, 3½ lbs., and simmer the whole gently for a few minutes; the next day decant the clear portion.

2. (Dr. Paris.) Aniseed, caraways, and corianders, of each, bruised, 1 oz.; sassafras chips, 9 oz.; water, 6 pints; simmer gently until reduced to 4 pints, then add of treacle, 6 lbs.; and when nearly cold, further add of tincture of opium, 3 fl. oz.

3. (Phil. Col. of Phar.) Carbonate of potassa, 2½ oz.; water, 26 pints (old wine measure); dissolve, add of sugar-house molasses (treacle). 16 pints (o. w. m.); simmer the mixture, remove the scum, and when it has considerably cooled, add, of tincture of opium, 24 fl. oz.; oil of sassafras, ½ fl. oz.; (dissolved in) rectified spirit, 1 quart (o. w. m.). It contains about 16 drops of laudanum (=1⅓ gr. of opium) in each fl. oz.

The following forms are also current in the wholesale trade:—

4. From molasses, 16 lbs.; distilled water, 2½ galls.; oil of sassafras, 1 fl. oz., (dissolved in) rectified spirit, ½ gall.; bruised ginger, ½ oz.; cloves, ½ oz.; laudanum, 8 fl. oz.; macerate for 14 days, and strain through flannel.

5. Sassafras chips, 1 lb.; ginger (bruised), 4 oz.; water, 3 galls.; simmer until reduced to 2 galls.; then add, of treacle, 16 lbs.; rectified spirit, 7 lbs.; laudanum, 1 pint.

6. Opium, ½ oz.; treacle, 7 lbs.; boiling water, 1 gall.; dissolve, and add, of rectified spirit, 1 quart; oil of sassafras, ½ dr.; cloves and mustard seed, of each, ½ oz.; coriander and caraway seeds, of each, 1 dr.; digest for a week.

7. Caraways, corianders, and aniseed, of each, 1 lb.; water, 6 galls.; distil 5 galls., and add, of treacle, 28 lbs.; laudanum, 1 quart; and oil of sassafras, 1 fl. oz., previously dissolved in rectified spirit, 1 gal.

Obs. This preparation is anodyne and narcotic, and, amongst the lower classes, is commonly given to children troubled with wind or colic. Its frequent and excessive use has sent many infants prematurely to the grave. Gray says, "It is chiefly used to prevent the crying of children in pain or starving." The dose is ½ teaspoonful and upwards, according to the age and susceptibility of the child.

Graves' Gout Preventive. A tincture prepared by steeping, for a week, dried orange peel and hiera picra, of each, 1 oz., and rhubarb, ½ oz., in brandy, 1 pint.

Grinrod's Remedy for Spasms. From acetate of morphia, 1 gr.; spirit of sal volatile and sulphuric ether, of each, 1 fl. oz.; camphor julep, 4 fl. oz.; for a mixture. It should be kept closely corked, in a cool place, and should be well shaken before use.—*Dose.* A teaspoonful in a glassful of cold water or wine, as required. It is a really valuable preparation.

Herrendschwand's Specific. A mixture of gamboge, 10 grs., with carbonate of potassa, 20 grs. (Dr. Paris.)

Holloway's Ointment. The original formula of ALBINOLO'S OINTMENT, of which this pretends to be a reproduction, contains the "graisses de serpent et de vipère," and other pharmaceutical curiosities. The principal ingredients, however, in the HOLLOWAY'S OINTMENT of the present day are very homely substances. In the case of Sillen *v.* Holloway, tried at the Court of Common Pleas in January, 1863, the plaintiff's council asserted that, on the ointment being received by the agent in Paris, it was submitted to the authorised government chemists to be analysed, in accordance with the law of France prohibiting the sale of secret remedies, and was found by them to contain butter, lard, Venice turpentine, white wax, yellow wax, and nothing else. In a letter to the 'Times,' Professor Holloway stated that the French analysis was incorrect, for three of the ingredients named were not in the ointment, while there were other components which the analysis had not discovered. The formula adopted by those who prepare an imitation ointment on the large scale, and which closely resembles, if it be not actually identical with, that employed by Mr. Holloway, is as follows:—Fresh butter (free from water), ¾ lb.; bees' wax (good), 4 oz.; yellow resin, 3 oz.; melt them together, add of vinegar of cantharides, 1 fl. oz., and simmer the whole, with constant agitation, for 10 or 12 minutes, or until the moisture is nearly evaporated; then add, of Canada balsam, 1 oz.; expressed oil of mace, ½ dr.; balsam of Peru or liquid styrax, 10 or 12 drops; again stir well, allow the mixture to settle, and when it is about half cold (not before) pour it into the pots, previously slightly warmed, and allow it to cool very slowly. The label will do the rest. No two samples of Holloway's ointment are precisely of the same colour or consistence.

Holloway's Pills. From aloes, 4 parts; jalap, ginger, and myrrh, of each, 2 parts; made into a mass with mucilage. and divided into 2-grain pills, of which about 4 dozen are put into each 1*s.* 1½*d.* box.

Jackson's Bathing Spirit. A species of soap

liniment, made of soft soap, 1 lb.; camphor, 6 oz.; oils of rosemary and thyme, of each ½ fl. oz.; rectified spirit, 1 gal.

Kaye's Infant's Preservative. A preparation partaking of the joint properties of Atkinson's nostrum and Godfrey's cordial, but more powerful than either, as indicated by the doses in which it is directed to be given during early infancy, viz., "two, three, or more drops."

Keating's Cough Lozenges. These are said to be composed of—Lactucarium, 2 drs.; ipecacuanha, 1 dr.; squills, ¾ dr.; extract of liquorice, 2 oz.; sugar, 6 oz.; made into a mass with mucilage of tragacanth, and divided into 20-gr. lozenges.

King's Sarsaparilla Pills. From the compound extract. "Instead of two pills being equivalent to ½ fl. oz. of the concentrated decoction or essence of sarsaparilla, as asserted, it takes about 32 of them to represent the given quantity, and about 4 of them to be equal in strength to the common decoction of the Pharmacopœia." "Instead of one *2s. 9d.* box of these pills being equal to a pint of the costly concentrated fluid preparation, it would take nearly 1½ lb. of them for that purpose." ('Med. Circ.,' ii, 493.)

Kitchener's Peristaltic Persuaders. See PILLS.

Lambert's Asthmatic Balsam. The active ingredients in this compound are said to be squills and aqueous extract of opium.

Lemazurier's Odontalgic Essence. From acetate of morphia, 1 gr.; dissolved in cherry-laurel water, 1 oz. For use, a teaspoonful is added to ½ a wine-glassful of warm water, and the mouth well rinsed out with the mixture.

Leroy's Purgative.—*a.* (No. 1.) Vegetable turbith, 6 drs.; scammony, 1½ oz.; jalap, 6 oz.; brandy, 10 pints; digest for 24 hours, and add a syrup made of senna, 6 oz.; water, 1¼ pint; sugar, 32 oz.

b. (No. 2.) As the last, only 1-3rd stronger.

c. (No. 3.) Twice as strong as No. 1.

Lewis's Electuarium. A liquid nostrum, said to be alterative and to contain a small quantity of both antimony and mercury.

Lewis's Baslamic Ointment. This preparation, which is declared by its proprietor to be "utterly unsurpassable," for the most part resembles Holloway's ointment. ('Med. Circ.,' ii, 493.)

Lewis's Silver Cream. This nostrum is said to depend for its efficacy on white precipitate and a salt of lead.

Locock's Pulmonic Lozenges. See WAFERS.

Mahomed's Paste. See ELECTUARY.

Mardant's Norton's Drops. A mixture of the tinctures of gentian and ginger, holding in solution a little bichloride of mercury, and coloured with cochineal.

Marriott's Dry Vomit. A mixture of equal parts of tartar emetic and sulphate of copper.

Marsden's Drops. A coloured solution of corrosive sublimate. (Dr. Paris.)

Matthieu's Vermifuge.—*a.* (To destroy the worms.) Tin filings, 1 oz.; male fern root, 6 drs.; worm seed, 4 drs.; resinous extract of jalap and sulphate of potassa, of each, 1 dr.; honey, q. s. to form an electuary.—*Dose.* A teaspoonful, repeated every third or fourth hour, for 2 or 3 days, when the following is to be substituted, and continued until the bowels are well acted on.

b. (To expel the worms.) Jalap and sulphate of potassa, of each, 40 grs.; scammony, 20 grs.; gamboge, 10 grs.; honey, q. s. as before.

McKinsey's Golden Cerate. This appears to resemble Poor Man's Friend.

McKinsey's Katapotia. This notorious nostrum is compounded of aloes, 5 oz.; soap, 1½ oz.; (both in powder;) beaten up with syrup of saffron and a little essential oil, and divided into pills varying in weight from 2 to 2½ grs. each. ('Med. Circ.,' iv, 86.)

McKinsey's Medicinal Powder. *Syn.* REV. T. SMITH'S M. P. From dried lavender flowers and rosemary tops, of each, 2½ oz.; asarabacca, 1 oz.; reduced to powder, and further disguised with a little perfume. A very small quantity of subsulphate of mercury is also most probably added. Two or three pinches of this powder, taken 3 or 4 times a day, as snuff, is said by the proprietor to be sufficient to cure almost every known disease. See ASARABACCA.

Morison's Aperient Powder. A mixture of cream of tartar and lump sugar, in nearly equal proportions, with sufficient powdered cassia to give it an aromatic flavour. See PILLS.

Morrison's Adhesive Paste. See PLASTER.

Ollivier's Biscuits. Take of the white of 2 eggs; water, ¾ pint; beat them together, strain the mixture, and add to it a solution of bichloride of mercury, 76 grs.; collect the precipitate, wash, dry, powder, and carefully weigh it; next add it to such a quantity of flour &c., that each 2-dr. biscuit may contain exactly ½ gr.

Papier Fayard. See PAPER. (Gout).

Pate Arsenicale. A powder composed of arsenious acid, 8 grs.; dragon's blood, 22 grs.; cinnabar, 70 grs. It is to be made into a paste with the saliva at the time of applying it. A favorite remedy in cancer on the Continent. (Dr. Paris.)

Perry's Balm of Syriacum. From English gin, 1 pint; moist sugar, ½ lb.; (dissolved in) water, 4 oz.; mix, and add of paregoric (Tinct. Camph. Co.—Ph. L. 1836), 1 oz. tincture of tolu, ½ oz.; tincture of cantharides, q. s.; together with a few drops each of the oils of aniseed and spearmint; agitate well together, and the next day filter, or decant the clear portion.

Perry's Preventive Lotion. This is said to be a solution of sal alembroth, 2 drs., in water,

1 pint. For use, it is diluted with 4 or 5 times its bulk of water.

Pieste's Toothache Essence. From liquor of ammonia, 2 parts; laudanum, 1 part. It is applied on lint.

Pilules Angéliques. *Syn.* GRAINS DE SANTÉ. Take of aloes and juice of roses, of each, 4 oz.; juices of borage and chicory, of each, 2 oz.; beat them together, and when they are reduced to the consistence of a soft pill-mass, add of powdered rhubarb, 2 drs., powdered agaric, 1 dr., and divide the mixture into 1½-gr. pills. A good purgative. *Dose.* 4 to 12.

Poor-man's Friend (French). See OINTMENT (Brown).

Poor-man's Friend (Dr. Roberts'). This consists chiefly of ointment of nitric-oxide of mercury.

Pringle's Remedy for Typhus. (Dr. Paris.) Pale cinchona (bruised), ½ oz.; water, 12 fl. oz.; boil them together for 10 minutes, adding, towards the end, Virginian snake-root (bruised), 2 drs.; macerate for an hour in a covered vessel, and to the strained liquid add of dilute sulphuric acid, 2 fl. drs., and when the mixture is cold, further add of spirit of cinnamon, 1 fl. oz. The dose is 2 table-spoonfuls every six hours.

Reynold's Gout Specific. Wine of colchicum disguised by some unimportant additions.

Righini's Odontalgic Drops. A solution of creasote in an equal weight of the strongest rectified spirit, coloured with cochineal, and disguised by the addition of a few drops of oil of peppermint.

Ruspini's Styptic. A strong solution of gallic acid in spirit of roses. Dr. A. T. Thomson says that it also contains sulphate of zinc.

Rust's Toothache Paste. See PASTE.

Scott's Drops. *Syn.* TINCTURE OF SOOT. From wood-soot, 2 oz.; assafœtida, 1 oz.; brandy or proof spirit, 1 pint. *Dose.* 1 to 2 table-spoonfuls; in hysteria, &c.

Smith's Powder. See MC.KINSEY'S POWDER.

Solomon's Anti-impetigines. A solution of bichloride of mercury disguised by the addition of a little flavouring and tinctorial matter. ('Med. Circ.,' ii, 69, 70.)

Standert's Red Mixture. Take of carbonate of magnesia, 1 oz.; powdered Turkey rhubarb, ½ oz.; tincture of rhubarb, 3 fl. oz.; tincture of opium, 2 fl. drs.; oils of aniseed and peppermint, of each, ½ dr.; (dissolved in) gin or proof spirit, 5 fl. oz.; agitate the whole together, then further add of soft water, 1½ pint. In colic and diarrhœa. *Dose.* A wine-glassful. The spirit is frequently omitted, but then the mixture soon spoils.

Standart's Stomachic Candy. Take of lump sugar, 1 lb.; water, 3 fl. oz.; dissolve by heat; add cardomom seeds, ginger, and rhubarb, of each, 1 oz.; and when the mixture is complete, pour it out on an oiled slab or into moulds.

Storey's Worm Cakes. Take of calomel and cinnabar of each, 24 grs.; powdered jalap, 72 g s.; ginger, 1 dr.; white sugar, 1½ oz.; syrup, q. s.; mix and divide into a dozen cakes. Resemble 'Ching's lozenges' in their action. (See page 719).

Struve's Lotion. See HOOPING-COUGH LOTION (page 715).

Succession Powder. A mixture of powdered quartz and diamond dust, chiefly the first. *Used* as an escharotic.

Tasteless Ague Drops. A solution of arsenite of potassia. It is the common ague medicine in the fen counties of England.

Turlington's Balsam. See BALSAM OF LIFE (*above*).

Valangin's Solution of Solvent Mineral. From arsenious acid, ½ dr., dissolved in hydrochloric acid, 1½ dr., and the solution diluted with distilled water, 1½ pint. In ague, &c. It has rather less than half the strength of the solution of arsenite of potassa, Ph. L.

Vance's Cream. See CHILBLAIN.

Wahler's Ointment. See CHILBLAIN.

Ward's Purging Powder. A mixture of jalap and cream of tartar, equal parts, coloured with a little red bole. *Dose.* A teaspoonful, or more, in broth or beer, twice or thrice daily; in dropsy.

Webster's Diet Drink. A sweetened decoction of betony, dulcamara, guaiacum wood, liquorice root, sarsaparilla, sassafras, thyme, and turmeric.

Wilson's Gout Tincture. This is said to be wine of colchicum.

Wright's Pearl Ointment. Take of white precipitate, 8 oz.; Goulard's extract, 1 pint; rub them to a cream, and add the mixture to white wax, 7 lb., and olive oil, 10 lb., previously melted together by a gentle heat; lastly, stir the whole until it is nearly cold. ('Pharm. Journ.')

Young's Aperient Drink. From carbonate of soda, 2½ drs.; bitartrate of potassa, 3 drs.; (both in crystals;) throw them into a soda-water bottle containing cold water, 8 fl. oz., and immediately cork it down securely, and keep it inverted, in a cool place, until required for use.

Zanhetti's Bohemian Restorative Tincture. From crushed raisins, ¾ lb.; hay saffron, 2 oz.; aqueous extract of opium, 3 drs.; powdered cochineal, 2 drs.; capillaire and orange-flower water, of each, ½ pint; proof spirit, 3 pints; digested together for a week, and then strained, with expression.

PAULLIN'IA. See GUARANA.

PAYN'IZING. The name given to Mr, Payne's process for preserving and mineralising wood. See DRY-ROT.

PEACH. *Syn.* PERSICUM, L. The fruit of *Amygdalus Persica*. Two varieties are known in our gardens — CLINGSTONE PEACH and FREESTONE PEACH, terms which explain themselves. The fruit is wholesome; but the flowers and kernels contain prussic acid, and are poisonous.

PEACH'WOOD. The produce of a species of *Cæsalpinia*, now extensively used in calico-printing.

PEAR. *Syn.* PYRUS, L. The fruit of *Pyrus communis* (Linn.), one of the rosaceæ. Its general qualities resemble those of the apple.

PEAR FLAVOUR. See ESSENCE.

PEARL. *Syn.* MARGARITA, MARGARITUM, PERLA, UNIO, L. The most beautiful and costly pearls are obtained exclusively from the pearl oyster (*Meleagrina margaritifera*) of the Indian Seas. The principal fisheries are on the coast of Ceylon, and at Olmutz, in the Persian Gulf. An inferior description of pearl is procured from a fresh-water shell-fish (*Unio margaritifera*) in the neighbourhood of Omagh, county of Tyrone. A similar quality is also procured from the river Ythan, Aberdeenshire. It is probable that pearls from this source, collected by the ancient Britons, may have given rise to the statement by Tacitus, in his Life of Agricola, of pearls "not very orient, but pale and wan," being among the indigenous products of Great Britain.

Pearls are composed of membrane and carbonate of calcium; or, in other words, of substances similar to bladder and chalk, in alternate layers.

The cause of the production of pearls is highly curious and interesting. When any foreign body gains a permanent lodgment within the shells of any of the mollusca which are lined with pearly matter, or nacre, the pearly secretion of the animal, instead of being spread in layers on the inside of its habitation, is accumulated around the offending particles in concentric films of extreme tenuity, and more or less spherical, forming a pearl.

Pearls were formerly used in medicine as absorbents or antacids; and among the ancients they were occasionally taken, dissolved in acid, both as a remedy and for the purpose of displaying the careless opulence and luxury of their possessors. A perfect pearl, large, truly spherical, highly iridescent, and reflecting and decomposing the rays of light with vivacity, claims to rank with the most costly of the gems, and in some parts of the East is, with justice, more highly prized than even the diamond. In Europe, however, the present estimation of their value is somewhat different. "A handsome necklace of Ceylon pearls, smaller than a large pea, costs from £170 to £300; but one of pearls about the size of peppercorns may be had for £15. The pearls in the former sell at a guinea each, and those in the latter at about 1s. 6d." (Milburn.) Seed pearls are of little value, however beautiful.

Pearl, Artificial. These are hollow spheres or beads of glass, perforated with two holes at opposite sides to permit of their being strung into necklaces. A small portion of essence d'orient is introduced into each, by suction, and is then spread over the inner surface of the glass. When this has become dry and hard, the globe is filled up with white wax, spermaceti, or gum arabic. The glass of which the beads are formed is slightly bluish and opalescent, and very thin. The latest improvement consists in removing the glassy appearance of the surface of the prepared bead, by exposure to the fumes of hydrofluoric acid, highly diluted.

Pearl, Mother of. *Syn.* UNIONUM CONCHÆ, L.; NACRE DE PERLE, Fr. This is the internal or nacreous layer of those shells which produce the pearls for ornamenting the person; hence the term 'mother of pearl' is by no means inappropriate. It is also derived from several other species, known in trade as ear-shells, green snail-shells, Bombay-shells, &c.

The brilliant hues of mother of pearl do not depend so much upon the nature of the substance as on its structure. Its surface is covered by minute corrugations or furrows, which give a chromatic appearance to the reflected light. Sir David Brewster was the first to show that this substance is capable of imparting its iridescent appearance to fusible metal or fine black wax.

Mother of pearl is cut and wrought with nearly similar tools to those used for ivory, but its treatment, owing to its more fragile nature and delicate structure, requires considerably greater care. It is polished with colcothar or putty powder.

The numerous applications of mother of pearl, for buttons and knife-handles, boxes, inlaying work, &c., are well known.

PEARL'ASH. This is prepared by calcining the crude potashes on a reverberatory hearth, dissolving the calcined mass in water, and, after repose, decanting the clear solution, and evaporating it to dryness in flat iron pans, the product being constantly stirred towards the end to reduce it to a semi-granular state. Although purer, its richness in absolute alkali is less than that of the potashes from which it is prepared, being only from 47 to 51½. This exists almost entirely under the form of carbonate. The commercial value of this substance is determined by the ordinary processes of ALKALIMETRY.

PEARL BARLEY. See BARLEY.

PEARLS (Rose). *Syn.* ROSE BEADS. The petals of red roses beaten in an iron mortar for some hours, until they form a smooth, black paste, then rolled into beads and dried. Hard; very fragrant; take a fine polish.

PEARL WHITE. This is subchloride of bismuth; but the name is now commonly applied to trisnitrate of bismuth, which is sold for it.

PEAS. *Syn.* GARDEN PEAS, MOTOR P.; PISA, L. The seed of *Pisum sativum* (Linn.). Poggiale found in 100 parts of common green peas, dried and shelled, 57 of starch, 21·7 of a nitrogenous substance (legumin), 1·9 of fatty matter, 3·2 of cellulose, 2·8 of ash, and 12·7 of

water. In the fresh state (GREEN PEAS) they are nutritive, and, with the pods which contain them, are highly serviceable in scurvy. The last have been used for making beer. The dried seeds are still more nutritious, but are heavy and flatulent unless well cooked. For kitchen use, 'SPLIT PEAS' should be chosen, and after having washed them in a little clean soft water, and allowed them to drain, they should be left to soak in cold soft water for at least 12 hours before applying heat to them, and should then be dressed in the same water in which they have been soaked, and be only gently simmered until they are reduced to a pulp. Additions of meat, vegetables, &c., should not be made until they have nearly arrived at this condition. 'WHOLE PEAS' require soaking for at least 18 or 20 hours.

A substitute for green peas in winter may be obtained by placing the dried seed on a flat dish, sprinkling them with water, and keeping them in a warm situation. In a few days germination commences, and, after it has proceeded sufficiently far, the whole is dressed in the usual manner. An easier and simpler plan is to preserve the green peas, when they are in season, by the common method adopted for gooseberries and other like fruit.

Peas, Is'sue. *Syn.* PISA PRO FONTICULIS, L. Orange berries, or the small unripe fruit of the orange tree, dried, and smoothed in a lathe. See ISSUE.

PEB'BLE. The trade name for the transparent colourless variety of rock crystal or quartz used for the lenses of spectacles instead of glass, over which, from its extreme hardness, it has the advantage of being little apt to be scratched.

PEC'TIC ACID. The name given by Braconnot to an acid which is found very generally diffused throughout the vegetable kingdom, and analogous to jelly.

Prep. From carrot roots, from which the juice has been pressed out, by boiling them with $\frac{1}{10}$th part of their weight of carbonate of potassa, and about 6 times their weight of water, until the liquid becomes gelatinous when neutralised with an acid. A pectate of potassium is formed, from which the acid may be obtained by neutralising the alkali with a stronger acid, or by carefully adding a solution of chloride of calcium as long as a gelatinous precipitate (pectate of calcium) falls, and, after washing this with water, decomposing it with dilute hydrochloric acid.

Prop., &c. A colourless jelly, having an acid reaction; scarcely soluble in cold water, more so in hot water; and precipitated by acids, alkalies, alcohol, salts, and even sugar. Its compounds with the bases are called pectates. By long boiling with solution of caustic alkali it is converted into metapectic acid, which does not gelatinise. (See *below*.)

PEC'TIN. *Syn.* VEGETABLE JELLY. Obtained by adding alcohol to the juice of ripe currants or other fruit, until a gelatinous precipitate forms, which must be drained, washed with a little weak alcohol, and dried.

Prop., &c. In the moist state it forms a neutral, tasteless, soluble, transparent jelly; when dried, a translucent mass, closely resembling isinglass; boiled with water, or with dilute acids, it is converted into parapectin and metapectin; in the presence of alkalies, these, as well as pectin, are changed into pectic acid, and, by continuing the ebullition for some time longer, into metapectic acid, which is not gelatinous. See PECTIC ACID.

PEC'TORALS. Under this head are popularly included all the various remedies employed in breath or chest diseases.

PEDIC'ULI. Three species of these parasites infest the human body:—PEDICULUS HUMANUS CAPITIS, OR HEAD LOUSE, which lives and breeds in the hair of the scalp, and does not voluntarily extend its ravages beyond it; —P. H. CORPORIS, or BODY LOUSE, which resides on the trunk of the body and the garments, and is characterised by being white and nearly immaculate; and P. PUBIS, or CRAB LOUSE (so named from the cheliform structure of its legs), found chiefly on the pubes, but if not checked, gradually extending itself to the armpits, eyebrows, and other parts covered with hair. This is the most malignant species of the three, and frequently burrows so deeply in the skin as to be with difficulty dislodged.

The presence of pediculi is, in general, an indication of dirty habits, or of contact with the dirty and lazy. Persons who perform the duties of the toilet with ordinary care, and who change their linen sufficiently often, are utter strangers to the visitations of these insects. The use of the hair-brush, strong scents, oil, soap-and-water, and the like, are incompatible with their existence. For the destruction of the *p. pubis*, a solution of from 15 to 20 grs. each of bichloride of mercury and sal ammoniac, in a pint of distilled or pure soft water, is most cleanly and effective. Weak tobacco water, decoction of stavesacre seeds or of white hellebore, and the ointments of mercury, sulphur, and white precipitate, are also frequently employed for the same purpose. See ACARI, VERMIN, &c.

PEL'LICLE. See CRYSTALLISATION.

PEL'LITORY. *Syn.* PELLITORY OF SPAIN; (PELLITORY ROOT; PYRETHRI RADIX, B. P.); PYRETHRUM (Ph. L. & E.), L. The root of *Anacyclus Pyrethrum*. It is a powerful tropical excitant. It is chiefly employed as a masticatory in headache, toothache, palsy of the tongue, and facial neuralgia and rheumatism; and, made into a tincture with rectified spirit, it is a common remedy among dentists for the toothache. Internally, it has been given as a gastric stimulant, and in intermittents, &c. ½ to 1 dr. may be chewed at a time.

PEL'TRY. The name applied to fur skins in the state in which they are received from the hunters. To prepare them as furs, the

inside of them is generally first 'tawed' by the application of a solution of alum. They are next well dusted over and rubbed with hot plaster of Paris or whiting, and are, lastly, thoroughly dried and brushed clean. When it is desired to change or modify their colour, the grease being removed by lime water or a weak soda lye, they are stretched out on a table or board, and the ordinary liquid mordants and dyes are applied to them hot, by means of a painter's brush.

The furs of the rabbit and hare are rendered fit for the purposes of the felt and hat manufactures by a process called by the French '*sécretage*.' This consists in thoroughly moistening the hair with a solution of quicksilver, 1 part, in aquafortis, 16 parts, diluted with half to an equal bulk of water. This is applied with a brush, and the moistened skins being laid together, face to face, are dried as rapidly as possible in a stove room. See FURS.

PEN'CILS. This name is applied to the small brushes made of camel's hair used by artists, as well as to the plumbago crayons familiarly known as black-lead pencils. The last are prepared by one or other of the following methods:—

1. The blocks of plumbago are exposed to a bright-red heat in a closely covered crucible, and are afterwards sawn into minute sticks, and mounted in cases of cedar or satin wood.

2. The plumbago, in powder, is calcined as before, and then mixed with an equal, or any other desired proportion of pure washed clay, also in powder, after which the mixture is reduced to a plastic state with water, and pressed into grooves cut on the face of a smooth board, or into well-greased wooden moulds, in which state it is left to dry. When dry, the pieces are tempered to any degree of hardness by exposing them, surrounded by sand or powdered charcoal, in a closely covered crucible, to various degrees of heat. The crucible is not opened until the whole has become cold, when the prepared 'slips' are removed and mounted as before. This method was invented by M. Conté, in 1795.

3. The dough or paste, prepared as last, is reduced to the required form by forcing it through a perforated plate (in a similar manner to that adopted for coloured crayons), or into minute metallic cylinders, from which it may be readily shaken after it has become partially dry.

Obs. The leads for some varieties of drawing-pencils are immersed for a minute in very hot melted wax or suet before mounting them. To the composition for others a little lamp-black is added, to increase and vary the degree of blackness. The pencils for asses' skin books and prepared paper are tipped with 'fusible metal.' Numerous improvements in pencil-cases and pencil-mounts have been patented of late years by Stevens and others.

PENNYROY'AL. *Syn.* PULEGIUM (Ph. L. & E.), MENTHA P. (Ph. D.), L. "The recent and dried flowering herb of *Mentha pulegium*, Linn." (Ph. L.) PENNYROYAL TEA is a popular emmenagogue, expectorant, and diaphoretic, and is in common use in asthma bronchitis, hooping-cough, hysteria, suppressions, &c. Water, essence, oil, and spirit of pennyroyal, are officinal. They are now chiefly used as mere adjuncts or vehicles.

PEP'PER (Black). *Syn.* PEPPER; PIPER, B.P.; NIGRI BACCÆ, PIPER NIGRUM (Ph. L. E. & D.), L. "The immature fruit (berry) of *Piper nigrum*, Linn., or the black pepper vine." (Ph. L.)

Pur. The ground black pepper of the shops is universally adulterated. In fact, the public taste and judgment are so vitiated, that the pure spice is unsaleable. A most respectable London firm, on commencing business, supplied their customers with unadulterated ground pepper, but in 3 cases out of every 4 it was returned on their hands and objected to, on account of its dark colour and rich pungency, which had induced the belief that it was sophisticated. The house alluded to was therefore compelled by the customers to supply them with an inferior, but milder and paler, article. The substances employed to lower black pepper are known in the trade as—'P. D.,' 'H. P. D.,' and 'W. P. D.'—abbreviations of pepper dust, hot p. d., white p. d. The first is composed of the faded leaves of autumn, dried and powdered; the second, the ground husks (hulls) of black mustard, obtained from the mustard mills; and the third is common rice, finely powdered. Equal parts of black peppercorns, H. P. D., and W. P. D., form the very best ground pepper sold. The ordinary pepper of the shops does not contain more than $\frac{1}{20}$th to $\frac{1}{10}$th of genuine pepper, or 2 to 2½ oz. in the lb. Very recently, ground oil-cake or linseed meal has been chiefly employed as the adulterant, instead of the old 'P. D.'

Uses, &c. Black pepper is a powerful stimulant, carminative, and rubefacient. Its use, in moderation, as a condiment, is peculiarly serviceable to persons who are of a cold habit, or who suffer from a weak digestion; but in inflammatory habits, and in affections of the mucous membranes, it is generally highly injurious. As a medicine, it is often serviceable in nausea, vomiting, chronic diarrhœa, and agues. In North America, a common remedy for the last is ½ oz. of ground pepper stirred up with a glassful of warm beer; or a like quantity made into a tincture by steeping it in 5 or 6 times its weight of gin, rum, or whisky, for a few days.

Prepared black pepper is made by steeping the berries for 3 days in 3 times their weight of vinegar, and then drying and grinding them. It is milder than common pepper. See CONFECTIONS, PIPERINE, &c.

Pepper, Cayenne. *Syn.* BIRD PEPPER, CHILI P., GUINEA P., INDIAN P., RED P.; PIPER

CAPSICI, P. CAYENNE, L. This is prepared from chillies, or the pods of *Capsicum frutescens*, or from *Capsicum baccatum*, or bird pepper, but generally from the first, on account of its greater pungency and acrimony; and, occasionally, from *Capsicum annuum* or medicinal capsicum.

Prep. 1. From the dried pods (powdered), 1 lb.; and wheaten bread or captain's biscuits (heated until they are perfectly dry and brittle, and begin to acquire a yellow colour throughout, and then powdered), 7 lbs.; mixed and ground together. Colouring matter and common salt are frequently added, but are unnecessary.

2. As the last, but making the mixture into a dough with water, then forming it into small cakes, drying these as rapidly as possible at a gentle heat, and then grinding them.

3. (Loudon.) The ripe pods, dried in the sun, are stratified with wheaten flour in a dish or tray, and exposed in a stove-room or a half-cold oven until they are quite dry; they are then removed from the flour, and ground to fine powder; to every oz. of this powder, 1 lb. (say 15 oz.) of wheaten flour (including that already used) are added, and the mixture is made into a dough with a little tepid water and a teaspoonful of yeast; after fermentation is well set up, the dough is cut into small pieces, and baked in a slow oven until it is perfectly hard and brittle; it is then beaten or ground to powder, and forms 'cayenne pepper.'

Pure cayenne pepper, when burnt, leaves a scarcely perceptible quantity of white ash; a red-coloured ash indicates the presence of red ochre, brick-dust, Armenian bole, or other earthy colouring matter. If red lead is present, it will be left behind under the form of a dark-coloured powder, or a small metallic globule.

Pur. The 'cayenne pepper' of the shops is often a spurious article, made by grinding a mixture of any of the reddish woods or sawdust, with enough red pods or chillies to render the mixture sufficiently acrid and pungent. Common salt, colcothar, red bole, brick-dust, vermilion, and even red lead, are also common additions.

Uses, &c. The capsicums resemble the peppers, except in their greater energy and their pungency being unmodified, by the presence of essential oil. As a condiment, under the form of cayenne pepper, and in all diseases in which the employment of a powerful stimulant or rubefacient is indicated, their uses are well known. In medicine, the fruit of *Capsicum annuum* (Linn.—Ph. E. & D.; *C. fastigiatum*, Blume—B.P., Ph. L.), or annual capsicum is ordered (CAPSICUM—Ph. L. E. & D.). The London College directs the fruit to be that of 'Guinea,' less than one inch long, oblong, cylindrical, and straight." See ESSENCE OF CAYENNE.

Pepper, Prepared Cayenne, is the residuum of cayenne—vinegar, essence, or tincture, dried and ground (see *below*).

Pepper (Soluble), Cayenne. *Syn.* CRYSTALLISED SOLUBLE CAYENNE. *Prep.* 1. Capsicum pods (recent, ground in a pepper mill), 1 lb.; rectified spirit, 2½ pints; proceed by percolation so as to obtain 2½ pints; from this distil one half of the spirit by the heat of a water bath; to the residuum add of fine dry salt, 5 lbs.; mix them well together, and dry the mixture at a very gentle heat, frequently stirring; lastly rub it through a sieve, and put it into warm dry bottles. It is usually coloured with a little vermilion or rouge (sesquioxide of iron), but it possesses an agreeable colour without it.

2. Essence of cayenne (No. 1, page 580), 6 pints; distil off 3 pints, add to the residual liquor, of dry salt, 12 lbs.; mix well, dry by a gentle heat, and otherwise proceed as before.

3. Capsicums (ground), 3 lbs.; red sanders or Brazil wood (sliced or rasped), 10 oz.; rectified spirit, 1 gal.; macerate for 14 days, then express the tincture, filter, distil off one half, add of dry salt, 15 lbs., and proceed as before.

4. As the first formula, with the addition of a strong decoction of saffron, q. s. It gives a beautiful colour to soups, &c.

Obs. The above formulæ are those actually employed by the houses most celebrated for their 'soluble cayenne.' The products are of the very finest quality, and are perfectly wholesome. We speak from an extensive experience in the manufacture. The spirit distilled from the essence forms a most suitable menstruum for making fresh essence or tincture of cayenne.

Pepper, Cu'beb. See CUBEBS.

Pepper, Jamai'ca. See PIMENTO.

Pepper, Kit'chen. See SPICE.

Pepper, Long. *Syn.* PIPERIS LONGI FRUCTUS, PIPER LONGUM (Ph. L. & E.), L. "The immature fruit (dried female spikes) of *Piper longum*, Linn." (Ph. L.), or long-pepper vine. The spikes are about 1½ inch in length, with an indented surface, and are of a dark-gray colour. In its general properties it resembles black pepper, but it is less aromatic, though equally pungent. Elephant pepper is merely a larger variety of this species. (Gray.) The root and stems, sliced and dried, form the 'pippula moola' of the East Indies. (Roxburgh.)

Pepper, Red. See CAYENNE PEPPER.

Pepper, White. *Syn.* PIPER ALBUM, L. This is made by either soaking ordinary black pepper in a solution of common salt, until the outside skins are soft, and then rubbing them off in the hands, or by merely rubbing off the skins of the over-ripe berries that fall from the vines. An inferior quality is made by bleaching black pepper with chlorine.

Obs. The use of white pepper instead of

black is an instance of the sacrifices made to please the eye. Pure white pepper has only about 1-4th of the strength of pure black pepper, whilst it is nearly destitute of the fine aroma of the latter. It also contains a mere trace of piperina or piperine, one of the most valuable constituents of black pepper.

PEP'PER PODS. Capsicums. See CAYENNE PEPPER.

PEP'PERMINT. *Syn.* MENTHA PIPERITA (Ph. L. E. & D.), L. "The recent and dried flowering herb of *Mentha piperita*" (Ph. L.), or garden peppermint. The flavour and odour of this herb are well known. It is the most pleasant and powerful of all the mints. Peppermint water and the essential oil have long been employed in nausea, griping, flatulent colic, hysteria, diarrhœa, &c.; but in regular practice chiefly to cover the taste of nauseous medicines, or as an adjunct or vehicle for more active remedies. See OILS (Volatile), WATERS, &c.

PEP'SIN. *Syn.* GASTERASE, CHYMOSIN. A peculiar principle found in the gastric juice, and which, in conjunction with hydrochloric acid, also present in the stomach, confers upon it the power of digesting certain portions of the food, and of dissolving, as Tuson has recently shown, calomel and other mineral substances.

Prep. 1. (Beale, 'Med. Times & Gaz.,' February 10th, 1872, p. 152.) "The mucous membrane of a perfectly fresh pig's stomach is carefully dissected from the muscular coat, and placed on a flat board. It is then lightly cleansed with a sponge and a little water, and much of the mucus, remains of food, &c., carefully removed. With the back of a knife, or with an ivory paper-knife, the surface is scraped very hard, in order that the glands may be squeezed and their contents pressed out. The viscid mucus thus obtained contains the pure gastric juice with much epithelium from the glands and surface of the mucous membrane. It is to be spread out upon a piece of glass, so as to form a very thin layer, which is to be dried at a temperature of 100° over hot water, or *in vacuo* over sulphuric acid. Care must be taken that the temperature does not rise much above 100 F°., because the action of the solvent would be completely destroyed. When dry the mucus is scraped from the glass, powdered in a mortar, and transferred to a well-stoppered bottle. With this powder a good digestive fluid may be made as follows:

Of the powder	5 grains.
Strong hydrochloric acid .	18 drops.
Water	6 ounces.

Macerate it at a temperature of 100° for an hour. The mixture may be filtered easily, and forms a perfectly clear solution very convenient for experiment.

"If the powder is to be taken as a medicine, from two to five grains may be given for a dose, a little diluted hydrochloric acid in water being taken at the same time. The pepsin powder may be mixed with the salt at a meal. It is devoid of smell, and has only a slightly salt taste. It undergoes no change if kept perfectly dry, and contains the active principle of the gastric juice almost unaltered.

"The method of preparing this pepsin was communicated to Mr. Bullock, of the firm of Messrs. Bullock and Reynolds, 3, Hanover Street, Hanover Square, who at once adopted it for the preparation of medicinal pepsin, and soon improved upon it in some particulars. The dose is from 2 to 4 or 5 grains. *Test.* 8 grains of this pepsin, with 10 drops dilute hydrochloric acid and an ounce of distilled water, dissolve 100 grains of hard-boiled white of egg in from twelve to twenty-four hours. In the body probably twice this quantity of white of egg or even more would be dissolved in a comparatively short space of time. The digestive powder prepared from the pig's stomach retains its activity for any length of time if kept dry. I had some which had been kept in a bottle for upwards of five years, and still retained its active power unimpaired. The solution made with this pepsin and hydrochloric acid was nearly tasteless and inodorous. One pig's stomach, which cost sixpence, will yield about 45 grains of the powder prepared as above described.

"Gradually the usefulness of this preparation of pepsin of the pig was found out, and it had to be prepared in increasing quantities. I should be afraid to say how many pigs' stomachs have been used of late years during the winter season.

"In 1857 Dr. Pavy carefully examined the pepsin prepared and sold by many different firms, and found that this dried mucus of the pig's stomach was the most active of them all ('Medical Times and Gazette,' 1857, vol. i, p. 336). In 1870 Professor Tuson instituted a still more careful comparative examination, and with a similar result ('Lancet,' August 13th, 1870); for he found that this preparation was *twenty-five times stronger than some others that he obtained for examination.*"

2. (Scheffer, 'Pharm. Journ.,' March 23rd, 1872, p. 761.) "Of the well-cleaned fresh hog stomach the mucous membrane is dissected off, chopped finely and macerated in water acidulated with muriatic acid for several days, during which time the mass is frequently well stirred. The resulting liquid, after being strained, is, if not clear, set aside for at least twenty-four hours in order to allow the mucus to settle. To the clarified liquid the same bulk of a saturated solution of sodium chloride is added, and the whole thoroughly mixed. After several hours the pepsin, which by the addition of chloride of sodium has separated from its solution, is found floating on the surface, from whence it is removed with a spoon and put upon cotton cloth to drain; finally it is submitted to strong pressure, to free it as much as possible from the salt solution.

"The pepsin, when taken from the press and

allowed to become air dry, is a very tough substance, and presents, according to thickness, a different appearance, resembling in thin sheets parchment paper, and in thick layers sole leather; its colour varies from a dim straw yellow to a brownish yellow. Besides a little mucus, it contains small quantities of phosphate of lime and chloride of sodium, which, however, do not interfere with its digestive properties, as they are found also in normal gastric juice.

"In order to get a purer article I redissolve the pepsin, as obtained after expression, in acidulated water, filter the solution through paper and precipitate again with a solution of sodium chloride; the precipitate, after draining and pressing, is now free of phosphate of lime and mucus, but still contains salt. In the freshly precipitated state the pepsin is very readily soluble in water, and cannot therefore be freed from adhering salt by washing.

"By allowing the pressed sheet of pepsin to get perfectly air dry—whereby it becomes coated with a white film and small crystals of chloride of sodium—and by immersing it then in pure water for a short time, the greater part of sodium chloride can be extracted, but it has to be done very rapidly, as the pepsin swells up considerably and loses its tenacity. By operating in this manner I have obtained a pepsin which dissolves in acidulated water to quite a clear colourless liquid, but as it still contains traces of salt, I prefer to call it purified pepsin."

Pepsin, Saccharated. To work it into saccharated pepsin ('American Journal of Pharmacy,' January, 1871) the damp pepsin, as it is taken from the press, is triturated with a weighed quantity of sugar of milk to a fine powder, which, when it has become air dry, is weighed again, the quantity of milk sugar subtracted, and so the amount of pepsin found. The strength of this dry pepsin is now ascertained by finding how much coagulated albumen it will dissolve at a temperature of 100° F. in five or six hours, and after this sufficient milk sugar is added to result in a preparation of which ten grains will dissolve one hundred and twenty grains of coagulated albumen, and this preparation I have called saccharated pepsin.

PERCHLO″RATE. *Syn.* PERCHLORAS, L. A salt of perchloric acid.

The perchlorates are distinguished from the chlorates by their great stability, and by not turning yellow when treated with hydrochloric acid. Like the chlorates, they give off oxygen when heated to redness. They may be prepared by directly neutralising a solution of the acid with a solution of the base. See POTASSIUM (Perchlorate of), and CHLORINE.

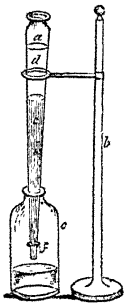
PERCHLO″RIC ACID. See CHLORINE.

PERCOLA′TION. *Syn.* METHOD OF DISPLACEMENT. A method of extracting the soluble portion of any substance in a divided state, by causing the menstruum to filter or strain through it. The 'sparging' of the Scotch brewers is an example of the application of this principle on the large scale. In pharmacy, the 'method of displacement' is frequently adopted for the preparation of tinctures, infusions, &c., and is, in some respects, superior to digestion or maceration. "The solid materials, usually in coarse or moderately fine powder, are moistened with a sufficiency of the solvent to form a thick pulp. In twelve hours, or frequently without delay, the mass is put into a cylinder of glass, porcelain, or tinned iron, open at both ends, but obstructed at the lower end by a piece of calico or linen, tied lightly over it as a filter; and the pulp being backed by pressure, ranging as to degree with different articles, the remainder of the solvent is poured into the upper portion of the cylinder, and allowed gradually to percolate. In order to obtain the portion of the fluid which is absorbed by the residuum, an additional quantity of the solvent is poured into the cylinder, until the tincture which has passed through equals in amount the spirit originally prescribed. The spirit employed for this purpose is then recovered, for the most part, by pouring over the residuum as much water as there is spirit retained in it, which may be easily known by an obvious calculation in each case. The method of percolation is now preferred by all who have made sufficient trial of it to apply it correctly." (Ph. E.)

The first portion of liquid obtained by the method of displacement is always in a state of high concentration. In general, it is a simple solution of the soluble ingredients of the crude drug in the fluid employed. But sometimes the solvent, if compound, is resolved into its component parts, and the fluid which passes through at any given time is only one of these, holding the soluble parts of the drug in solution. Thus, if diluted alcohol be poured over powder of myrrh, in the cylinder of the percolator, the fluid which first drops into the receiver is a solution of an oily consistence, chiefly composed of resin and volatile oil, dissolved in alcohol. In like manner, when the powder of gall-nuts is treated in the same way by hydrated sulphuric ether, two layers of fluid are obtained, one of which is a highly concentrated solution of tannin in the water of the ether, and the other a weak solution of the same principle in pure ether. In all cases, therefore, in which it is not otherwise directed, it is absolutely necessary to agitate the several portions of the liquid obtained by percolation together, in order to ensure a product of uniform strength or activity.

Several forms of displacement apparatus are employed by different operators. A simple and useful one is that figured in the margin. It has also the advantage of being inexpensive, and may be made by any worker in tin plate.

In operating on some substances it is found advantageous to hasten the process by pressure.



a. Percolator.

b. Stand.

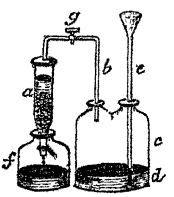
c. Receiver.

d. Menstruum.

e. Substance operated on.

f. Calico strainer.

This may be effected by any of the methods adopted for that purpose, and already described under FILTRATION. An ingenious little apparatus, which is well adapted for small quantities, is shown in the *engr.* By pouring mercury or water through (*e*), into the bottle (*c*), the air in the latter suffers compression, and acts in a corresponding manner on the percolating liquor in (*a*). The whole of the joints must be made air-tight.



a. Percolator.
b. Tube connecting it with—
c. A double-necked bottle containing—
d. Mercury.
e. Feeding-tube.
f. Receiver.
g. Stop-cock to regulate or arrest the pressure of air on the contents of the cylinder (*a*).

The method of displacement, although apparently simple, requires for its successful application no inconsiderable amount of experience and skill in manipulation. The principal points to be attended to are—the reduction of the substance to the proper state of comminution (neither too coarse nor too fine),—the due regulation of the period of maceration according to the hardness, density, and texture of the substance; and, more important still,—the proper packing of the ingredients in the cylinder. On the correct performance of the last the success of the process mainly depends. Some substances require considerable pressure to be used, whilst others, when even lightly packed, scarcely permit the fluid to pass through them. When the material is too loosely packed, the menstruum passes through quickly, but without exerting its proper solvent action; when too great pressure is employed, percolation either progresses very slowly or not at all. On the whole, the firmness of the packing should be inversely as the solvent and softening power of the menstruum upon the solids exposed to its action; but to this rule there are many exceptions, and each substance may be said to require special treatment. An excellent plan, applicable to all substances, and especially to those of a glutinous or mucilaginous nature, is to mix the powder with an equal bulk of well-washed siliceous sand before rubbing it up with the menstruum. In reference to the coarseness of the powder, it must be observed that substances which readily become soft and pappy when wetted by the menstruum, should not be used so fine as those that are more woody and fibrous, and not of a glutinous or resinous nature.

The 'method of displacement' has the advantage of expedition, economy, and yielding products possessing considerable uniformity of strength; but the difficulties attending its application by the inexperienced are serious obstacles to its general adoption in the laboratory. It answers admirably for the preparation of all tinctures that are not of a resinous nature, and for most infusions of a woody and fibrous substances, as roots, woods, barks, leaves, seeds, insects, &c., and particularly when cold or tepid water is taken as the solvent. It is also especially adapted for the preparation of concentrated infusions and essences, as they may thus be obtained of any required strength without loss, or requiring concentration by heat, which is so destructive to their virtues.

"When (ordinary) tinctures are made in large quantities, displacement is never likely to supersede maceration, on account of any practical advantages it may possess. If the prescribed directions be duly attended to, the process of maceration is unexceptionable. The process is more simple than the other; the mode of operating is more uniform, it is, in fact, always the same; it requires less of skill and dexterity in conducting it; it requires less constant attention during its progress, which, in operating on large quantities is a consideration; and, finally, the apparatus required is less complicated. When, however, only small quantities of tincture are made at a time, and kept in stock, the adoption of the process of displacement will often be found convenient and advantageous. It offers the means of making a tincture in two or three hours, which, by the other process, would require as many weeks." (Mohr and Redwood.)

Another useful application of the method of displacement is to the manufacture of extracts on the large scale. Here it is superior to any other plan. By the simple and inexpensive forms of apparatus in block-tin, stoneware, or glass, which have recently been designed for the purpose, not merely a first-class product is ensured, but a great saving in fuel and labour is at the same time effected. See BREWING, EXTRACT, TINCTURE, &c.

PERCUS'SION. *Syn.* PERCUSSIO, L. In medicine, the act of striking any part of the body with the fingers, or any instrument, to ascertain its condition. See AUSCULTATION.

PERCUS'SION CAPS. The composition employed to prime these articles is noticed under FULMINATING MERCURY.

PER'FECT LOVE. See LIQUEUR (Parfait Amour).

PER'FUME. A substance that emits or casts off volatile particles which, when diffused through the atmosphere, agreeably affect the organs of smelling. The term is also applied to the volatile effluvia so perceived. The principal source of perfumes is the Vegetable Kingdom. Its flowers, seeds, woods, and barks, furnish a rich variety, from which the most fastidious connoisseur may select his favourite bouquet. A few perfumes, as musk, ambergris, and civet, are derived from the Animal Kingdom; but none of these evolve an aroma comparable in freshness to that of the rose, or in delicacy to that of the orange-blossom, or even the unpretending jasmine. The Inorganic Kingdom yields not a single perfume, so called; nor has the science of chemistry yet been able to produce a single odoriferous compound from matter absolutely inorganic.

PERFU"MERY. Perfumes in general; also the art of preparing them. In its commercial application, this word embraces not merely perfumes, but also cosmetics, and other articles of a closely allied character employed at the toilet, the manufacture and sale of which constitute the trade of the modern perfumer. Formulæ for the preparation of all the more valuable perfumes, as well as of others met with in trade, both simple and compound, will be found under the heads COSMETICS, DEPILATORY, ESSENCE, HAIR DYES, OILS, PASTES, PASTILS, POMMADE, SPIRIT, WATERS, &c., to which we refer the reader.

Perfumes, Ace'tic. See VINEGAR.

Perfumes, Ammo"niated. These may be prepared by simply adding a sufficient quantity of ammonia to the liquid perfumes. When the articles are to be distilled, a cheaper plan is to add about 5 drs. of sal ammoniac and 8 drs. of carbonate of potassa to each pint of the article just before distillation. Ammoniated Cologne water is now a fashionable substitute for spirit of sal volatile.

PERIOD'IC ACID. See IODINE.

PERISTAL'TIC PERSUA'DERS. See PILLS (Kitchener's).

PER'MANENT WHITE. See BARYTA (Sulphate) and WHITE PIGMENTS.

PERNAMBU'CO WOOD. *Syn.* PEACH WOOD. The wood of *Cæsalpinia echinata.* It constitutes the paler variety of Brazil wood used by the dyers.

PER'RY. *Syn.* PYRACEUM, L. A fermented liquor prepared from pears in the same way as cider is from apples. The red rough-tasted sorts are principally used for this purpose. The best perry contains about 9% of absolute alcohol; ordinary perry, from 5 to 7%.

Perry is a very pleasant-tasted and wholesome liquor. When bottled 'champagne fashion,' we have seen it frequently passed off for champagne, without the fraud being suspected.

PER'SIAN BER'RIES. See FRENCH BERRIES.

PERSPIRA'TION. The liquid or vapour secreted by the ramifications of the cuticular arteries over the surface of the body. The perspiratory apparatus consists of a gland deeply seated in the corium, communicating by means of tubules (pores) with the surface of the scarf-skin.

The uses of the perspiratory functions appear to be to preserve the suppleness and sensibility of the skin, to maintain the temperature of the body at a uniform standard, and to remove from the system a number of compounds noxious to animal life. The perspiration "is a fluid whose regularity and continuance of exhalation are not merely conducive but absolutely necessary, to health; without such regularity, the animal temperature would run riot, and substances of an injurious quality would be allowed to permeate the finest and most delicate of the tissues of the body." (Eras. Wilson.) "From the constriction or constipation of the cutaneous pores by the ambient air, especially when the body, beforehand put into a heat, is suddenly exposed thereunto, the serous particles, which used to fly off continually in vapour, being now pent in, ecite an ixntense and feverish effervescence; till, finding some other passage, either by the kidneys or by the glandules of the nose and windpipe, they are discharged by way of a catarrh; or, missing this separation, still keep up the ebullition, very often to the harard of life, by suffocating the vital flame. And this is the natural consequence of obstructed insensible perspiration, which, in the vulgar phrase, is the same with what they mean by catching cold, and of which, give me leave to remark, that as fevers make two thirds of diseases infesting mankind, according to the computation of the judicious Sydenham, so two thirds of fevers very probably may take their rise from perspiration hindered." (Daniel Turner.) Suppressed perspiration is also one of the commonest causes of diarrhœa,

PERU'VIAN BALSAM. See BALSAM OF PERU.

PERU'VIAN BARK. See CINCHONA.

PES'SARY. *Syn.* PESSUM, PESSARIUM, L. An instrument made of caoutchouc, gutta percha, box-wood, or ivory, inserted into the vagina to support the mouth and neck of the uterus. They are variously formed, to meet the prejudices of the party or the necessities of the case. The cup, conical, globe, and ring pessaries (pessi) are those best known.

Medicated pessaries are prepered by adding the active ingredients to a hard cerate, and pressing the mixture into the desired form. Astringents (various), belladonna, acetate of

lead, iodine, mercury, opium, &c., have been thus applied by Dr. Simpson and others.

PEST'ILENCE. See PLAGUE.

PESTILEN'TIAL DISEASES. All those diseases which are epidemic and malignant and assume the character of a plague. See CHOLERA, &c.

PETONG'. Same as *packfong*.

PET'ROLENE. The pure liquid portion of mineral tar. It has a pale yellow colour, a penetrating odour, and a high boiling-point; is lighter than water, and is isomeric with the oils of turpentine and lemons. In its general proportions, it resembles rectified mineral naphtha.

PETRO'LEUM. *Syn.* ROCK OIL, LIQUID BITUMEN, OIL OF PETRE; OLEUM PETRÆ, BITUMEN LIQUIDUM, L. PETROLEUM is an oil found oozing from the ground or obtained on sinking wells in the soil. To a limited extent it is met with in most countries of Europe and in the West India islands, but occurs in abundance in Pennsylvania and other parts of the United States and in Canada. It varies in colour from slight yellow to brownish black, in consistence from a thin mobile liquid to a fluid as thick as treacle, in specific gravity from 800 to 1100 (water being 1000) and is either clear and transparent or turbid and opaque. Petroleum is essentially a volatile oil, and when submitted to distillation yields gases homologous with light carburetted hydrogen of marsh-gas (Ronalds obtained three), liquids of similar constitution (Pelouze and Cahours isolated twelve), and solid paraffin-like bodies. Commercially petroleum is distilled so as to yield petroleum-spirit or mineral naphtha used as a substitute for turpentine and for burning in sponge-lamps and costermongers' barrow-lamps; petroleum oil used all over the world as mineral lamp oil for illuminating purposes; and a heavy oil employed for lubricating machinery. The value of a sample of rock-oil is determined by thus distilling a weighed quantity in a small glass retort and weighing the products. The petroleum or middle product must be of such a character as to have a specific gravity not higher than 810 or 820 and to contain so little petroleum spirit that it only evolves inflammable vapour when heated to 100° Fahr. in the manner prescribed in the Petroleum Act, 1871 (see *below*). Any petroleum product or mineral oil which will not stand this test, and which is kept in larger bottles than one pint, and in larger total quantity than three gallons cannot be stored or sold except by licence of the local authorities.

Directions for Testing Petroleum to ascertain the temperature at which it gives off inflammable vapour.

The vessel which is to hold the oil shall be of thin sheet iron; it shall be two inches deep and two inches wide at the opening, tapering slightly towards the bottom; it shall have a flat rim, with a raised edge one quarter of an inch round the top; it shall be supported by this rim in a tin vessel four inches and a half deep and four and a half inches in diameter; it shall also have a thin wire stretched across the opening, which wire shall be so fixed to the edge of the vessel that it shall be a quarter of an inch above the surface of the flat rim. The thermometer to be used shall have a round bulb about half an inch in diameter, and is to be graduated upon the scale of Fahrenheit, every ten degrees occupying not less than half an inch upon the scale.

The inner vessel shall be filled with the petroleum to be tested, but care must be taken that the liquid does not cover the flat rim. The outer vessel shall be filled with cold, or nearly cold water; a small flame shall be applied to the bottom of the outer vessel, and the thermometer shall be inserted into the oil so that the bulb shall be immersed about one and a half inches beneath the surface. A screen of pasteboard or wood shall be placed round the apparatus, and shall be of such dimensions as to surround it about two-thirds, and to reach several inches above the level of the vessels.

When heat has been applied to the water until the thermometer has risen to about 90° Fahr., a very small flame shall be quickly passed across the surface of the oil on a level with the wire. If no pale blue flicker or flash is produced, the application of the flame is to be repeated for every rise of two or three degrees in the thermometer. When the flashing-point has been noted, the test shall be repeated with a fresh sample of the oil, using cold, or nearly cold, water as before; withdrawing the source of heat from the outer vessel when the temperature approaches that noted in the first experiment, and applying the flame test at every rise of two degrees in the thermometer. See NAPHTHA, OILS (Mineral), &c.

PEW'TER. This is an alloy of tin and lead, or of tin with antimony and copper. The first only is properly called pewter. Three varieties are known in trade;—

Prep. 1. (PLATE PEWTER.) From tin, $89\frac{9}{10}$; antimony, $7\frac{7}{10}$; bismuth and copper, of each, $2\frac{2}{10}$; fused together. *Used* to make plates, teapots, &c. Takes a fine polish.

2. (TEIPLE PEWTER. From tin, $79\frac{9}{10}$; antimon, $15\frac{9}{10}$; lead, $6\frac{9}{10}$; as the last. *Used* for minor articles, syringes, toys, &c.

3. (LEY PEWTER.) From tin, $80\frac{9}{10}$; lead, $20\frac{9}{10}$. *Used* for measures, inkstands, &c.

Obs. According to the report of the French commission, pewter containing more than 18 parts of lead to 82 parts of tin is unsafe for measures for wine, and similar liquors and, indeed, for any other utensils exposed to contact with our food or beverages. The legal sp. gr. of pewter in France is 7·764; if it be greater, it contains an excess of lead, and is liable to prove poisonous. The proportions of these metals may be approximately determined from the sp. gr.; but correctly, only by an assay

for the purpose. See BRASS, GERMAN SILVER, LEAD, and TIN.

PHE'NOL. C_6H_6O. See CARBOLIC ACID.

PHE'NYL. C_6H_5. The hypothetical compound radical of the phenyl-series. Carbolic acid is said to be its hydrate.

PHENYL'AMINE. $C_6H_5H_2N$. Aniline is sometimes so named on account of its relation to the phenyl series.

PHILO'NIUM. The ancient name of an aromatic opiate, reputed to possess many virtues, invented by Philo. See CONFECTION OF OPIUM.

PHILOS'OPHER'S STONE. *Syn.* LAPIS PHILOSOPHORUM, L. A wonderful substance, the discovery of which formed the day dreams of the alchemists. It was supposed to be capable of converting all the baser metals into gold, and of curing all diseases. Some of the alchemists appear to have laboured under the delusion that they had actually discovered it. The last of these enthusiasts was the talented and unfortunate Dr. Price, of Guildford. Speaking of the age of alchemy, Liebig says,—"The idea of the transmutability of metals stood in the most perfect harmony with all the observations and all the knowledge of that age, and in contradiction to none of these. In the first stage of the development of science, the alchemists could not possibly have any other notions of the nature of metals than those which they actually held. . . . We hear it said that the idea of the philosopher's stone was an error; but all our views have been developed from errors, and that which to-day we regard as truth in chemistry may, perhaps, before to-morrow, be regarded as a fallacy."

PHILOSOPHIC CANDLE. An inflamed jet of hydrogen gas.

PHILOSOPHIC WOOL. Flowers of zinc.

PHIL'TRE. *Syn.* PHILTRUM, L. A charm or potion to excite love. The ancients had great faith in such remedies. Nothing certain is now known respecting their composition; but there is sufficient evidence that recourse was frequently had to them by the ancients, and that "their operation was so violent that many persons lost their lives and their reason by their means." The Thessalian philtres were those most celebrated. (Juv., vi, 610, &c.) At the present day the administration of preparations of the kind is interdicted by law.

PHLORE'TIN. $C_{15}H_{14}O_5$. A crystallisable, sweet substance, formed along with grape sugar, when phloridzin is acted on by dilute acids.

PHLORID'ZIN. $C_{21}H_{24}O_{10}$. *Syn.* PHLORIZINE; PHLORIDZINUM, L. *Prep.* By acting on the fresh root-bark of the apple, pear, or plum tree, with boiling rectified spirit; the spirit is distilled off, and the phloridzin crystallizes out of the residual liquor as it cools.

Prop &c. Fine, colourless, silky needles, freely soluble in rectified spirit and in hot water, but requiring 1000 parts of cold water for its solution; its taste is bitter and astringent. When its solution is boiled with a little dilute sulphuric acid or hydrochloric acid, it is changed into grape sugar and phloretin.

Phloridzin bears a great likeness to salicin. It is said to be a powerful febrifuge. *Dose.* 3 to 15 grs.

PHOCE'NIC ACID. See DELPHINIC ACID.

PHŒNIC'INE. See INDIGO PURPLE.

PHOS'GENE GAS. See CHLOROCARBONIC ACID.

PHOS'PHATE. *Syn.* PHOSPHAS, L. A salt of phosphoric acid. See PHOSPHORIC ACID and the respective metals.

PHOS'PHIDE. See PHOSPHURET.

PHOS'PHITE. *Syn.* PHOSPHIS, L. A salt of phosphorous acid. See PHOSPHOROUS ACID.

PHOS'PHORUS. P.

Prep. This is now only conducted on the large scale:—Bone-ash (in powder), 12 parts, and water 24 parts, are stirred together in a large tub until the mixture is reduced to a perfectly smooth 'pap'; oil of vitriol, 8 parts, is then added in a slender stream, active stirring being employed during the whole time, and afterwards until the combination appears complete; the next day the mass is thinned with cold water, and, if convenient, heated in a leaden pan or boiler until it has entirely lost its granular character; it is now transferred to one or a series of tall casks (according to the extent of the batch), and further diluted with a large quanty of water; after repose, the clear liquid is decanted, the sediment washed with water, and the 'washings' and 'decanted liquor' evaporated in a leaden or copper boiler until the white calcareous deposit (gypsum) becomes considerable; the whole is then allowed to cool, the clear portion decanted, and the sediment thoroughly drained on a filter; the liquid thus obtained is evaporated in an iron pot to the consistence of a thick syrup (say 4 parts), when dry charcoal (in powder), 1 part, is added, and the desiccation continued until the bottom of the pot becomes nearly red hot, after which it is covered over and allowed to cool; the dry mixture, when cold, is put into one or more earthen retorts well covered with 'luting' and properly dried, and heat is applied (sideways rather than at the bottom) by means of a good air-furnace; after a short time the beak of the retort is connected with a copper tube, the other end of which is made to dip about one fourth of an inch beneath the surface of some lukewarm water placed in a trough or wide-mouthed bottle.

The distilled product is purified by squeezing it through chamois leather under warm water, and is then moulded for sale by melting it under water heated to about 145° Fahr., and sucking it up to any desired height in slightly tapering, but perfectly straight, glass tubes, previously warmed and wetted. The bottom of the tube being now closed with the finger,

it is withdrawn, and transferred to a pan of cold water to congeal the phosphorus, which will then commonly fall out, or may be easily expelled by pressure with a piece of wire.

Prop., &c. Phosphorus, in its normal condition, is a pale yellow, semi-transparent, and highly combustible solid; soft and flexible at common temperatures; it becomes waxy at about 75° Fahr.; melts at about 111° and boils at 550° Fahr.; it takes fire in the air at 165°, and oxidates at all temperatures above 32°. Exposed to the air below 60°, its surface is slowly converted into phosphorous acid. It is apparently insoluble in water, but it conveys its peculiar flavour and odour to that fluid when agitated with it; it is slightly soluble in ether, naphtha, and the fixed and volatile oils, and more freely so in bisulphide of carbon. It unites with oxygen, forming oxides, and with oxygen and hydrogen, forming acids, and with the metals, forming phosphides.

Phosphorus is remarkable for assuming several allotrophic forms. In one of these forms (amorphous phosphorus) its properties are so altered that they might be those of a distinct element.

Uses. The principal consumption of phosphorus is in the manufacture of lucifer matches. When swallowed, it acts as a powerful corrosive poison; but small doses of its ethereal and oily solutions are occasionally administered in cases of chronic debility, extreme prostation of the nervous powers, impotency, &c. Its action is that of a powerful diffusible stimulant and diuretic; it is also aphrodisaic. Its use requires great caution, and the effects must be narrowly watched. The treatment of poisoning by phosphorus consists of the administration of a powerful emetic and the copious use of mucilaginous drinks.

Concluding remarks. From the great inflammability of phosphorus it can only be safely preserved under water. In commerce, it is always packed in tin cylinders filled with water, and soldered up air-tight. The leading points to be observed to ensure success in this manufacture are chiefly connected with the firing. The heat of the furnace should be most slowly raised at first, but afterwards equably maintained in a state of bright ignition. After 3 or 4 hours of steady firing, carbonic and sulphurous anhydride are evolved in considerable abundance, provided the materials had not been well dried in the iron pot; then sulphuretted hydrogen makes its appearance, and next phosphuretted hydrogen, which last should continue during the whole of the distillation. The firing should be regulated by the escape of this remarkable gas, which ought to be at the rate of about two bubbles per second. If the discharge comes to be intercepted, it is to be ascribed either to the temperature being two low, or to the retort getting cracked; and if, upon raising the heat sufficiently, no bubbles appear, it is a proof that the apparatus has become defective, and that it is needless to continue the operation. We may infer that the process approaches its conclusion by the increasing slowness with which the gas is disengaged under a powerful heat; and when it ceases to come over we may cease firing, taking care to prevent reflux of water into the retort (and consequent explosion), from condensation of its gaseous contents, by admiting air into it through a recurved glass tube, or through the tube of the copper adapter. The usual period of the operation, upon the great scale, is from 24 to 30 hours.

Phosphorus, Amor'phous. *Syn.* RED PHOSPHORUS, ALLOTROPIC PHOSPHORUS; PHOSPHORUS FUSCUS, P. RUBER. L. This is phosphorus in that peculiar condition to which Berzelius has applied the term "allotropic." The honour of its discovery is due to Dr. Shrötter, of Vienna.

Prep. The ordinary phosphorus of commerce, rendered as dry as possible, is placed in a shallow vessel of hard and well-annealed Bohemian glass, fitted with a safety tube just dipping beneath the surface of a little hot water contained in an adjacent vessel; heat is then applied by means of a metallic bath (a mixture of lead and tin), the temperature of which is gradually raised until it ranges between 464 and 482° Fahr., and bubbles of gas escape from the end of the safety tube and catch fire as they come in contact with the air; this temperature is maintained until the amorphous condition is produced, the length of the exposure being regulated by a miniature operation with tubes conducted in the same bath; as soon as this point is reached, the apparatus is allowed to cool, and the amorphous phosphorus, which still contains some unconverted phosphorus, detached from the glass; it is then reduced to powder by careful trituration under water, drained on a calico filter, and, whilst still moist, spread thinly on shallow trays of iron or lead; in this state it is exposed, with frequent stirring, to heat in a chloride of calcium bath, at first gentle, and then gradually increased to its highest limit, and the heat continued until no more luminous vapour escapes; the residuum on the trays is then cooled, washed with water until this last ceases to affect test paper, and is, lastly, drained and dried. To render it absolutely free from unaltered phosphorus, it may be washed with bisulphide of carbon.

On the small scale, common phosphorus may be converted into amorphous phosphorus by simply exposing it for 50 or 60 hours to a temperature of about 473° Fahr., in any suitable vessel from which the air is kept excluded by a stream of carbonic acid, or any other gas which is unable to act chemically on the phosphorus.

By keeping common phosphorus fused at a high temperature, under the above conditions, for fully 8 days, compact masses of amorphous phosphorus may be obtained.

Prop., &c. A reddish-brown, infusible, inodorous, solid substance, which is reconverted into ordinary phosphorus by simply exposing it to a heat a little above 500° Fahr. It is unaltered by atmospheric air; is insoluble in bisulphide of carbon, alcohol, ether, or naphtha; is non-luminous in the dark below about 390° Fahr.; and does not take fire at a lower temperature than that necessary for its reconversion into the common or crystalline form. The sp. gr. ranges between 2·089 to 2·017, according to the method of preparing it. Its properties render it an admirable substitute for the common phosphorus in the composition for tipping matches, both as regards security from spontaneous ignition and the health of the manufacturers; but the anticipations that it would be thus generally applied, owing to its high price, have not yet been realised.

Phosphorus, Trichloride of. PCl_3. *Syn.* PHOSPHOROUS TERCHLORIDE, PHOSPHOROUS CHLORIDE. By gently heating phosphorus, in excess, in dry chlorine gas; or by passing the vapour of phosphorus through a stratum of powdered mercuric chloride, strongly heated in a glass tube. It is limpid, colourless, highly fetid, fumes in the air, and is slowly resolved by water into phosphorous acid and hydrochloric acid. Sp. gr. 1·45.

Phosphorus, Pentachloride of. PCl_5. *Syn.* PHOSPHORIC CHLORIDE, PERCHLORIDE OF PHOSPHORUS.

Prep. By the spontaneous combustion of phosphorus in an excess of dry chlorine; or by passing a stream of dry chlorine into the liquid terchloride. By the first method it is obtained as a white crystalline sublimate; by the second, as a solid crystalline mass. It is volatile; water resolves it in phosphoric acid and hydrochloric acid.

Phosphorus, Oxychloride of. PCl_3O. *Syn.* PHOSPHORIC OXYCHLORIDE, PHOSPHORIC MONOOXYCHLORIDE.

Prep. By heating pentachloride of phosphorus with a quantity of water insufficient to convert it into phosphoric acid. It is a colourless, fuming liquid, having the sp. gr. 1·7.

Phosphorus, Hydride of. PH_3. *Syn.* PHOSPHORETTED HYDROGEN, PHOSPHURETTED HYDROGEN.

Prep. 1. Phosphorous acid is gently heated in a retort, and the first portion of the gas collected.

2. From phosphorus (in small lumps) boiled in a solution of hydrate of potassium or milk of lime, contained in a small retort, as before. Take a very small thin retort, capable of holding not more than 1 oz. or 1½ oz. of water; place in this 3 or 4 fragments of the sticks of fused hydrate of potassium, each being about ½ inch in length; add as much water as will barely cover them, and then drop in a small fragment of phosphorus, about the size of a horse-bean; apply a very gentle heat with the small flame of a spirit lamp, agitating the retort continually. A pale cloud will first appear in the interior, and reaches the orifice, and burns in the air; the retort should be placed on its beak about an inch under the surface of water; must be taken not to withdraw the lamp. When the bubbles of gas come to the surface they spontaneously inflame.

3. From phosphide of calcium and dilute hydrochloric acid, as above; or simply from the phosphide thrown into water.

Obs. The gas obtained by methods 2 and 3 is contaminated with the vapour of a liquid phosphide of hydrogen, PH_2, which gives to it the property of spontaneous inflammability.

Prop., &c. Colourless; very fetid; slightly soluble in water; burns with a white flame; decomposed by light, heat, and strong acids; as commonly prepared, inflames on contact with air, at ordinary temperatures, but when pure, only at the heat of boiling water. Sp. gr. 1·24. It is rendered quite dry by standing over fused chloride of calcium.

Phosphorus, Suboxide of. P_4O. (Odling.) A reddish-brown powder, formed when a stream of oxygen is forced upon phosphorus, melted beneath the surface of hot water. To purify it from phosphoric acid and free phosphorus, it is washed on a filter with water, then dried by bibulous paper, and finally digested with bisulphide of carbon.

Hypophosphorous Acid. H_3PO_2. By cautiously decomposing a solution of hypophosphite of barium with sulphuric acid, filtering from the precipitate (sulphate of baryta), and evaporating. Dissolve hypophosphite of calcium, 480 grs. in distilled water, 6 fl. oz.; dissolve crystallised oxalic acid, 350 grs., in another portion of distilled water, 3 fl. oz.; mix the solutions and filter the mixture through white filtering paper. Add distilled water carefully to the filtrate till it measures 10 fl. oz., and evaporate this to 8½ fl. oz. The solution thus prepared contains about 10% of terhydrated hypophosphorous acid.

Prop. A viscid, uncrystallisable liquid having a strongly acid reaction. It is a powerful drying agent, and forms salts called hypophosphites.

Ammonium, Hypophosphite of. $(NH_4)_3PO_2$. *Prep.* Dissolve hypophosphite of calcium, 6 oz., in water, 4 pints; and dissolve translucent sesquicarbonate of ammonium, 7·23 oz. (barely 7½), in water, 2 pints; mix the solutions; filter, washing out the solution retained by the carbonate of lime with water, q. s.; evaporate the filtrate to dryness with great care; dissolve it in alcohol, q. s.; filter, evaporate, and crystallise. Very soluble in both alcohol and water.

Barium, Hyperphosphite of. $Ba_3(PO_4)_2$. *Prep.* Boil phosphorus in a solution of hydrate of barium (baryta water) till all the phosphorus disappears and the vapours have no longer a garlic odour. Filter, evaporate, and set aside to crystallise.

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boiled with a
hydrochloric
e sugar and
s to salicin.
Dose.

Calcium, Hypophosphite of. $Ca_3(PO_2)_2$.

Prep. Slack recently burned lime, 4 lbs., with water, 1 gall., and mix it with water, 4 galls., just brought to the boiling temperature in a deep open boiler, stirring until a uniform milk of lime is formed; then add phosphorus, 1 lb., and keep up the boiling constantly, adding hot water from time to time, so as to preserve the measure as nearly as may be until all the phosphorus is oxidised and combined, and the strong odour of the gas has disappeared; then filter the solution through muslin, wash out that portion retained by the calcareous residue with water, and evaporate the filtrate till reduced to 6 pints; re-filter, to remove a portion of carbonate of calcium resulting from the action of the air upon the solution; evaporate again until a pellicle forms, and set aside to crystallise—or continue the heat with constant stirring until the salt granulates.

Obs. As spontaneously inflammable phosphoretted hydrogen is given off during the boiling, the process must be conducted under a hood, with a strong draught or in the open air. Smaller proportions than those given may be used.

Prop. Hypophosphite of calcium is a white salt, with pearly lustre, crystallising in flattened prisms; soluble in 6 parts of cold water, and slightly soluble in dilute alcohol. It is the most important of these compounds, and when introduced into the stomach it is supposed to be converted into phosphate of calcium. It has been termed 'chemical food.' By decomposition it readily furnishes the other hypophosphites.

Ferric, Hyperphosphite of. $FePO_2$. *Prep.* By precipitating a solution of hypophosphite of sodium or ammonium, with solution of ferric sulphate, washing the gelatinous precipitate with care (it being somewhat soluble); and, finally, drying it into an amorphous white powder. This is freely soluble in hydrochloric and hypophosphorous acids.

Potassium, Hypophosphite of. K_3PO_2. *Prep.* From hypophosphite of calcium, 6 oz., dissolved in water, 4 pints; and granulated carbonate of potassium, 5¾ oz., dissolved in water, ½ pint. Mix, filter, and wash the precipitate till the filtrate measures 5 pints. Evaporate till a pellicle forms, then stir constantly, continuing the heat till the salt granulates. A white, opaque, deliquescent body, very soluble in water and alcohol.

Quinine, Hypophosphite of. Dissolve sulphate of quinine, 1 oz., in water, by the aid of diluted sulphuric acid; precipitate the alkaloid with ammonia; wash the precipitated quinine and digest it in hypophosphorous acid with heat (the quinine being in excess); after filtering the solution, allow it to evaporate spontaneously till the required salt crystallises. It forms elegant tufts of soft, feathery crystals, which are soluble in 60 parts water.

Sodium, Hypophosphite of. Na_3PO_2. *Prep.* From hypophosphite of calcium, 6 oz., dissolved in water, 4 pints; and crystallised carbonate of sodium, 10 oz., dissolved in water, 1½ pint. Proceed as in making hypophosphite of potassium, but allowing 6 pints as the measure of the filtrate. If required in crystals, the granulated salt may be dissolved in alcohol sp. gr. ·835, evaporated till syrupy, and set by in a warm place. Crystallises in rectangular tables, with a pearly lustre; is very soluble in water and ordinary alcohol, and deliquesces when exposed to the air.

Phosphorus, Trioxide of. P_2O_3. *Syn.* PHOSPHOROUS ANHYDRIDE; ANHYDROUS PHOSPHORIC ACID.

Prep. By burning phosphorus in a limited supply of air. White flaky powder, with an odour of garlic, and rapidly absorbing water to form phosphorous acid.

Phosphorous Acid. H_3PO_3. *Syn.* HYDRATED PHOSPHOROUS ACID. Pure phosphorus is volatilised through a layer of powdered mercuric chloride, contained in a glass tube; terchloride of phosphorus comes over, which, on being mixed with water, is resolved into hydrochloric acid and phosphorous acid; by evaporating the mixed liquid to the consistence of a syrup, the first is expelled, and the residuum forms a crystalline mass of hydrated phosphorous acid on cooling.

Prop., &c. It is a powerful deoxidising agent. Heated in a closed vessel, it is resolved into hydrated phosphoric acid and pure phosphuretted hydrogen gas. With the bases it forms salts, called phosphites, which possess little practical importance.

Phosphorous Pentoxide Acid. P_2O_5. *Syn.* ANHYDROUS PHOSPHORIC ACID; PHOSPHOROUS ANHYDRIDE; PHOSPHORIC OXIDE. By the vivid combustion of phosphorus in a stream of dry atmospheric air, or under a bell-jar, copiously supplied with dry air. The product is pure anhydrous phosphoric acid under the form of snow-like flakes. It must be immediately collected and put into a warm, dry, well-stoppered bottle. In this state it exhibits an intense attraction for water, and when thrown into it combines with explosive violence; exposed to moist air for only a few seconds, it deliquesces to a syrupy-looking liquid.

Phosphoric Acid. There are three distinct acids usually grouped under this head, namely, METAPHOSPHORIC ACID, HPO_3; PYROPHOSPHORIC ACID, $H_4P_2O_7$; and PHOSPHORIC ACID, H_3PO_4.

Metaphosphoric Acid. HPO_3. *Syn.* MONOBASIC PHOSPHORIC ACID; GLACIAL PHOSPHORIC ACID.

Prep. Bones (calcined to whiteness and powdered), 3 parts, are digested for several days in oil of vitriol, 2 parts, previously diluted with water, 6 parts, the mixture being frequently stirred during the time; a large quantity of water is next added, the whole thrown in a strainer, and the residual matter washed with some hot water; the mixed liquors are

then precipitated with a solution of carbonate of ammonium, in slight excess, filtered from the insoluble, finally ignited in a platinum crucible.

By acting upon the anhydride with cold water.

When phosphoric acid is added to a strong solution of phosphate of zirconium, and the mixture, after concentration, is exposed to a low temperature, prismatic crystals are deposited. These, after being strongly heated to expel their basic water, are pure metaphosphate of sodium. From the solution of this salt in cold water, a solution of pure metaphosphoric acid may be obtained, as above, by means of nitrate or acetate of lead and sulphuretted hydrogen.

Obs. This acid precipitates the salts of silver white, and is distinguished from the other modifications of phosphoric acid by the property which its solution possesses of coagulating albumen.

Pyrophosphoric Acid. $H_4P_2O_7$. *Syn.* DIBASIC PHOSPHORIC ACID. By strongly heating common or phosphate of sodium. The water of crystallisation only is at first expelled, and the salt becomes anhydrous; but as the temperature reaches that of redness the salt loses water and is decomposed. By solution of the altered salt in water, crystals of pyrophosphate of sodium may be obtained. A solution of this last compound, treated with nitrate of lead, and the resulting precipitate, suspended in cold water, and decomposed by sulphuretted hydrogen, yields a solution of pure pyrophosphoric acid.

Obs. Heat resolves this into a solution of the ordinary acid. Pyrophosphoric acid precipitates the salts of silver of a white colour. The salts of this acid are called pyrophosphates.

Phosphoric Acid. H_3PO_4. *Syn.* TRIHYDRIC PHOSPHATE, TRIBASIC PHOSPHORIC ACID, ORTHOPHOSPHORIC ACID. Ordinary nitric acid is heated in a tubulated retort connected with a receiver, and small fragments of phosphorus are dropped into it, singly and at intervals; as soon as the oxygenation of the phosphorus is complete, the heat is increased, the undecomposed acid distilled off, and the residuum evaporated to the consistence of a syrup. In this state it forms the phosphoric acid of the shops. Commercial phosphate of sodium is dissolved in water and the solution precipitated with another of acetate of lead; an abundant white precipitate (phosphate of lead) falls; this is collected on a filter, well washed, and, whilst still moist, is suspended in distilled water, and sulphuretted hydrogen gas passed into it, in excess; a black insoluble precipitate forms, while pure tribasic phosphoric acid remains in solution, and is easily deprived of the residual sulphuretted hydrogen by a gentle heat. By concentration in vacuo over sulphuric acid, it may be obtained in thin crystalline plates.

The solution of this acid may be boiled without change, but when concentrated and heated to about 400° Fahr. it is converted into pyrophosphoric acid, and at a red heat into metaphosphoric acid. Its salts are the ordinary phosphates, or nitrophosphates, and they give a yellow precipitate with nitrate of silver.

Tests. The following reactions characterise the ordinary or other phosphates:—1. Chloride of barium produces in aqueous solutions of the neutral and basic phosphates a white precipitate, which is insoluble in either hydrochloric or nitric acid, and with difficulty soluble in a solution of chloride of ammonium. —2. Solution of sulphate of calcium produces in neutral and alkaline solutions of the phosphates a white precipitate, freely soluble in acids, even the acetic.—3. Sulphate of magnesium produces in solutions of the phosphates, to which some chloride of ammonium and free ammonia has been added, a white, crystalline, and quickly subsiding precipitate of the phosphate of ammonium and magnesium, which is insoluble in a solution of either ammonia or chloride of ammonium, but readily soluble in acids, even the acetic.—4. Nitrate of silver, with neutral and basic alkaline phosphates, gives a light yellow precipitate. If the fluid in which the precipitate is suspended contained a basic phosphate, it does not affect test paper; if it contained a neutral phosphate, the reaction will be acid. If the phosphate examined has been heated to redness before solution, it then, as a metaphosphate, gives a white precipitate with nitrate of silver.—5. Hydrochloric acid is added to the solution to acid reaction, and afterwards 1 or 2 drops of a concentrated solution of ferric chloride; a solution of acetate of potassium is next added in excess, when a flocculent, gelatinous, white precipitate will be formed if phosphoric acid or any phosphate was present in any form or combination in the original liquor. This test is highly characteristic, and of general applicability.—*Obs.* The insoluble phosphates must be first treated with diluted hydrochloric or sulphuric acid, and the resulting solution filtered and neutralised with an alkali, before applying the reagents. When the substance under examination consists of a very small quantity of phosphoric acid or phosphate, with a large quantity of sesquioxide of iron, it should be fused with some carbonate of sodium, the residuum of the ignition exhausted with water, and the tests applied to the filtered solution. Arsenious acid, if present, should be removed by sulphuretted hydrogen before applying the tests. When phosphate of aluminum, the solution in hydrochloric acid is neutralised with carbonate of sodium; carbonate of barium is next added in excess, followed by the addition of hydrate potassium, also in excess, after which the whole is boiled. An insoluble phosphate of barium is formed, which may be decompose by sulphuric acid, as before. See MOLYBDATE OF AMMONIUM.

Estim. Pure solutions or phosphoric acid may be tested by the common methods of

acidimetry. When in a state of combination, it may be separated and weighed in either of the forms noticed under GUANO.

Uses, &c. This acid is the common form, and is the compound alluded to when 'phosphoric acid' is spoken of. It is extensively employed by the bleacher, dyer, calico-printer, and enameller. Unlike sulphuric acid and the other strong acids, it does not coagulate albumen nor injure vegetable fibre, and is not decomposed by contact with organic matter. In combination with alumina and a large boracic acid, it is said to be capable of producing a glaze for earthenware of extreme beauty and durability, and perfecty innocuous. It is also used in medicine.

PHOSPHORUS, BALDWIN'S. Recently fused nitrate of calcium. For this purpose it must be broken into fragments whilst still warm, and at once placed in dry and well-stopped phials. After exposure for some time to the direct rays of the sun, it emits sufficient light in the dark to render visible the figures on the dial-plate of a watch.

PHOSPHORUS, BOLOGNIAN. *Syn.* KERCHER'S PHOSPHORUS, BOLOGNIAN STONE. This substance was accidentally discovered by a shoemaker of Bologna, and excited much interest about the middle of the 17th century. The following is said to have been the formula employed by the Logani family, who were particularly successful in its preparation, and acquired wealth by its sale to the curious throughout Europe.

Prep. Reduce recently calcined native sulphate of barium to powder, make it into a paste with mucilage of gum tragacanth, and roll the mass into pieces about ¼ inch thick and 1 to 2 inches long; dry these slowly by a moderate heat, and then expose them to ignition in a wind furnace, by placing them loosely among the charcoal; lastly, allow them to cool slowly, and at once place the pieces in well-stopped phials. Like the preceding substance, it phosphoresces in the dark after exposure to the sun's rays.

PHOSPHORUS, CANTON'S. *Prep.* From calcined oyster shells, 3 parts; flowers of sulphur, 1 part; placed in alternate layers in a covered crucible, and exposed to a strong heat for about an hour. It is preserved and used like the above.

PHOSPHORUS, HOMBERG'S. Recently ignited chloride of calcium.

PHOSPHORUS BOTTLES. *Prep.* 1. Phosphorus, 12 grs.; olive oil, ½ oz.; mix in an oz. phial, and place the latter, loosely corked, in a basin of hot water; as soon as the phosphorus is melted, remove the phial, cork it securely, and agitate it until nearly cold. On being uncorked, it emits sufficient light in the dark to see the time by a watch, and will retain this property for some years if not too frequently employed. These are frequently called 'luminous phials.'

2. (BRIQUETS PHOSPHORIQUES.)—*a.* From phosphorus, 3 parts; white wax, 1 part; cautiously melted together by the heat of hot water; as the mixture begins to cool, the bottles are turned round, so that it may adhere to the sides.

b. (Bendix.) Cork (rasped small, and dry) and yellow wax, of each, 1 part; phosphorus, 4 parts; petroleum, 8 parts; mixed, by fusion, as the last.

Used as instantaneous-light bottles. A sulphur match rubbed against the composition immediately inflames on exposure to the air. They should be only unstoppered at the instant of introducing the match, and should be handled with caution.

PHOSPHORUS MATCHES. See MATCHES, and *above*.

PHOSPHORUS PASTE. *Syn.* ANTI-ARSENICAL RAT-POISON, PHOSPHOR-PASTE. *Prep.* 1. Phosphorus, 1 oz.; warm water, 1 pint; place them in a bottle, cork it, and agitate them well together, until the phosphorus is reduced to a minute state of division, adding towards the end moist sugar, ½ lb.; next add of lard (melted by a gentle heat), 1 lb., and repeat the agitation until the whole is nearly cold; when cold, form it into a stiff dough with oatmeal or barley meal, and make this into small balls or cakes; lastly, dry these in the air, without artificial heat.

2. (Simon.) Phosphorus, 8 parts; water (lukewarm), 180 parts; mix in a mortar, and add of rye meal, 180 parts; when cold, further add of butter or lard, 180 parts; sugar, 125 parts; and, mix the whole thoroughly together. This is the formula authorised by an ordonnance of the Prussian Government, dated April 27th, 1843.

Obs. Rats, mice, &c., eat the above composition with avidity, after which they soon die. It is said that the best method of using it is to place small pieces of it in and about the holes, with some water in a shallow vessel for them to drink. It has the advantage of retaining its efficacy for many years, and is less dangerous to human beings than compositions containing arsenic, whilst it is even more effective for the purpose for which it is employed. Some persons recommend the addition of a little oil of rhodium or oil of aniseed. See RATS, &c.

PHOS'PHURET. *Syn.* PHOSPHIDE; PHOSPHURETUM, PHOSPHIDUM, L. A compound of phosphorus with a metal or other basic radical. See the respective METALS, &c.

PHOSPHURETTED HY'DROGEN. *Syn.* PHOSPHORETTED HYDROGEN. See HYDROGEN.

PHOTOG'RAPHY. *Syn.* HELIOGRAPHY. The art of producing images on prepared surfaces by means of the actinic or chemical rays of the sun's light. The principal photographic processes now in use are the positive-, negative-, and dry-collodion processes, in each of which a thin film or skin of iodised collodion forms the sensitive surface, a plate of glass being generally used as the foundation of the film

In a positive picture the 'lights' are silvery white by reflected light, and the 'shades' are produced by a 'backing' of black varnish or velvet, showing through the glass plate. In a negative picture the 'lights' are of a dirty yellow or brown by reflection. and being formed by opaque deposits, appear dense black by transmitted light. Negatives are used in the various paper-printing processes; they are placed upon prepared paper and exposed to direct light, which darkens those parts of the paper not protected by the opaque 'lights,' and thus produces positive prints with natural lights and shades. In this way the portrait 'cartes de visite' and other paper photographs are formed. The advantages of the 'dry-collodion process" are, that the plates, when 'sensitised,' will keep for any length of time, and may be 'developed' several days after taking the picture. The principal paper processes are the Talbotype, or calotype, invented in 1839 by Mr. Fox Talbot; the ordinary albumen process, in which pure white of egg is used to give a glossy surface to the paper; and the waxed paper process, in which the paper is waxed before being sensitised. The Daguerreotype process, discovered by M. Daguerre in 1839, has been almost entirely superseded by the easier, healthier, and less expensive collodion process. It consists in submitting a plate of silver or silvered copper to the vapour of iodine and bromine in the dark. A sensitive film of iodide and bromide of silver is thus formed on the plate, which is immediately exposed to the image of an object in the camera obscura. The latent image impressed on the plate is brought out or developed by exposing the plate to the action of the vapour of mercury.

The art of photography cannot be adequately expounded in a work like the present, and we must refer our readers for practical directions to one of the many special treatises on the subject which have been written. The work which contains the greatest amount of information within a moderate compass is Jabez Hughes's 'Principles and Practice of Photography' (Simpkin, Marshall, and Co.), of which no fewer than nine editions have been issued. Besides this excellent little guide to manipulation, the 'Year Book of Photography,' edited for many years past by Geo. Wharton Simpson, M.A. (Piper and Carter), takes cognisance of all the latest improvements introduced into the practice of the art, and furnishes details in the form of an annual report. See CAMERA OBSCURA, COLLODION, &c.

PHOTOM'ETRY. The art of determining the relative intensities of different lights. Various methods have been adopted, at different times, for this purpose, among which, however, a few only are sufficiently simple for general application. The principle adopted by Bouguer and Lambert depends on the fact that, though the eye cannot judge correctly of the proportional force of different lights, it can, generally, distinguish with great precision when two similar surfaces or objects presented together are equally illuminated, or when the shadows of an opaque object produced by different lights are equally dark. Now, as light travels in straight lines, and is equally diffused, it is evident that its intensity will progressively lessen as the distance of its source increases. This diminution is found to be in the duplicate ratio of the distance. To apply this principle to candles, lamps, gaslights, &c., we have only to arrange two of them so that the light or shadow resulting from both shall be of equal intensity, after which we must carefully measure the distance of each of them from the surface on which the light or shadow falls. The squares of these distances give their relative intensity. In general, some known light, as that from a wax candle (4 to the lb.), is taken as the standard of comparison.

Dr. Ritchie's 'photometer' consists of a rectangular box, about 2 inches square, open at both ends, and blackened inside to absorb extraneous light. In this, inclined at angles of 45° to its axis, are placed two precisely similar rectangular plates of plain silvered glass, and fastened so as to meet at the top, in the middle of a narrow slit about an inch long and the eighth of an inch broad, and which is covered with a strip of tissue or oiled paper. In employing this instrument, the "lights must be placed at such a distance from each other, and from the instrument between them, that the light from each shall fall on the reflector next it, and be reflected to the corresponding portion of the oiled paper. The photometer is then to be moved nearer to the one or the other, until the two portions of the oiled paper corresponding to the two mirrors are equally illuminated, of which the eye can judge with considerable accuracy."

In Prof. Wheatstone's 'PHOTOMETER' the relative intensity of the two lights is determined by the relative brightness of the opposite sides of a revolving silvered ball illuminated by them.

In the method of photometry usually, but erroneously, ascribed to Count Rumford, the shadows of an opaque object formed by different lights, and allowed to fall on a white wall or paper screen, are contrasted. A wire about $\frac{3}{16}$ths of an inch thick, and about a foot in length, with the one end bent so as to form a handle, is commonly used to form the shadows. The method of proceeding is similar to that first above noticed.

It is generally supposed that the equality of two shadows can be appreciated with greater certainty than that of two lights.

PHTHIS'IC. A popular name for difficulty of breathing, from its supposed resemblance to phthisis. See BRONCHITIS, and *below*.

PHYSIC BALLS. See VETERINARY MEDICINES.

PI'CA. Depraved appetite. (See page 128.)

PIC'AMAR. One of the peculiar principles discovered by Reichenbach in beech-tar, and described by him as a viscid, colourless, oily liquid, only feebly odorous, but intensely bitter; insoluble in water; freely soluble in alcohol, ether, and oils; boiling-point 520° Fahr.; sp. gr. 1·095. See KREASOTE.

PICCALIL'LI. See PICKLES.

PICK'LE. The liquor in which substances used as food are preserved. That for flesh is commonly brine; that for vegetables, vinegar; both of which are commonly flavoured with spices, &c.

Prep. 1. (FOR MEAT.)—*a.* From bay salt, 3 lbs.; saltpetre, 2½ oz.; moist sugar, 1 lb.; allspice and black pepper, of each (bruised), 1 oz.; water, 9 pints; simmer them together in a clean covered iron or enamelled vessel for 7 or 8 minutes; when the whole has cooled, remove the scum, and pour it over the articles to be preserved. Used for hams, tongues, beef, &c., to which it imparts a fine red colour and a superior flavour.

b. From bay salt and common salt, of each, 2 lbs.; moist sugar, 1 lb.; saltpetre, ½ lb.; allspice (bruised), ½ oz.; water, 1 gal.; as before. Used chiefly for pork and hams. Common salt may be substituted for bay salt, but it is less powerfully antiseptic, and the flavour is less grateful.

2. (FOR VEGETABLES.)—*a.* Strong distilled vinegar, to each quart of which 1½ oz. of good salt has been added.

b. Good distilled vinegar, 4 pints; common salt, 2½ oz.; black pepper, ½ oz.; unbleached Jamaica ginger, 2½ oz.; (the last two bruised, but not dusty;) mace (shredded), ¼ oz.; simmer in an enamelled iron or stoneware vessel, as above, and strain through flannel. Sometimes a little capsicum is added. Used either hot or cold, according to the vegetable it is intended to preserve.

Pickle, Lemon. See SAUCES.

PICKLES. These well-known articles are easily prepared of the finest quality. The vegetables and fruit, selected of the proper quality and at the proper season, after being well cleansed with cold spring water, are steeped for some time in strong brine; they are then drained and dried, and transferred to bottles or jars; the spice (if any) is then added, the bottles filled up with hot, strong, pickling vinegar, and at once securely corked down and tied over with bladder. As soon as the bottles are cold, the corks are dipped into melted wax, the more surely to preserve them air-tight. Good wood or distilled vinegar is commonly used for this purpose; but the best malt or white wine vinegar of the strength known as No. 22 or 24 is exclusively employed for the finer pickles which are not spiced. In those for early use the 'steep' may be made in hot or boiling brine, by which the product will be ready for the table in a much shorter period; but with substances of a succulent and flabby nature, as cabbage, cauliflower, some fruit, &c., or in which crispness is esteemed a mark of excellence, this is inadmissible. To such articles the vinegar should also be added cold, or, at furthest, should be only slightly warmed. As a general rule, the softer and more delicate articles do not require so long soaking in brine as the harder and coarser kinds; and they may be often advantageously pickled by simply pouring very strong pickling vinegar over them, without applying heat. It must also be observed that beetroot, and other like substances which are sliced, as well as certain delicate fruits, must not be steeped at all. The spice is commonly added whole to the bottles; but a more economical plan is to steep it (bruised) for some time, or to simmer it in the vinegar before using the latter, as in the forms given under PICKLE (*above*).

The spices and flavouring ingredients employed for pickles are—allspice, black and white pepper, capsicums or red pods, cloves, garlic, ginger, horseradish, lemon peel, mace, mustard, shallots, and turmeric. These are chosen with reference to the particular variety of the pickle, or the taste of the consumer.

In the preparation of pickles it is highly necessary to avoid the use of metallic vessels, as both vinegar and brine rapidly corrode brass, copper, lead, &c., and thus become poisonous (see page 367). These liquids may be best heated or boiled in a stoneware jar by the heat of a water bath or a stove. Common glazed earthenware should be avoided, either for making or keeping the pickles in, as the glazing usually contains lead. Pickles should also be kept from the air as much as possible, and should only be touched with wooden or bone spoons. They are also better prepared in small jars, or bottles, than in large ones, as the more frequent opening of the latter exposes them too much. Copper or verdigris is frequently added to pickles to impart a green colour, or the vinegar is boiled in a copper vessel until sufficiently 'greened' before pouring it on the vegetables. This poisonous addition may be readily detected by any of the tests mentioned at page 367. If a green colour be desired, it may be imparted to the vinegar, and ultimately to the pickles, by steeping vine leaves, or the leaves of parsley or spinach, in it. A teaspoonful of olive oil may be advantageously added to each bottle, to keep the pickles white, and to promote their preservation.

*** The following list includes the leading pickles of the shops, and some others:—

Barbarries. From the ripe fruit, without heat.

Beans. From the young green pods of the scarlet bean, and the French or kidney bean, with heat.

Beetroot. From the sliced root, without steeping in brine, and with cold spiced vinegar.

When wanted for immediate use, the vinegar may be used boiling hot,

Brocoli. As CAULIFLOWERS.

Cabbage. This, either red or white, is cut into thin slices, and steeped in strong brine or sprinkled with common salt, and allowed to lie for 1 or 2 days; after which it is drained for 10 or 12 hours in a warm room, and then put into jars or bottles, with or without a little mace and white peppercorns, and at once covered with cold, strong, white vinegar.—Another plan is to steep the sliced cabbage in alum water for 10 or 12 hours, and, after draining and drying it, to pour the vinegar upon it as before. The product of the last formula eats very fresh and crisp, but takes longer to mature than that of the other. Some persons add a little salt with the vinegar; and others mix slices of red beet with the cabbage.

Capsicums. As GHERKINS.

Cauliflowers. As CABBAGE (nearly). Or, they may be steeped in hot brine for 1 or 2 hours before pouring the vinegar over them.

Cherries. From the scarcely ripe fruit, bottled, and covered with strong and colourless pickling vinegar.

Codlins. As BEANS.

Cucumbers. As GHERKINS.

Elderflowers. From the clusters, just before they open, as RED CABBAGE. A beautiful pickle.

English Bamboo. From the young shoots of elder, denuded of the outer skin, pickled in brine for 12 or 14 hours; then bottled with a little white pepper, ginger, mace, and allspice, and pickled with boiling vinegar. Excellent with boiled mutton.

Eschalots. With boiling spiced vinegar, or spices added to each bottle.

French Beans. See *above*.

Garlic. As ESCHALOTS.

Gherkins. From small cucumbers (not too young), steeped for a week in very strong brine; this last is then poured off, heated to the boiling-point, and again poured on the fruit; the next day the gherkins are drained on a sieve, wiped dry, put into bottles or jars with some spice (ginger, pepper, or cayenne), and at once covered with strong pickling vinegar, boiling hot. Several other pickles may be prepared in the same way.

Gooseberries. From the green fruit, as either CABBAGE or CAULIFLOWERS.

Indian Mango. From green peaches. (See *below*.)

Indian Pickle. *Syn.* PICCALILLI. This is a mixed pickle which is characterised by being highly flavoured with curry-powder, or termeric, mustard, and garlic. The following form is commonly used:—Take 1 hard white cabbage (sliced), 2 cauliflowers (pulled to pieces, some French beans, 1 stick of horseradish (sliced), about 2 dozen small white onions, and 1 dozen gherkins; cover them with boiling brine; the next day drain the whole on a sieve, put into a jar, and add, of curry-powder or turmeric, 2 oz.; garlic, ginger, and mustard seed, of each, 1 oz.; capsicums, ½ oz.; fill up the vessel with hot pickling vinegar, bung it up close, and let it stand for a month, with occasional agitation. See MIXED PICKLES (*below*).

Lemons. From the fruit, slit half way down into quarters, and cored, put into a dish, and sprinkled with a little salt; in about a week, the whole is placed in jars or bottles with a little turmeric and capsicums, and covered with hot vinegar.

Limes. As the last.

Mangoes. As LEMONS, adding mustard-seed and a little garlic, with spices at will. ENGLISH MANGOES are made from cucumbers or small melons, split and deprived of their seeds.

Melons. As LEMONS (nearly).

Mixed Pickles. From white cabbage, cauliflowers, French beans, cucumbers, onions, or any other of the ordinary pickling vegetables, at will (except red cabbage or walnuts) treated as GHERKINS; with raw ginger, capsicum, mustard seed, and long pepper, for spice, added to each bottle. A little coarsely bruised turmeric improves both the colour and flavour.

Mushrooms. From the small button mushrooms, cleansed with cold spring water, and gently wiped dry with a towel, then placed in bottles, with a blade or two of mace, and covered with the strongest white pickling vinegar, boiling hot.

Myrobalans. The yellow myrobalan preserved in strong brine. Gently aperient.

Nasturtiums. From the unripe or scarcely ripe fruit, simply covered with cold strong vinegar; or, as CABBAGE or GHERKINS.

Onions. From the small button or filbert onion, deprived of the outer coloured skin, and either at once put into bottles and covered with strong white pickling vinegar, or previously steeped for a day or two in strong brine or alum water. When required for early use, the vinegar should be poured on boiling hot.

Peaches. From the scarcely ripe fruit, as GHERKINS.

Peas. As BEANS or CAULIFLOWERS.

Piccalilli. See INDIAN PICKLE.

Radish Pods. As BEANS or GHERKINS.

Samphire. From the perennial samphire (*Erythmum maritimum*), covered with strong vinegar, to each pint of which ¾ oz. of salt has been added, and poured on boiling hot. Said to excite the appetite.

Tomatoes. From the common tomato or love apple, as GHERKINS.

Walnuts. From the young fruit of *Juglans regia*, or common walnut:—1. Steep them in strong brine for a week, then bottle them, add spice, and pour on the vinegar boiling hot.

2. On each pint of the nuts, spread on a dish, sprinkle 1 oz. of common salt; expose them to the sun or a full light for 10 or 12

days, frequently basting them with their own liquor; lastly, bottle them, and pour on the vinegar, boiling hot.

3. (Dr. Kitchener.) Gently simmer the fruit in brine, then expose it on a cloth for a day or two, or until it turns black; next put it into bottles or jars, pour hot spiced vinegar over it, and cork down immediately. In this way the pickle becomes sufficiently mature for the table in half the time required for that prepared by the common method. Dr. Kitchener also recommends this parboiling process for several other pickles. Some persons pierce the fruit with an awl or stocking-needle, in several places, in order to induce early maturation. The spices usually employed are mustard-seed, allspice, and ginger, with a little mace and garlic.

PIC'OLINE. An oily substance, discovered by Dr. Anderson, associated with analine, chinoline, and some other volatile bases, in certain varieties of coal-tar naphtha.

PIC'RIC ACID. $HC_6H_2(NO_2)_3O$. *Syn.* CARBAZOTIC ACID, NITROPHENISIC ACID, TRINITROPHENISIC ACID. A peculiar compound formed by the action of strong nitric acid on indigo, aloes, wool, and several other substances.

Prep. 1. Add, cautiously and gradually, 1 part of powdered indigo to 10 or 12 parts of hot nitric acid of the sp. gr. 1·43; when the reaction has moderated and the scum has fallen, add an additional quantity of nitric acid, and boil the whole until red fumes are no longer evolved; redissolve the crystals of impure picric acid deposited in boiling distilled water, and remove any oily matter found floating on the surface of the solution by means of bibulous paper; a second time redissolve in boiling water the crystals which form as the liquid cools, saturate the new solution with carbonate of potassa, and set it aside to crystallise; the crystals of picrate of potassium thus obtained must be purified by several re-solutions and re-crystallisations, and next decomposed by nitric acid; the crystals deposited as the liquid cools yield pure picrid acid by again dissolving them in boiling water, and re-crystallisation.

2. Dissolve the yellow resin of *Xanthorrhœa hastilis* (Botany Bay Gum) in a sufficiency of strong nitric acid. Red vapours are evolved, accompanied by violent frothing, and a deep red solution is produced, which turns yellow after boiling. Evaporate this solution over a water bath. A yellow crystalline mass is deposited, which consists of picric acid with small quantities of oxalic and nitrobenzoic acids. The picric acid is purified by neutralising the yellow mass with potassa, and crystallising twice out of water. The pure picrate of potassium thus obtained is decomposed by hydrochloric acid, and the liberated picric acid is purified by two crystallisations. This process, devised by Stenhouse, is one of the best, and yields a quantity of the acid amounting to 50% of the resin employed.

Prop., &c. Brilliant yellow scales, scarcely soluble in cold water, but very soluble in boiling water, and in alcohol and ether; fusible; volatile; taste, insupportably bitter, and very permanent. It forms salts with the bases (picrates, carbazotates), mostly possessing a yellow colour, and exploding when heated. The picrate of lead has been proposed as a fulminating powder for percussion caps. The picrate of potassium has been given with advantage in intermittent fevers. A solution of picric acid in alcohol is an excellent test for potassa, if there be not too much water present, as it throws down a yellow crystalline precipitate with that alkali, but forms a very soluble salt with soda. Most of the picrates may be made by the direct solution of the carbonate, hydrate, or oxide of the metal, in a solution of the acid in hot water. The picrate of silver forms beautiful starry groups of acicular crystals, having the colour and lustre of gold.

The principal use of crude picric acid is for dyeing yellow. It is said to be largely employed for the adulteration of beer. It is, however, highly poisonous. According to Prof. Rapp, it acts deleteriously both when swallowed and applied to the unsound skin. Five grains seriously affected a large dog, and killed it within 24 hours. It induces vomiting, feebleness, and general loss of nervous tone. The tissues of animals poisoned by it (even the white of the eye) were tinged of a yellow colour. See PORTER, &c.

PICROTOX'IN. $C_{12}H_{14}O_5$. *Syn.* PICROTOXINE, PICTROTOXIA, PICROTOXINA. A poisonous principle discovered by Boullay in the fruit of *Anamirta paniculata*, or *Cocculus Indicus*.

Prep. 1. Precipitate a decoction of *cocculus Indicus* with a solution of acetate of lead, gently evaporate to dryness, redissolve the residuum in alcohol of ·817, and crystallise by evaporation; repeat the solution and crystallisation a second and a third time. Any adhering colour may be removed by agitating it with a very little water; or by animal charcoal, in the usual manner.

2. (Kane.) Alcoholic extract of *cocculus Indicus* is exhausted with the smallest possible quantity of water, and the mixed liquors filtered; to the filtrate hydrochloric acid is added, and the whole set aside to crystallise. The product may be purified as before.

Prop., &c. It forms small, colourless, stellated needles; soluble in alcohol, ether, and acetic acid, and feebly so in water; boiling water dissolves it freely; taste of solutions, inexpressibly bitter; reaction, neutral. It does not combine with acids, as formerly asserted, but it forms feeble combinations with some of the bases. It is a powerful intoxicant and narcotico-acrid poison. It acts powerfully on the spinal cord and nervous system generally, occasioning an increase of the animal temperature, and peculiar movements, similar to

those described by Flourens as resulting from sections of the cerebellum. It is frequently present in malt liquors, owing to their common adulteration with cocculus Indicus.

PIERRE DIVINE. *Syn.* CUPRUM ALUMINATUM. See LAPIS DIVINUS.

PIES. Alexis Soyer gives the following instructions for making pies:—

To make a pie to perfection,—when your paste (half-puff or short) is carefully made, and your dish or form properly full, throw a little flour on your paste-board, take about a ½ lb. of your paste, which roll with your hand until (say) an inch in circumference; then moisten the rim of your pie-dish, and fix the paste equally on it with your thumb. When you have rolled your paste for the covering, or upper crust, of an equal thickness throughout, and in proportion to the contents of your pie (½ inch is about the average), fold the cover in two, lay it over one half of your pie, and turn the other half over the remaining part; next press it slightly with your thumb round the rim, cut neatly the rim of the paste, form rather a thick edge, and mark this with a knife about every quarter of an inch apart; observing to hold your knife in a slanting direction, which gives it a neat appearance; lastly, make two small holes on the top, and egg-over the whole with a paste-brush, or else use a little milk or water. Any small portion of paste remaining may be shaped to fanciful designs, and placed as ornaments on the top.

"For meat pies, observe that, if your paste is either too thick or too thin, the covering too narrow or too short, and requires pulling one way or the other, to make it fit, your pie is sure to be imperfect, the covering no longer protecting the contents. It is the same with fruit; and if the paste happens to be rather rich, it pulls the rim of the pie to the dish, soddens the paste, makes it heavy, and, therefore, indigestible as well as unpalatable."

Meat pies require the addition of either cayenne, or black pepper, or allspice; and fruit pies, of enough sugar to sweeten, with mace, ginger, cloves, or lemon peel, according to taste and the substance operated on. See PASTRY, &c.

PIG. The pig or hog (*Sus Scrofa*—Linn.), one of the common pachydermata, is now domesticated in all the temperate climates of the world. Its flesh constitutes pork, bacon, ham, &c.; its fat (lard) is officinal in the Pharmacopœias. The skin, bristles, and even the blood and intestines of this animal, are either eaten as food or turned to some useful purpose in the arts. See PORK, LEATHER, &c.

PIG'MENTS. These are noticed under the *respective colours.*

PIKE. The *Esox Lucius* (Linn.), a fresh-water fish. It is remarkable for its voracity, but is highly esteemed by epicures. Various parts of it were formerly used in medicine. The fat (OLEUM LUCII PISCIS) was one of the simples of the Ph. L. of 1618, and was esteemed as a friction in catarrhs. It is even now used in some parts of Europe to disperse opacities of the cornea.

PIL'CHARD. The *Clupea Pilchardus*, a fish closely resembling the common herring, than which, however, it is smaller, but thicker and rounder and more oily. It abounds on the coasts of Devon and Cornwall, where it is not only consumed as food, but pressed for its oil.

PILES. *Syn.* HEMORRHOIDS; HÆMORRHOIDES, L. A painful disease occasioned by the morbid dilatations of the veins at the lower part of the rectum and surrounding the anus.

Piles are principally occasioned by costiveness and cold; and, occasionally, by the use of acrid food. They have been distinguished into—BLIND PILES, or a varicose state of the veins without bleeding,—MUCOUS PILES, when the tumours are excoriated, and mucus or pus is discharged,—BLEEDING PILES, when accompanied with loss of blood, and—EXCRESCENTIAL PILES, when there are loose fleshy excrescences about the verge of the anus and within the rectum.

The treatment of piles consists in the administration of mild aperients, as castor oil, or an electuary of sulphur and cream of tartar. When there is much inflammation or bleeding, cold and astringent lotions, as those of sulphate of zinc or alum, should be applied; and when the pain is considerable, fomentations of decoction of poppy heads may be used with advantage. To arrest the bleeding, ice is also frequently applied, but continued pressure is more certain. When the tumours are large and flaccid, the compound ointment of galls is an excellent application; and if there is a tendency to inflammation, a little liquor of diacetate of lead may be added. In confirmed piles, the internal use of copaiba, or, still better, of the confection of black pepper, should be persevered in for some time, together with local applications. In severe cases the protruded tumours are removed by surgeons, by the knife or ligature. See OINTMENTS, ELECTUARIES, &c.

PILL COCHIA. See COMPOUND COLOCYNTH PILLS (*below*).

PILL RUFI. See PILLS OF ALOES WITH MYRRH (*below*).

PILLS. *Syn.* PILULÆ (Ph. E. & D.), PILULA (Ph. L.), L.; PILULES, SACCHAROLÉS SOLIDES, Fr. Pills are little balls, of a semi-solid consistence, composed of various medicinal substances, and intended to be taken whole. The facility with which they are made and administered, their comparatively little taste, their power of preserving their properties for a considerable length of time, and, lastly, their portability and inexpensiveness, have long rendered them the most frequently employed and the most popular form of medicine.

The rapid and skilful preparation of pills,

from all the numerous substances of which they are composed, is justly considered to demand the highest qualifications in the practical dispenser. The medicinals employed must be made into a consistent and moderately firm mass, sufficiently plastic to be rolled or moulded into any shape, without adhering to the fingers, knife, or slab, and yet sufficiently solid to retain the globular form when divided into pills. A few substances, as certain extracts, &c., are already in this condition; but the others require the use of an excipient to give them the requisite bulk or consistence. As a general rule, all the constituents of a pill which can be pulverised should be reduced to fine powder, before mixing them with the soft ingredients which enter into its composition; and these last, or the excipient, should next be gradually added, and the mixture triturated and beaten until the whole forms a perfectly homogeneous mass. It is then ready to be divided into pills. This is effected by rolling it on a slab, with a pill or bolus knife, into small pipes or cylinders, then dividing these into pieces of the requisite weight; and, lastly, rolling them between the thumb and finger to give them a globular form. A little powdered liquorice-root or starch is commonly employed to prevent the pills adhering to the fingers, or to each other, after they are made. Magnesia, so frequently used for this purpose, is unsuited for pills containing metallic salts or the alkaloids, or other remedies, which are exhibited in very small doses.

Instead of forming the mass into pills by hand, in the manner just referred to, a convenient and simple instrument, called a 'pill-machine,' is now generally used by the druggists for the purpose. This consists of two pieces. The first (see fig. 1) is divided into three compartments:—*c* is a vacant space to receive the divided mass, which is to be rolled into pills:—*b* is a grooved brass plate, which assists in dividing the mass into pills; and —*a* is a box for containing the powder for covering the pills, and to receive them as they are formed. The second (see fig. 2) consists of a brass plate (*a*), grooved to match the plate *b* in fig. 1, and bounded at both ends by movable projecting plates (*b b*), containing each two wheels under the ledge of the plate (*b*); and a wooden back (*c*), with two handles, (*d d*), to which this plate is affixed. In using this machine, the pill-mass is rolled into a cylindrical form on the front part of it, by means of fig. 2 inverted; the small roll is then laid on the cutting part of the instrument (1, *b*), and divided by passing fig. 2 over it, the little wheels enabling the latter to run easily on the brass plate which forms the margin of the bed of the machine. The pills, thus formed, are then drawn forward on to the smooth bed on which the mass was first rolled, and receiving a finishing turn or two with the smooth side of the "cutter," by which they are rendered more nearly spherical. They are, lastly, thrown over into 1, *c*, ready to be transferred to the pill-box.

Fig. 1.

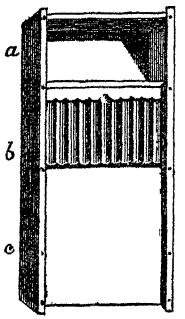
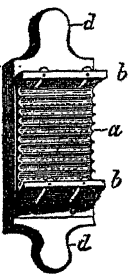


Fig. 2.



The nature of the excipient should be suited to that of the active ingredients in pills, as well as in all other forms of medicine. Soft extracts, and other substances of a like character, may be rendered more consistent by the addition of any simple powder, as that of liquorice or sugar. Vegetable powders are generally beaten up with syrup or treacle, and heavy powders with conserve of roses or extract of liquorice. Castile soap (made of olive oil and soda) and medicinal soft soap (made of olive oil and potash) are commonly employed for fatty and resinous matters, as well as for many others which are not decomposed by alkalies. When the chief ingredient of the mass is resin, rectified spirit is frequently used to soften it, either with or without the addition of soap to increase its solubility in the stomach. For many substances no excipient is required. Thus, most of the gum-resins and stiff extracts may be at once made into pills, or, at all events, after being slightly softened by heat. Mucilage, formerly so much used in the preparation of pills, is now only employed for those which are to be taken within a day or two after being made; as pills containing it become so hard and insoluble when kept for some time, as to resist the action of the stomach, and frequently to pass through the bowels without even losing their form.

It may be further remarked, that no deliquescent salt should enter into the composition of pills not intended for immediate use; and that when efflorescent salts are so employed, they should be first freed from their water of crystallisation.

When the mixed ingredients are made into a mass (pill-mass), which it is not intended at once to divide into pills, it should be preserved in a piece of bladder or gut-skin placed in a covered stoneware or earthenware pot. In this state it may be occasionally moistened with a little weak spirit to prevent its getting hard.

The weight (size) of pills varies from ½ gr. to 6 grs. If heavier than this, they are called 'boluses.' Formerly, as a general rule, they were made of 5 grs. each; but pills of this weight are, in general, so large, that some persons find a difficulty in swallowing them. Another disadvantage of large pills is the trouble of nicely apportioning the dose,—one pill being, perhaps, too small a quantity, and two pills the reverse. Hence, 2 to 3-gr. pills are now the favourite size with both pill-takers and dispensers, notwithstanding that 5-gr. pills are still ordered in one of the authorised Pharmacopœias.

Pills are occasionally coated with gold, silver, and other substances, to render them more agreeable to the eye, or to prevent the taste of nauseous ingredients affecting the palate during deglutition. They are gilded and silvered by placing them, in the moist state, on a leaf or two of the metal in a small gallipot, and covering them in a similar manner with another leaf of metal; over the mouth of the gallipot is laid a piece of smooth writing paper, and on this the palm of the hand; a sudden and rapid circular motion is then given to the whole. If the pills are not sufficiently moist or sticky, they should be rendered so by rolling them between the fingers very slightly moistened with mucilage, before proceeding to silver them. Another method is to shake them in a similar manner with a little gold or silver dust.

When pills are to be covered with gelatin, each pill, being stuck on the point of a very thin wire four or five inches in length, is dipped into a solution of gelatin, so as to coat it completely, and the wire is then inserted into a pincushion, or a vessel containing fine sand, and left until the gelatin is firm, which occurs in about a quarter of an hour; the pins may then be easily removed by simply warming them, by placing the centre of each wire for a second or two in the flame of a spirit lamp or candle. 'Sugar-coated pills' are prepared in nearly the same way, but substituting hot and highly concentrated syrup, to which a little gelatin has been added, for a simple solution of gelatin.

M. Durden covers pills with collodion. Others have recommended for this purpose a solution of gutta percha in either chloroform or bisulphide of carbon. The ready solubility in the stomach of pills thus covered has, with justice, been questioned. Gelatin, or, still better, gelatin mixed with a little sugar, is unexceptionable in this respect; whilst it undoubtedly excludes the taste of nauseous medicines more effectually than any other substance. Mr. Furley employs a thin coating of albumen to render pills tasteless.

As pill-masses are likely to get hard and brittle by keeping, an excellent plan is to keep the dry ingredients powered and mixed together in well-corked bottles or jars, when a portion may at any time be beaten up with syrup, conserve, soap, &c.; according to the formula, and as wanted for use. The mixed ingredients in this state are technically known as 'species' or 'powder for' the respective pills.

"It is generally said that pills should be taken on an empty stomach, and at a considerable distance from a meal; but for ourselves, we think that it is nearly always better to take them during a meal; first, because the stomach does not then find itself immediately under the influence of substances which, if not always dangerous, seldom fail to act more or less disagreeably; secondly, because its absorbent action is more certain; and, lastly, because they are then taken more easily." (Trousseau and Reveil). The meal here referred to should be a light one, from which acidulous and other substances likely to interfere with the action of the remedy should be excluded. The dose should also be increased.

In the London Pharmacopœia the singular number ('pilula') is now very properly employed to express the names of the officinal pill-masses; but in the other Pharmacopœias the names are given in the plural form. As the latter is almost universally adopted in speaking of magistral formulæ and nostrums, we have used it in all cases, for the sake of uniformity and for ease of reference. See BOLUS, EXTRACT, PRESCRIBING, and *below*.

Pills, Abernethy's. See ABERNETHY MEDICINES (page 4).

Pills of Ac'etate of Lead. *Syn.* PILULÆ PLUMBI ACETATIS, L. *Prep.* 1. Acetate of lead, 20 grs.; powdered camphor, 15 grs.; conserve of roses, q. s.; mix and divide into 12 pills.

2. (Radius.) Acetate of lead and powdered mallow or liquorice root, of each, ½ dr.; simple syrup, q. s.; divide into 18 pills.—*Dose.* 1 to 5 daily, washed down with water soured with vinegar; as a powerful astringent in hæmorrhages, diarrhœa, the night-sweats in phthisis, &c. See OPIATED LEAD PILLS.

Pills of Acetate of Mercury. *Syn.* PILULÆ HYDRARGYRI ACETATIS, L. *Prep.* 1. Subacetate of mercury, 18 grs.; sugar of milk (or manna), 1 dr.; mucilage, q. s.; divide into 24 pills.—*Dose.* As an alterative, 1 daily; as a sialogogue, 1 every 4 or 5 hours, or oftener; in syphilis, &c. See KEYSER'S PILLS.

3. (Opiated—Carmichael.) Acetate of mercury, camphor, and opium, of each, 30 grs.; syrup of poppies to mix. For 30 pills. Less apt to affect the stomach and bowels than the last.

Pills of Acetate of Mor'phia. *Syn.* PILULÆ MORPHIÆ ACETATIS, L. *Prep.* 1. Acetate of morphia, 2 grs.; sugar of milk, 15 grs.; conserve of roses, 20 grs.; for 12 pills. Anodyne, sedative, and soporific.—*Dose.* One, as required.

2. (Dr. A. T. Thomson.) Acetate of mer-

phia, 1 gr.; powdered foxglove, 6 grs.; powdered camphor, 10 grs.; powdered gum arabic, 8 grs.; syrup of tolu, q. s.; to be divided into 6 pills. Sedative and antispasmodic.—*Dose.* One, every 3 or 4 hours; in phthisis, palpitations, spasms, &c. The hydrochlorate of morphia may be used instead of the acetate, with advantage.

Pills of Ac'onite. *Syn.* PILULÆ ACONITI, P. EXTRACTI A., L. *Prep.* (Dr. Turnbull). Alcoholic extract of aconite, 1 gr.; liquorice powder, 12 grs.; simple syrup, q. s.; mix, and divide the mass into 6 pills.—*Dose.* One pill, every 3 or 4 hours; as a powerful anodyne and sedative in excessive action of the heart, acute rheumatism, gout, neuralgia, &c. The utmost care should be taken both in their preparation and administration.

Pills, Alibert's. See APERIENT PILLS.

Pills of Al'oes. *Syn.* PILULA ALOËS SOCOTRINÆ (B. P.,) PILULÆ ALOETICÆ, PILULÆ ALOËS (Ph. E.), L. *Prep.* 1. (Ph. E.) Socotrine aloes (in powder) and Castile soap, equal parts; conserve of red roses, q. s. to form a pill-mass.

2. (Ph. U. S.) Powdered aloes and Castile soap, equal parts, beat into a mass, and divided into 4-gr. pills.

Obs. "This pill may be also correctly made with the finer qualities of East Indian aloes, as the (true) Socotrine variety is very scarce; and many, not without reason, prefer (pure) Barbadoes aloes." (Ph. E.) The *dose*, as a laxative, is 5 to 10 grs.; as a purgative, 12 to 20 grs., or more. See PILLS OF ALOES WITH SOAP.

Pills of Aloes and Assafœtida. *Syn.* PILULA ALOËS ET ASSAFŒTIDA (B. P.). *Prep.* Socotrine aloes, in powder, 1; assafœtida, 1; powdered hard soap, 1; confection of roses, 1 (¼ confection sufficient.—*Squire*). Mix. Cathartic and antispasmodic.—*Dose.* 5 to 10 grs.

Pills of Aloes (Compound). *Syn.* PILULÆ ALOETICÆ COMPOSITÆ, PILULA ALOËS COMPOSITA (Ph. L.), PILULÆ A. COMPOSITÆ (Ph. D.), L. *Prep.* 1. (Ph. L.) Socotrine aloes (in powder), 1 oz.; extract of gentian, ½ oz.; oil of caraway, 40 drops; treacle, q. s.; the whole to be beaten together until they form a mass proper for making pills.

2. (Ph. D.) Hepatic aloes (in powder), 2 oz.; extract of gentian and treacle, of each, 1 oz.; oil of caraway, ½ fl. dr.; as the last.

Obs. The above is a very valuable purgative in habitual costiveness and indigestion, in all cases in which the use of aloes is not contra-indicated. The *dose* is from 5 to 15 grs., or more.

Pills of Aloes (Diluted). *Syn.* PILULÆ ALOËS DILUTÆ, L. *Prep.* 1. (Dr. Marshall Hall.) Barbadoes aloes, Castile soap, extract of liquorice, and treacle, equal parts; water, q. s.; dissolve, with heat, strain, and evaporate to the consistence of a pill-mass. Resembles the PILULA ALOËS CUM SAPONE—Ph. L.

Pills of Aloes and Assafœti'da. *Syn.* PILULÆ ALOËS ET ASSAFŒTIDA (Ph. E.), L. *Prep.* (Ph. E.) Aloes (Socotrine or East Indian, powdered), assafœtida, and Castile soap, equal parts; beat them with conserve of red roses to a proper pill-mass.—*Dose.* 5 to 10 grs., once or twice daily, as a stomachic tonic and laxative, in dyspepsia, flatulence, &c.; and 12 to 20 grs., as a purgative in similar cases. It is extremely useful in costiveness, with flatulency, occurring in hysterical and hypochondriacal subjects. The B. P. preparation is the same as this, except that hard soap is used instead of Castile soap.

Pills of Aloes and Gin'ger. *Syn.* PILULÆ ALOËS ET ZINGIBERIS, L. *Prep.* (Ph. D. 1826.) Aloes, 1 oz.; Castile soap, ½ oz.; ginger, 1 dr.; oil of peppermint, ½ dr.; beaten to a mass. A useful laxative in cold habits.—*Dose.* As the last.

Pills of Aloes and Ipecac'uanha. *Syn.* DR. BAILLIE'S DINNER PILLS; PILULÆ ALOËS ET IPECACUANHÆ, L. *Prep.* (Dr. Baillie.) Powdered aloes, 30 grs.; powdered ginger (finest), 45 grs.; ipecacuanha, 12 grs.; syrup of orange peel, q. s. to mix. For 24 pills.—*Dose.* One, about an hour before dinner.

Pills of Aloes and I'ron. *Syn.* PILULÆ ALOËS ET FERRI (Ph. E.), L. *Prep.* 1. (B. P.) Barbadoes aloes, 2; sulphate of iron, 1½; compound powder of cinnamon, 3; confection of roses, 4; mix (6 of confection required. *Squire*).—*Dose.* 5 to 10 grs.

2. (Ph. E.) Sulphate of iron, 3 parts; Barbadoes aloes, 2 parts; aromatic powder, 6 parts; conserve of red roses, 8 parts; powder the aloes and sulphate of iron separately, beat the whole to a mass, and divide this into 5-gr. pills. An excellent medicine in chlorosis, hysteria, and atonic amenorrhœa.—*Dose.* 1 to 3 pills daily.

Pills of Aloes and Mas'tic. See DINNER PILLS.

Pills of Aloes and Mer'cury. *Syn.* PILULÆ ALOËS CUM HYDRARGYRO, L. See APERIENT PILLS (8).

Pills of Aloes and Myrrh. *Syn.* RUFUS'S PILLS; PILULA ALOËS CUM MYRRHÂ (Ph. L. & D.), PILULÆ RUFI or COMMUNES (Ph. L. 1720), P. ALOËS ET MYRRHÆ (B. P., Ph. E.), L. *Prep.* 1. (Ph. L.) Socotrine or hepatic aloes (in powder, ½ oz.; saffron, myrrh (powdered), and soft soap (Ph. L.), of each, 2 drs.; treacle, q. s. to form a pill-mass.

2. (Ph. D.) Hepatic aloes, 2 oz.; myrrh, 1 oz.; dried saffron, ½ oz.; all in powder; treacle, 2½ oz.

3. (Ph. E.) Aloes (Socotrine or East Indian), 4 parts; myrrh, 2 parts; saffron, 1 part; beat them to a pill-mass with conserve of red roses, q. s.

4. (Ph. L. 1836 and Ph. D. 1826). Aloes (in powder), 2 oz.; saffron and powdered myrrh, of each, 1 oz.; syrup, q. s. to form a pill-mass.

5. (B. P.) Socotrine aloes, 2; myrrh, 1; dried saffron, ½; confection of roses, 2½ (3 are

required.—*Squire*). Mix. Stimulant and cathartic. *Dose.* 5 to 10 grs.

Obs. This compound is a most excellent stomachic purgative and emmenagogue, when there are no febrile symptoms present. It is said to have been employed ever since the time of Rhazes, and is still in extensive use. —*Dose.* 10 to 20 grs.

Pills of Aloes and Rhu'barb. *Syn.* PILULÆ ALOËS ET RHEI, P. R. CUM RHEO, L. *Prep.* Powdered Socotrine or hepatic aloes, powdered rhubard, and soft soap (Ph. L.), of each, ½ dr.; oil of chamomile, 10 drops; for 30 pills. —*Dose.* 1 to 5, either as a stomach tonic or laxative; especially in dyspepsia, with loss of appetite.

Pills of Aloes and Rose-juice. *Syn.* PILULÆ ALOËS ROSATÆ, L.; PILULES ANGELIQUES, GRAINS DE SANTÉ, Fr. *Prep.* Take aloes and rose juice, of each, 4 oz.; juice of borage and chicory, of each, 2 oz.; dissolve with heat, evaporate to an extract; add, of rhubarb, 2 drs.; agaric, 1 dr.; and divide the mass into 1½-gr. pills.—*Dose.* 4 to 12, as a purge.

Pills of Aloes with Soap. *Syn.* PILULA ALOËS CUM SAPONE (Ph. L.), L. *Prep.* (Ph. L.) Powdered extract of Barbadoes aloes, soft soap, and extract of liquorice, equal parts; treacle, q. s. to form a pill-mass.—*Dose.* 10 to 20 grs.; in the usual cases in which aloes is administered. It is more readily soluble in the juices of the primæ viæ, and is milder than most of the aloetic pills without soap. See PILLS OF ALOES (Diluted).

Pills, Al'terative. *Syn.* PILULÆ ALTERANTES, L. See CALOMEL, MERCURIAL, and PLUMMER'S PILLS, &c.

Pills of Al'um. *Syn.* PILULÆ ALUMINIS, P. A. COMPOSITÆ, L. *Prep.* 1. (Augustin.) Alum, 20 grs.; benzoic acid, 6 grs.; powdered gum and white sugar, of each, 10 grs.; water, q. s. to form a mass. For 36 pills. In phthisis and atonic mucous discharges. The whole to be taken in the course of 2 or 3 days.

2. (Capuron.) Catechu, 1 dr.; alum, ½ dr.; opium, 10 grs.; syrup of red roses, q. s.; divide into 5-gr. pills.—*Dose.* 1 to 3; in chronic diarrhœa and leucorrhœa.

3. (Radius.) Alum and catechu, equal parts; extract of gentian, q. s. to mix; divide into 2 or 3-gr. pills.—*Dose.* 2 to 4, every four hours; in passive hæmorrhages, mucous discharges, and chronic diarrhœa.

Pills of Ammoni'acum. *Syn.* PILULÆ AMMONIACI, L. *Prep.* 1. Gum ammoniacum, 1 dr.; powdered sugar, ½ dr.; conserve of hips, q. s. In old coughs and hysterical affections.

2. (Compound.)—*a.* (Ainslie.) Ammoniacum, 1 dr.; mercurial pill, 15 grs.; powdered squills, 6 or 8 grs.; simple syrup, q. s. For 16 pills. In asthmatic coughs, with deranged action of the liver.—*Dose.* One, 2 or 3 times a day.

b. (W. Cooley.) Ammoniacum and sagapenum, of each, 1 dr.; dried sulphate of iron, ½ dr.; conserve of hips, q. s. In obstructed menstruation, and in the chronic diarrhœa of hysterical subjects.

Pills of Ammo"niated Cop'per. *Syn.* PILULÆ CUPRI AMMONIATI (Ph. E.), P. C. AMMONIURETI, L. *Prep.* (Ph. E.) Ammoniated copper (in fine powder), 1 part; bread-crumb, 6 parts; solution of carbonate of ammonia, q. s. to make a mass, which is to be divided so that each pill may contain ½ gr. of ammoniated copper. In epilepsy, and in some other spasmodic diseases.—*Dose.* 1 pill, night and morning, gradually increased to 5 or 6.

Pills of Ammoniated I'ron. *Syn.* PILULÆ FERRI AMMONIATI, P. F. AMMONIO-CHLORIDI, L. *Prep.* 1. (Dr. Copland.) Ammoniated iron, 1 dr.; aloes and extract of gentian, of each, ½ dr.; for 30 pills. In scrofula, chlorosis, amenorrhœa, &c.

2. (Radius.) Ammoniated iron and galbanum, of each, 1 dr.; assafœtida, 2 drs.; castor, 20 grs.; tincture of valerian, q. s. For 3-gr. pills.—*Dose.* 2 pills, night and morning; in atonic nervious disorders, epilepsy, &c.

Pills of Ammo"nio-cit'rate of Ir'on. *Syn.* PILULÆ FERRI AMMONIO-CITRATIS, L. *Prep.* (Beral.) Ammonio-citrate of iron, 1 dr.; white sugar, 3 drs.; mucilage, q. s. to mix. For 3-gr. pills.—*Dose.* 1 to 3, or more; as a mild chalybeate tonic.

Pills, Analep'tic. See JAMES'S PILLS, &c.

Pills, Anderson's Scot's. Various formulæ for these pills are extant, the products of which differ widely from the genuine article. Dr. Paris, some years since, declared that they consisted of Barbadoes aloes, jalap, and oil of aniseed. "A careful examination of the proprietary article, with other facts that have come to our knowledge, leads us to believe that the first of the following formulæ is the one now employed in the preparation of the 'Grana Angelica,' or 'Anderson's True Scot's Pills,' of the present day." (Cooley.)

Prep. 1. From Barbadoes] aloes, 7 lbs.; jalap (in fine powder), 2¼ lbs.; treacle, ½ lb.; soap, 6 oz.; melted together by the heat of a water bath, and, when partly cold, aromatised by stirring in of oil of aniseed, 1 oz. The mass is divided into about 3½-gr. pills, of which 26 or 27 are placed in each 1s.-1½d. box. A mild and useful aperient.—*Dose.* 5 to 15 grs., or more.

2. (Original formula.) Socotrine aloes, 1 oz.; best myrrh, ¼ oz.; saffron, 1 dr.; separately pounded very fine; mix them, in an earthen pipkin, with a spoonful each of water and sweet oil, by the heat of a slow fire, and form the mass into "common-sized pills." From a copy of the original document in the Chapel of the Rolls.

3. (P. Cod.) Aloes and gamboge, of each, 6 drs.; oil of aniseed, 1 dr.; syrup, q. s.; mix, and divide into 4-gr. pills. Much more powerful than the preceding, and closely resembling Morison's 'No. 2 pills.'

4. (Phil. Coll. of Pharm.) Barbadoes aloes (in powder), 3 lbs.; Castile soap, ½ lb.; colo-

cynth and gamboge (both in fine powder), 2 oz.; oil of aniseed, 1 oz.; beat to a mass with water, q. s., and divide it ito 3-gr. pills. Less active than the last, but more so than the 'True Scot's Pills.'

Pills, An'odyne. *Syn.* PILULÆ ANODYNÆ, L. *Prep.* 1. (Hosp. F.) Opium (in powder), 6 grs.; camphor, 15 grs.; conserve of roses, q. s.; divide into 12 pills.—*Dose.* 1 to 3, as required.

2. (A. T. Thomson.) Calomel, potassio-tartrate of antimony, and opium, equal parts; syrup of saffron, q. s.; divided in 3½-gr. pills. In acute rheumatism and neuralgia.—*Dose.* 1 pill, at bedtime.

Pills, Antibil'ious. All the ordinary aperient and stomachic pills may be classed under this head. See the names of their proprietors or reputed inventors, or those of their leading ingredients.

Pills, Antichlorot'ic. *Syn.* PILULÆ ANTICHLORITICÆ, L. *Prep.* 1. (Radius.) Aloes and carbonate of iron, of each, ½ dr.; gum ammoniacum, 1 dr.; extract of taraxacum, q. s. For 3-gr. pills.—*Dose.* 2 to 6, night and morning; in chlorosis, amenorrhœa, &c.

2. (Trousseau & Reveil.) Porphyrised iron filings, 1 dr.; extract of wormwood, q. s. For 36 pills.—*Dose.* 3 or 4; as the last.

Pills, Antimo"nial (Compound). *Syn.* PILULÆ ANTIMONIALIS COMPOSITÆ, P. ANTIMONII CO., L. *Prep.* 1. Antimonial powder, ½ dr.; calomel, camphor, and powdered opium, of each, 6 grs.; conserve of roses, q. s.; divide into 4-gr. pills.—*Dose.* 2, at night; in acute rheumatism, neuralgia, chronic coughs, &c.

2. (St. B. Hosp.) Tartar emetic, 1 gr.; guaiacum and pill of aloes and myrrh, of each, ½ dr.; treacle, to mix. For 16 pills. As the last.

Pills, Antispasmod'ic. *Syn.* PILULÆ ANTISPASMODICÆ, L. *Prep.* (Dr. A. T. Thomson.) Opium, 1 gr.; Russian castor, 13 grs.; powdered digitalis, 2 grs.; syrup, to mix; divide into 4 pills.—*Dose.* 1 or 2, two or three times a day; in spasmodic asthma, difficulty of breathing, &c. Several other formulæ for antispasmodic pills will be found both above and below.

2. (Trousseau & Reveil.) Musk, 15 grs.; extract of valerian, ½ dr.; liquorice powder, q. s. For 20 pills.—*Dose.* 1 every two hours, until there is a marked improvement in the symptoms; in pneumonia, accompanied by delirium, especially in drunkards; in spasms of the uterus, and in various other spasmodic affections.

Pills, Ape"rient. *Syn.* PILULÆ APERIENTES, L. *Prep.* 1. Hepatic aloes, 2 drs.; rhubarb and Castile soap, of each, 1 dr.; scammony, ½ dr.; (all in powder;) essential oil (at will), 10 or 12 drops; beaten to a smooth mass, and divided into pills.

2. Compound extract of colocynth (Ph. L. 1836), 1½ dr.; extract of gentian, ½ dr.; powdered ipecacuanha, 20 grs.; oil of cloves, caraway, or cassia, a few drops. In dyspepsia, loss of appetite, &c.

3. (Abernethy's.) See page 4.

4. (Alibert's.) From calomel, resin of jalap, and Castile soap, of each, 1 dr.; oil of orange peel or citron, 6 or 8 drops. For 60 pills. As an occasional mild purgative, especially in bilious habits and worms.

5. (Sir B. Brodie.) Compound extract of colocynth and mercurial pill, of each, ½ dr.; scammony and Castile soap, of each, 15 grs.; oil of caraway, 6 or 7 drops. For 24 pills. As the last.

6. (W. Cooley.) Aloes, 1½ dr.; jalap and Castile soap, of each, 1 dr.; rhubarb and cardamoms, of each, ½ dr.; (all in powder;) oil of juniper, 12 drops. For 3-gr. pills. A useful mild aperient, for either frequent or occasional use.

7. (Dr. Copland.) Compound extract of colocynth (Ph. L. 1836), 40 grs.; extract of henbane, 30 grs.; Castile soap, 12 grs; ipecacuana, 6 or 7 grs. For two dozen pills.—*Dose.* 2, on retiring to rest. As an aperient in nervous affections and irritable habits.

8. (Harvey.) Mercurial pill and powdered aloes, of each, ½ dr.; ginger, 20 grs. For 24 pills. In constipation, attended with a deficiency of bile.

9. (Dr. Neligan.) Compound colocynth pill and soap of jalap, equal parts; either with or without a few drops of some aromatic essential oil. For 4 or 5-gr. pills. As an aperient for general use.

10. (Sir C. Scudamore.) Compound extract of colocynth, 40 grs.; extract of rhubarb, ½ dr.; scammony and soap, of each, 12 grs.; oil of caraway, 5 or 6 drops. For 20 or 24 pills.

11. (Stahl's; PILULÆ APERIENTES STAHLII, —Ph. Hannov.) Powdered aloes, 1 oz.; compound extract of colocynth, ½ oz.; iron filings, 2 drs.; mucilage, q. s. In amenorrhœa, low habits, and worms.

12. (Vance.) Compound extract of colocynth, 80 grs.; extract of rhubarb, 12 grs.; Castile soap, 6 or 8 grs.; oil of cinnamon, 4 or 5 drops.

Obs. The products of the above formulæ may be divided into pills of any size deemed most agreeable to the patient, and they may be aromatised by the addition of any essential oil at will. The *dose* varies, according to circumstances, from 5 to 10 or 12 grs., or more. Those containing aloes or mercurials are best taken at bedtime. For other formulæ, see the various officinal and other pills containing aloes, colocynth, gamboge, rhubarb, scammony, &c.

Pills, Aromat'ic. *Syn.* PILULÆ AROMATICÆ, L. *Prep.* (Ph. L. 1746.) Compound powder of aloes, 3 oz.; balsam of Peru, ½ oz.; syrup of orange peel, q. s. Aperient, sudorific, and nervine.—*Dose.* 10 to 20 grs.

Pills of Arse"niate of I'ron. *Syn.* PILULÆ FERRI ARSENIATIS, L. *Prep.* (Biett.) Arseniate of iron, 3 grs.; extract of hops, 2 drs.;

powdered mallow-root, ½ dr; syrup, q. s. For 48 pills.—*Dose.* 1 to 2, daily; in cancerous, scrofulous, and herpetic affections. See ARSENICAL PILLS.

Pills of Arseniate of So'da. *Syn.* PILULÆ SODÆ ARSENIATIS, L. *Prep.* (Erasmus Wilson.) Arseniate of soda, 2 grs.; distilled water, the smallest possible quantity to dissolve it; powdered gum guaiacum, ½ dr.; oxysulphuret of antimony, 20 grs.; mucilage, q. s. For 24 pills.—*Dose.* 1 pill, as the last; in herpes, &c. See ARSENICAL PILLS.

Pills, Arsen'ical. *Syn.* ASIATIC PILLS, CARNATIC P., EAST INDIAN P., TANJORE P.; PILULÆ ARSENICI, P. ARSENICALIS, P. ASIATICÆ, P. ACIDI ARSENIOSI, L. *Prep.* (P. Cod.) Arsenious acid, 1 gr.; black pepper (in fine powder), 12 grs.; rub them together for some (considerable) time in an iron mortar, then add, of powdered gum, 2 grs.; water, q. s. to make a mass; which is to be accurately divided into 12 pills. Each pill contains $\frac{1}{12}$ gr. of white arsenic.

Obs. This compound is commonly employed in the East Indies in syphilis, elephantiasis, intermittents, the bites of venomous snakes, &c.; and as a preventive to hydrophobia. The common practice in England is to employ 16 grs. of pepper to 1 gr. of arsenious acid, and to divide the mass into 16 instead of 12 pills. The *dose* is one or two pills daily, taken *after* a meal. The use of all compounds containing arsenic demands great caution.

Pills, Arsenical (Opiated). *Syn.* PILULÆ ARSENICI CUM OPIO, L. *Prep.* (A. T. Thomson.) Arsenious acid, 2 grs.; powdered opium, 8 grs.; Castile soap, 20 grs.; simple syrup, q. s. For 24 pills.—*Dose.* As the last; in intermittents, herpes, lepra, psoriasis, periodical headaches, neuralgia, &c. See *above*.

Pills, Asiat'ic. See ARSENICAL PILLS.

Pills of Assafœt'ida. *Syn.* PILULÆ ASSAFŒTIDÆ (Ph. E. & U. S.), L. *Prep.* 1. (Ph. E.) Assafœtida, galbanum, and myrrh, of each 3 parts; conserve of red roses, 4 parts, or q. s.; mix, and beat them to a proper pill-mass.

2. (Ph. U. S.) Assafœtida, 1½ oz.; Castile soap, ½ oz.; water, q. s.; divide into 240 pills.

Obs. The above (particularly the last) are stimulant and antispasmodic.—*Dose.* 5 to 10 grs., twice or thrice daily; in hysterical affections, &c. See *below*.

Pills of Assafœtida (Compound). *Syn.* PILULÆ ASSAFŒTIDÆ COMPOSITÆ (B. P., Ph. D.) *Prep.* 1. (Ph. D.) Assafœtida, 2 oz.; galbanum, myrrh, and treacle, of each, 1 oz.; mix in a capsule, by the heat of steam or a water bath, and stir until it becomes a uniform mass. —*Dose, &c.* As the last. The B. P. directs the quantity of galbanum to be double the above.

2. (Hosp. F.) Assafœtida, 1 dr.; soft soap (Ph. L.), 20 grs.; ipecacuanha and squills, of each (in powder), 12 grs.; syrup, q. s.—*Dose.* 5 to 10 grs.; in chronic asthmas, coughs, &c.

Pills of Assafœtida with I'ron. *Syn.* PILULÆ ASSAFŒTIDÆ CUM FERRO, L. *Prep.* (W. Cooley.) Assafœtida, 1 dr.; extract of chamomile, ½ dr.; mix with a slight heat; add, of dried protosulphate of iron, 15 grs.; oil of cajeput, 10 drops; and divide into 36 pills. In hypochondriasis, hysteria, amenorrhœa, chlorosis, &c., after an aperient.

Pills, Asthma. *Syn.* PILULÆ ANTASTHMATICÆ, L. *Prep.* 1. (Expectorant.) From compound squill pill, 20 grs.; calomel, 5 grs.; powdered opium, 3 grs.; made into 6 pills.—*Dose.* 1 or 2, at bedtime. Expectorant, and sometimes laxative.

2. (Tonic.) From compound iron pill, 2 drs.; extract of gentian, 1 dr.; mix, and divide into 60 pills.—*Dose.* 2, night and morning, with an occasional dose of laxative medicine.

Pills, Astringent. *Syn.* PILULÆ ASTRINGENTES, L. See PILLS OF ACETATE OF LEAD, ALUM, GALLIC ACID, NITRATE OF SILVER, SULPHATE OF IRON, TANNIN, &c.

Pills, Bacher's Ton'ic. *Syn.* PILULÆ TONICÆ BACHERI, L. *Prep.* 1. (Dr. Paris.) Extract of black hellebore and powdered myrrh, of each, 1 oz.; powdered blessed thistle, 3 drs.; mix, and divide into 1-dr. pills.—*Dose.* 2 to 6, three times a day.

2. (P. Cod.) Alkaline extract of hellebore and extract of myrrh, of each, 2 drs.; powdered blessed thistle, 1 dr. For 4-gr. pills. —*Dose.* 1 or 2, as the last. An alterative tonic, hydragogue, and emmenagogue; in debility, dropsy, amenorrhœa, &c. A favourite remedy in some parts of Europe.

Pills, Dr. Baillie's. *Prep.* (Cooley.) Aqueous extract of aloes and compound extract of colocynth, of each, 3 drs.; Castile soap, 1 dr.; oil of cloves, 15 drops. For 4-gr. pills. A good occasional aperient.—*Dose.* 1 to 3, at bedtime, or early in the morning. See DINNER PILLS

Pills, Barbarossa's. These are supposed to have been the first mercurial preparation employed in medicine. They consisted of quicksilver, rhubarb, musk, and amber.

Pills, Rev. D. Barclay's. *Prep.* (Cooley.) Resinous extract of jalap, 1 dr.; almond or Castile soap, 1½ dr.; extract of colocynth, 2 drs. (or powdered colocynth, 3 drs.); gum guaiacum, 3 drs.; potassio-tartrate of antimony, 10 grs.; oil of juniper, 8 or 10 drops; oils of caraway and rosemary, of each, 4 drops; make a mass with syrup of buckthorn (the smallest possible quantity), and divide into 4-gr. pills. A diaphoretic aperient.—*Dose.* 1 to 3, at bedtime.

Pills, Dr. Baron's. *Prep.* From compound rhubarb pill, 30 grs.; compound extract of colocynth, 20 grs.; powdered ipecacuanha, 6 grs. For 3-gr. pills. An excellent stomachic aperient.—*Dose.* 1 to 3 pills, at bedtime; in dyspepsia, loss of appetite, &c.

Pills, Barthez's. *Prep.* From myrrh, 1 dr.; aloes, ½ dr.; musk, 15 grs.; camphor, 12 grs.; balsam of Peru, q. s. to form a mass. For 3½-gr. pills.—*Dose.* 2, thrice daily; in hysteria, amenorrhœa, chlorosis, &c.

Pills, Bath Digestive. *Prep.* (Cooley.) Rhubarb, 2 oz.; ipecacuanha and Castile soap, of each, ½ oz.; capsicum, ginger, and gamboge, of each, ¼ oz.; (all in powder;) syrup of buckthorn, q.s. For 4-gr. pills.—*Dose.* 1, as a dinner pill; 2 or 3 as an aperient.

Pills of Be'beerine. *Syn.* PILULÆ BEBEERINÆ, L. *Prep.* From sulphate of bebeerine, ½ dr.; aromatic confection, q. s.; oil of cajeput, 5 or 6 drops. For 18 pills.—*Dose.* 1 to 3, every four hours; as an antiperiodic, instead of bark or quinine.

Pills, Be'chic. PILULÆ BECHICÆ, L. *Prep.* (Trousseau and Reveil.) Extract of digitalis, 15 grs.; white oxide of antimony, 30 grs.; extract of liquorice, 40 grs.; mix carefully, and divide into 40 pills. Expectorant and sedative.—*Dose.* 2 to 12, or more; in cases of irritating coughs, catarrh of the pulmonary capillaries or bronchia, &c. See COUGH PILLS.

Pills, Beddoe's. *Prep.* From dried (effloresced) carbonate of soda, 1 dr.; soap, 1½ dr.; oil of juniper, 12 drops; syrup of ginger, q. s.; divide into 30 pills. In gravel, stone, &c. —*Dose.* 2 to 5.

Pills of Belladon'na (Compound). *Syn.* PILULÆ BELLADONNÆ COMPOSITÆ, L. *Prep.* 1. (Ainslie.) Extract of belladonna, mercurial pill, and powdered ipecacuanha, equal parts. For 3-gr. pills.—*Dose.* 1, night and morning, in cancerous and glandular affections.

2. (Debreyne.) Camphor and assafœtida, of each, 1 dr.; extract of belladonna, 20 grs.; extract of opium, 5 grs.; syrup, q. s. For 48 pills.—*Dose.* 1 pill, gradually increased to 6, daily. In hysteria, amenorrhœa, &c.

Pills, Belloste's. See MERCURIAL PILLS.

Pills, Bennet's. See FULLER'S PILLS.

Pills of Bichlo''ride of Mercury†. Pills of corrosive sublimate.

Pills of Bichlo''ride of Plat'inum. *Syn.* PILULÆ PLATINI BICHLORIDI, L. *Prep.* (Dr. Hoefer.) Bichloride of platinum, 7½ grs.; extract of guaiacum, 1 dr.; liquorice powder, q. s. For 24 pills.—*Dose.* 1 pill, twice or thrice daily; as an alterative, in syphilis, &c.

Pills, Bicker's. *Prep.* From rust (carbonate) of iron, 2 drs.; aloes, myrrh, and sulphur, of each, 1 dr.; ox-gall, q. s. to mix. For 4-gr. pills.—*Dose.* 1 to 6, morning and evening; in debility, chlorosis, &c.

Pills of Bit'tersweet. *Syn.* PILULÆ DULCAMARÆ, L. *Prep.* (Radius.) Extract of bittersweet (dulcamara), 1 dr.; crude antimony and bittersweet (in powder), of each, ½ dr. For 3-gr. pills.—*Dose.* 6 to 12, twice or thrice a day; in obstinate skin diseases.

Pills, Blaud's. *Syn.* PILULÆ ANTICHLOROTICÆ, L. *Prep.* (Trousseau and Reveil.) Sulphate of protoxide of iron, 2 parts; reduce it to powder, and dry it in a stove at 104° Fahr.; add to this dry carbonate of potassa, 2 parts; honey, 1 part; and form the mass into 50 pills. Tonic and emmenagogue.—*Dose.* 1 to 10, daily; in debility, chlorosis, &c.

Pills, Blue. See MERCURIAL PILLS.

Pills, Bontius's. *Syn.* PILULÆ HYDROGOGÆ, P. H. BONTII, L. *Prep.* (B. Cod.) Socotrine aloes, gamboge, and gum ammoniacum; of each, 1 dr.; white-wine vinegar, 6 drs.; dissolve by heat, at twice, press out the liquor, evaporate to a pilular consistence, and divide into 4-gr. pills.—*Dose.* 1 to 3; as a strong cathartic, in dropsy.

Pills, Brigg's Gout and Rheumatic. This nostrum closely resembles in appearance, odour, and properties, the PLUMMER'S PILL of the Pharmacopœia; the two are probably identical. (Cooley.)

Pill of Bro'mide of I'ron. *Syn.* PILULÆ FERRI BROMIDI, L. *Prep.* (Magendie.) Bromide of iron and powdered gum arabic, of each, 12 grs.; conserve of roses, 20 grs.; mix, and divide into 20 pills. They should be kept in a dry, corked phial. Tonic and alterative.—*Dose.* 1 to 2, night and morning; in debility, especially that of scrofulous habits, in chlorosis, &c.

Pills of Bru'cine. *Syn.* PILULÆ BRUCIÆ, L. *Prep.* (Magendie.) Brucine, 12 grs.; confection of roses, ½ dr.; carefully mixed and divided into 24 pills, which are recommended to be silvered. The quantity of the confection may be advantageously doubled.—*Dose.* 1 pill, night and morning; in the same affections as those for which strychnine is administered. The acetate, hydrochlorate, or sulphate of brucine may be substituted for the alkaloid in the above formula, in a slightly larger quantity.

Pills of Cal'omel. *Syn.* PILULÆ CALOMELANOS, P. E CALOMELANE, P. HYDRARGYRI SUBCHLORIDI, P. H. CLORIDI†, P. H. C. MITIS (Ph. U. S.), L. *Prep.* 1. Calomel, 4 drs.; powdered gum arabic, 1 dr.; simple syrup, q.s.; mix, and divide into 240 pills. Each pill contains 1 gr. of calomel. A convenient form of exhibiting this drug when uncombined with other remedies.—*Dose.* 1 to 5 pills, according to the indication.

2. (U. C. Hosp.) Calomel, 2 drs.; rhubarb, 1½ dr.; confection of senna, q. s. For 4 dozen pills. An excellent alterative aperient, especially in hepatic affections.

Pills of Calomel (Compound). *Syn.* PLUMMER'S PILLS, RED P.; PILULA HYDRARGYRI SUBCHLORIDI COMPOSITA, PILULÆ CALOMELANOS COMPOSITÆ (Ph. E. & D.), PILULÆ PLUMMERI, PILULA HYDRARGYRI CHLORIDI COMPOSITA (Ph. L.). *Prep.* 1. (Ph. L.), L. Chloride of mercury (calomel) and oxysulphide of antimony, of each, 2 drs.; rub them together, add of guaiacum (in powder) and treacle, of each, 4 drs., and form the whole into a pill-mass.

2. (Ph. E.) Calomel and golden sulphide of antimony, of each, 1 part; guaiacum (in powder) and treacle, of each, 2 parts; beat the whole to a pill-mass, and divide it into 6-gr. pills.

3. (Ph. D.) Calomel and precipitated sulphide of antimony, of each 1 dr.; triturate them together, then add, of guaiacum resin (in

powder), 2 drs.; castor oil, 1 fl. dr.; and beat the whole to a uniform mass.

4. (B. P.) Calomel, 1; sulphurated antimony, 1; guaiac resin (in powder), 2; castor oil, 1; mix.—*Dose.* 5 to 10 grs.

Obs. An excellent alterative pill; very useful in lepra, in secondary syphilis affecting the skin, and in various other chronic cutaneous diseases; also in dyspepsia and liver complaints.—*Dose.* 3 to 10 grs., night and morning.

Pills of Calomel and Opium. *Syn.* PILULÆ CALOMELANOS ET OPII (Ph. E.), L. *Prep.* (Ph. E.) Calomel, 3 parts; opium, 1 part; conserve of red roses, q. s.; divide the mass so that each pill may contain 2 grs. of calomel. —*Dose.* 1 or 2 pills, in rheumatism, facial neuralgia, and various inflammatory affections. They offer a convenient form for gradually introducing mercury into the system, and, if continued, induce salivation.

Pills of Cam'phor. *Syn.* PILULÆ CAMPHORÆ, P. CAMPHORATÆ, L. *Prep.* Camphor and sugar, of each (in powder), 2 parts; conserve of hips, 1 part. For 3-gr. pills. Anaphrodisiac, sedative, diaphoretic, and nervine.—*Dose.* 1 to 5, twice or thrice a day.

Pills of Camphor (Compound). *Syn.* PILULÆ CAMPHORÆ COMPOSITÆ, P. CAMPHORATÆ C., L. *Prep.* 1. (Dupuytren.) Camphor, 24 grs.; pure musk, 8 grs.; opium, 2 grs.; syrup, q. s.; divide into 12 pills.—*Dose.* 1 to 4, three or four times daily; in putrescent sores, hospital gangrene, &c.

2. (Fr. Hosp.) Gum ammoniacum, 40 grs.; camphor, 30 grs.; musk, 10 grs.; opium, 5 grs.; tincture of valerian, q. s.; divide into 4-gr. pills.—*Dose.* 2 to 6 pills daily; in nervous and hysterical affections, &c.

3. (Ricord.) Camphor and lactucarium (or extract of lettuce), equal parts; divide into 4-gr. pills.—*Dose.* 3 to 6 pills daily; as an anaphrodisiac.

4. (U. C. Hosp.) Camphor, 20 grs.; assafœtida, 1 dr.; extract of valerian, 2 drs. For 30 pills. As No. 2.

Pills of Canthar'ides. *Syn.* PILULÆ CANTHARIDIS, P. C. COMPOSITÆ, L. *Prep.* 1. Cantharides (in very fine powder), 8 grs.; extract of gentian, ½ dr.; liquorice powder, 10 grs. For 12 pills.—*Dose.* 1 to 4 daily; as a diuretic, emmenagogue, &c.

2. (Ellis.) Cantharides (in very fine powder), 18 grs.; opium and camphor, 36 grs.; mix, and divide into 36 pills.—*Dose.* 1 pill, at bedtime; as an aphrodisiac, in parties labouring under general debility. They should be used with extreme caution, and but seldom.

Pills of Caout'chouc. *Syn.* PILULÆ GUMMI ELASTICI, L. *Prep.* (Bouis.) India rubber, cut into small squares or spheres, then moistened with syrup of tolu, and, lastly, shaken in a box with a mixture of powdered gum and sugar. In phthisis.—*Dose.* 1 pill, three or four times a day. They pass through the primæ viæ unaltered, and may therefore fairly be presumed to be inert.

Pills of Cap'sicum. *Syn.* CAYENNE PEPPER PILLS; PILULÆ CAPSICI, L. *Prep.* 1. (Guy's Hosp.) Capsicum, 1 part; rhubarb, 2 parts; (both in powder;) treacle, q. s.; mix, and divide into 3½-gr. pills.—*Dose.* 1 to 3, an hour before dinner; to create an appetite and promote digestion.

2. (Radius.) Powdered capsicum, 20 grs.; extract of gentian, 1 dr.; powdered gentian, q. s. to form a mass. For 60 pills.—*Dose.* 2 to 4 pills, thrice daily; in chronic dyspepsia, especially in the loss of tone of the stomach arising from intemperance.

Pills of Car'bonate of I'ron. *Syn.* VALLET'S PILLS; PILULÆ FERRI CARBONATIS (Ph. E.), L. *Prep.* (B. P., Ph. E.) Saccharated carbonate of iron, 4 parts; conserve of red roses, 1 part; mix, and divide the mass into 5-gr. pills.—*Dose.* 1 to 3, or more; as a mild chalybeate and antichlorotic. 5 to 20 grs., B. P. For another formula, see BLAUD'S PILLS (*above*).

Pills, Catarrh'. *Syn.* PILULÆ ANTICATARRHALES, L. *Prep.* 1. (Trousseau and Reveil.) Turpentine, 4 drs.; ammoniacum, 1 dr.; balsam of tolu, ½ dr.; aqueous extract of opium, 6 grs.; liquorice powder, q. s.; mix, and divide into 80 pills.—*Dose.* 5 or 6 daily; in chronic catarrh of the bronchi and bladder.

2. (Trousseau & Reveil.) Alcoholic extract of aconite, 30 grs.; sulphuret of calcium, 16 grs.; powdered sugar, q. s. For 24 pills.—*Dose.* 1 pill, three or four times daily; in chronic pulmonary catarrh.

Pills, Cathar'tic. *Syn.* PILULÆ CATHARTICÆ, L. *Prep.* 1. (Dr. Collier.) Calomel, 10 grs.; powdered jalap and prepared chalk, of each, ½ dr.; oil of caraway, 10 drops; syrup of buckthorn, to mix; divide into 5-gr. pills. —*Dose.* 1 to 4.

2. (Dr. A. T. Thomson.) Scammony, 4 grs.; extract of taraxacum, 16 grs.; divide into 6 pills.—*Dose.* 3 pills, twice daily; in hypochondriasis and chronic inflammation of the liver.

3. (A. T. Thomson.) Calomel, 15 grs.; powdered jalap, 45 grs.; mucilage, q. s. to mix. For 18 pills.—*Dose.* 1 to 3, at night, to empty the bowels, in bilious affections. Other formulæ for cathartic pills will be found both *above* and *below*.

Pills, Cathartic (Compound). *Syn.* PILULÆ CATHARTICÆ COMPOSITÆ, L. *Prep.* (Ph. U. S.) Compound extract of colocynth, 4 drs.; powdered extract of jalap and calomel, of each, 3 drs.; powdered gamboge, 40 grs.; water, q. s.; mix, and divide into 180 pills. An excellent purgative, especially in bilious affections, dyspepsia, &c.—*Dose.* 1 to 3 pills.

Pills, Chamberlain's Restor'ative. A nostrum composed of cinnabar and milk of sulphur, equal parts; beaten up with conserve of hips.

Pills of Cham'omile. *Syn.* PILULÆ ANTHEMIDIS, P. FLORUM CHAMÆMELI, L. *Prep.* Extract of gentian, 1 dr.; powdered aloes, ½ dr.; powdered rhubarb, 20 grs.; oil of cha-

momile, 10 drops. A tonic and stomachic aperient.—*Dose.* 5 to 15 grs. This forms the 'chamomile pills' of the shops. They should be kept in a corked phial. See *below.*

Pills of Chamomile (Compound). *Syn.* PILULÆ ANTHEMIDIS COMPOSITÆ, L. *Prep.* 1. (Ainslie.) Extract of chamomile, 1 dr.; assafœtida, ½ dr.; powdered rhubarb, 20 grs.; divided into 30 or, better, 36 pills.—*Dose.* 1, as a dinner pill; or 2 to 3, twice a day, in flatulent dyspepsia.

2. (Beasley.) Aqueous extract of aloes, 12 grs.; extract of chamomile, 36 grs.; oil of chamomile, 3 drops. For 12 pills.—*Dose.* 2, at night, or twice a day; in dyspepsia, loss of appetite, &c. See NORTON'S PILLS.

Pills, Chapman's. *Prep.* Mastic, 12 grs.; aloes, 16 grs.; rhubarb, 24 grs. For 12 pills. An excellent stomachic aperient.—*Dose.* 2 to 4.

Pills of Chiray'ta. *Syn.* DR. REECE'S PILLS; PILULÆ CHIRAYTÆ, L. *Prep.* From chirayta, 2 drs.; dried carbonate of soda, 20 grs.; powdered ginger (best), 15 grs.; divided into 36 pills.—*Dose.* 2, twice a day. In acidity, flatulence, and dyspepsia, especially when complicated with gout or debility.

Pills of Chlo"ride of Ba"rium. *Syn.* PILULÆ BARII CHLORIDI, L. *Prep.* 1. (Pierquin.) Chloride of barium, 1 dr.; resin of guaiacum, 4 drs.; conserve of fumitory, q. s.; divided into 188 pills.—*Dose.* 1 pill, morning and evening, afterwards increased to 2; in tapeworm, and in the rheumatism of scrofulous subjects.

2. (Walsh.) Chloride of barium, 15 grs.; powdered marsh-mallow or liquorice root and mucilage of tragacanth, of each, q. s. to make 200 pills.—*Dose.* 3, gradually increased to 10 or 12, daily; in cancer, scrofula, goitre, syphilis, &c.

Obs. The above are very poisonous, and their exhibition demands great caution.

Pills of Chloride of Cal'cium. *Syn.* PILULÆ CALCII CHLORIDI, L. *Prep.* 1. As the last.

2. (Gräfe.) Chloride of calcium, 1 dr.; extract of opium, 10 grs.; mucilage, q. s. For 54 pills.—*Dose.* 1, every two or three hours, gradually increased until 10, or even 12, are taken every hour; in gonorrhœa, more especially when occurring in scrofulous subjects.

Pills of Chloride of Gold. *Syn.* PILULÆ AURI CHLORIDI, L. *Prep.* From terchloride of gold, 3 grs.; powdered liquorice, 1 dr.; syrup, q. s. For 48 pills.—*Dose.* 1 pill, twice or thrice daily. (See page 581.)

Pills of Chloride of Gold and So'dium. *Syn.* PILULÆ AURI ET SODI CHLORIDI, P. A. SODIO-CHLORIDI, L. *Prep.* (Magendie.) Soda-chloride of gold, 1 gr.; extract of mezereon, 2 drs.; divide into 60 pills. (See page 581.)

Pills of Chloride of Lime. *Syn.* PILLS OF CHLORINATED LIME; PILULÆ CALCIS HYPOCHLORITIS, L. *Prep.* 1. Chloride of lime, 12 grs.; starch powder, 24 grs.; conserve of hips, q. s.; divide into 36 pills.

2. (Dr. Copland.) Chloride of lime, 15 grs.; compound powder of tragacanth, 90 grs.; syrup, q. s. For 24 pills.—*Dose.* 1 to 3, twice or thrice daily; in various putrid affections, fevers, &c.

Pills of Chloride of Mercury†. Pills of calomel.

Pills, Chol'era. *Syn.* PILULÆ ANTICHOLERICÆ, L. *Prep.* Powdered camphor, 15 grs.; powdered capsicum (pure), ½ dr.; bicarbonate of soda, 1 dr.; conserve of roses, q. s. For 36 pills.—*Dose.* 2 to 4, every 15 minutes, washed down with a wine-glassful of cold water containing half a teaspoonful of ether; repeated every 15 or 20 minutes, until reaction ensues. They should be freshly made.

Pills of Cit'rate of I'ron and Quinine'. *Syn.* PILULÆ FERRI CITRATIS CUM QUINÂ, L. *Prep.* From citrate of iron and quinine, 1 dr.; powdered citric acid, 20 grs.; conserve of hips, q. s. For 36 pills. An excellent tonic in debility, chlorosis, &c.—*Dose.* 1 to 3, twice or thrice daily.

Pills, Dr. Clark's. See DINNER PILLS.

Pills, Coindet's. See PILLS OF IODIDE OF MERCURY.

Pills of Col'chicum. See GOUT PILLS.

Pills of Col'ocynth. *Syn.* PILULÆ È DUOBUS, P. EX COLOCYNTHIDE SIMPLICIORES, L. *Prep.* (Ph. L. 1746.) Colocynth and scammony, of each, 2 oz.; oil of cloves, 2 drs.; syrup of buckthorn, q. s. An active hydragogue cathartic. —*Dose.* 3 to 12 grs.

Pills of Colocynth (Compound). *Syn.* PILL OF COCHIA; PILULÆ COCCIÆ, P. COCHLÆ, PILULA COLOCYNTHIDIS COMPOSITA (B. P.), P. COLOCYNTHIDIS COMPOSITÆ (Ph. L. & D.), P. COLOCYNTHIDIS (Ph. E.), L. *Prep.* 1. (Ph. L.) Extract of colocynth (simple), 1 dr.; powdered extract of aloes, 6 drs.; powdered scammony, 2 drs.; powdered cardamoms, ½ dr.; soft soap (Ph. L.), 1½ dr.; mix, and beat them altogether, so that a mass may be formed. This is intended as a substitute for the compound extract of colocynth of the Ph. L. 1836.

2. (Ph. E.) Socotrine or East Indian aloes and scammony, of each, 8 parts; sulphate of potassa, 1 part; beat them together; add of colocynth, in fine powder, 4 parts; next add of oil of cloves, 1 part; and, with the aid of a little rectified spirit, beat the whole to a mass, and divide this into 5-gr. pills.

3. (Ph. D.) Colocynth pulp, scammony, and Castile soap, of each (in powder), 1 oz.; hepatic aloes, 2 oz.; treacle, 10 drs.; oil of cloves, 1 fl. dr.; mix, and beat them into a mass of uniform consistence.

4. (Ph. L. 1746.) Socotrine aloes and scammony, of each, 2 oz.; pulp of colocynth, 1 oz.; oil of cloves, 2 drs.; syrup of buckthorn, q. s. to form a pill-mass. This is the original formulæ published by Galen for 'pilulæ cochiæ minores,' and, under various slight modifications, it has continued in use ever since.

5. Aloes, 1½ lb.; colocynth, ½ lb.; jalap, 6

oz.; (all in powder;) oil of cloves, 1½ oz.; syrup or treacle, q. s. to mix. *Prod.* About 4¾ lbs. This forms the common 'pil. cochiæ' of the druggists. A few, more conscientious than the rest, add to the above, scammony, 6 oz. It is greatly inferior to the Ph. pill.

6. (B. P.) Colocynth, in powder, 1; Barbadoes aloes, in powder, 2; scammony, in powder, 2; sulphate of potash, in powder, ¼; oil of cloves, ¼; distilled water, a sufficiency (about ¼); mix. Dr. Gregory's favourite pill. —*Dose.* 5 to 10 grs.

Obs. Compound colocynth pill is a cheap and excellent cathartic, more powerful than the other officinal aloetic pills, and well adapted to cases of habitual costiveness. It has long been extensively used by the poorer classes, and in domestic medicine generally.—*Dose.* 5 to 15 grs.

Pills of Colocynth and Hen'bane. *Syn.* PILULÆ COLOCYNTHIDIS ET HYOSCYAMI (B. P., Ph. E.), L. *Prep.* 1. (Ph. E.) Colocynth pill-mass, 2 parts; extract of henbane, 1 part; beat them up with a few drops of rectified spirit (if necessary), and divide them into 5-gr. pills.—*Dose.* 1 to 3 pills; as an anodyne purgative, in irritable bowels.

2. (B. P.) Colocynth, in powder, 1; Barbadoes aloes, in powder, 2; scammony, in powder, 2; sulphate of potash, in powder, ¼; oil of cloves, ¼; extract of hyoscyamus, 3; distilled water, a sufficiency: mix.—*Dose.* 5 to 10 grains.

Pills of Copai'ba. *Syn.* PILULÆ COPAIBÆ, L. *Prep.* (Ph. U. S.) Pure balsam of copaiba, 2 oz.; recently prepared calcined magnesia, 1 dr.; mix thoroughly, then set the mixture aside until it acquires a pillular consistence, and, lastly, divide it into 200 pills.

Obs. Unless the magnesia has been very recently calcined, the copaiba hardens very slowly or not at all. It is said that "lime produces the effect more completely and uniformly than magnesia," and that "specimens of copaiba which are old and contain the most resin" harden quickest. (Redwood.) For present use, the quantity of magnesia may be at least doubled. Dr. Pereira orders copaiba, 1 oz.; magnesia, 5 or 6 drs.—*Dose.* 10 to 30 grs., frequently; in diseases of the mucous membranes of the urinary organs. Cubebs are often added.

Pills, Dr. Copland's. See APERIENT and PECTORAL PILLS.

Pills of Corro'sive Sub'limate. *Syn.* PILLS OF CHLORIDE OF MERCURY; P. OF BICHLORIDE OF M.†, HOFFMANN'S P.; PILULÆ SUBLIMATIS CORROSIVI, P. HYDRARGYRI BICHLORIDI†, P. MAJORES HOFFMANNI, L. *Prep.* 1. Corrosive sublimate, 3 grs.; white sugar, ½ dr.; triturate together in a glass mortar for some time, then add of powdered gum arabic, 20 grs., and beat the whole to a mass with dilute hydrochloric acid, q. s. For 36 pills, each containing $\frac{1}{12}$ gr. of corrosive sublimate.

2. (Brera.) Corrosive sublimate, 3 grs.; rectified spirit, the smallest possible quantity to dissolve it; bread-crumb, q. s. to form a mass. For 24 pills, each containing ⅛ gr. of the corrosive sublimate.

3. (Dr. Paris.) Corrosive sublimate and sal ammoniac, of each, 5 grs.; water, ½ fl. dr.; triturate together until solution is complete, then add, of honey, ½ dr., liquorice powder, 1 dr. (or, q. s.), and divide into 40 pills. Each pill contains ⅛ gr. of corrosive sublimate.

4. (Ph. Hannov.) Corrosive sublimate, 15 grs.; distilled water, ½ fl. dr.; crum of bread, q. s. to form a mass. For 120 pills, each containing ⅛ gr.

Obs. The above formulæ are among those most usually employed. Other authorities order pills containing $\frac{1}{10}$th of a gr. Dzondi orders $\frac{1}{30}$ gr., and Hufeland only $\frac{1}{30}$ gr., in each pill. The commencing dose should not exceed 1 pill containing the $\frac{1}{12}$ of a grain, twice or thrice a day. It may afterwards be safely kept at ⅛th of a grain. They are chiefly employed in syphilis, but are also occasionally exhibited with great advantage in glandular indurations and enlargements, and in cancer; due caution being observed.

Pills, Cough. See PECTORAL PILLS, EXPECTORANT P., &c.

Pills of Cre'asote. *Syn.* PILULÆ CREASOTI, L. *Prep.* 1. (Pitschaft.) Creasote, 6 grs.; powdered henbane, 24 grs.; conserve of hips, q. s. For 24 pills.—*Dose.* 1, three times daily; in sea-sickness, the vomiting during pregnancy, &c.

2. (Rieche.) Creasote, 1 dr.; extract of liquorice and gum galbanum, of each, ½ dr.; powdered mallow-root, 2 drs.; to be divided into 2-gr. pills.—*Dose.* 3 to 6, four times a day; in acute rheumatism, bronchitis, neuralgia, phthisis, &c.

Pills, Crespigny's. See DINNER PILLS.

Pills of Cro'ton Oil. *Syn.* PILULÆ CROTONIS, P. TIGLII, L. *Prep.* 1. Croton oil, 3 drops; oil of cloves, 4 drops; bread-crum, q. s. For 3 pills, one of which is a dose.

2. (Dr. Copland.) Croton oil, 6 drops; pill of aloes and myrrh, 1½ dr.; soap, 20 grs.; liquorice powder, q. s. For 30 pills.—*Dose.* 2 to 4.

3. (Dr. Reece.) Croton oil, 6 drops; Castile soap, ½ dr.; oil of caraway, 8 drops; liquorice powder, q. s. For 12 pills.—*Dose.* 1 to 3. In dropsy, visceral obstructions, &c. See CROTON OIL.

4. (With MERCURY—Dr. Neligan.) Croton-oil soap, 3 grs.; extract of henbane and mercurial pill, of each, 24 grs.; oil of pimento, 12 drops; divide into 12 pills.—*Dose.* 2 at bed-time. (See *above*.)

Pills of Cy'anide of Mer'cury. *Syn.* PILULÆ HYDRARGYRI CYANIDI, P. H. CYANURETI, L. *Prep.* (Guibourt.) Cyanide of mercury, 6 grs.; opium, 12 grs.; bread-crum, 60 grs.; honey or syrup, q. s. For 96 pills.—*Dose.* 1, night and morning; in syphilis, chronic inflammation of the viscera, &c.

Pills of Cyanide of Potas'sium. *Syn.* PILULÆ POTASSII CYANIDI, L. *Prep.* (Golding Bird.) Cyanide of potassium, 2 grs.; arrow-root, 20 grs.; simple syrup, q. s. For 18 pills. —*Dose.* 1, twice or thrice a day; as a sedative, in hysteria, gastrodynia, extreme nervous excitability, &c. See DRAUGHT and MIXTURE.

Pills of Dandeli'on. See PILLS OF TARAXACUM.

Pills, De Haen's. *Prep.* (St. Marie.) Gum ammoniacum and pill aloes with myrrh, of each, 1 dr.; extract of hemlock and Castile soap, of each, 1½ dr. For 2-gr. pills.—*Dose.* 3 to 6 daily; in painful or obstructed menstruation, chlorosis, &c.

Pills of Del'phine. *Syn.* PILULÆ DELPHINIÆ, L. *Prep.* (Dr. Turnbull.) Delphine, 1 gr.; extracts of henbane and liquorice, of each, 12 grs. For 12 pills.—*Dose.* 1 to 3, twice a day; in dropsy, gout, rheumatism, &c., instead of veratrine.

Pills, Diaphoret'ic. *Syn.* PILULÆ DIAPHORETICÆ, L. *Prep.* 1. Antimonial powder, ½ dr.; opium, 10 grs.; calomel, 5 grs.; confection of opium, q. s. to mix; divide into 10 pills.—*Dose.* 1, at bedtime; in coughs and bronchial irritability, after an aperient.

2. Guaiacum, 10 grs.; emetic tartar and opium, of each, 1 gr.; simple syrup, q. s. to mix; divide into 3 pills.—*Dose.* 1 to 2, in acute rheumatism, &c.

3. Camphor and antimonial powder, of each, ½ dr.; opium, 10 grs.; aromatic confection, q. s. to mix. For 12 pills. In fevers, and in some spasmodic diseases.—*Dose.* 1 pill.

4. Powdered guaiacum, 10 grs.; compound powder of ipecacuanha, 5 grs.; confection of roses, q. s. to mix; for a dose. As a diaphoretic, in inflammatory affections and rheumatism.

Pills, Diarrhœ'a. *Syn.* PILULÆ ANTIDIARRHŒALES, L. *Prep.* (Troussean & Reveil.) Soft extract of opium, 1½ gr.; calomel and powdered ipecacuanha, of each, 3 grs.; conserve of hips, q. s.; divide into 10 pills.—*Dose.* 1, two or three times daily; in chronic and choleraic diarrhœa.

Pills, Diges'tive. Under this head are generally classed all the stomachic and milder aperient pills. See BATH PILLS, DINNER, PILLS, &c.

Pills of Digita'line. *Syn.* PILULÆ DIGITALINÆ, L. *Prep.* 1. Digitaline, 1 gr.; powdered sugar, ½ dr.; thick mucilage, q. s. For 24 pills.—*Dose.* 1 to 4 daily, watching the effects; as a sedative to reduce the force of the circulation, in phthisis, enlargement of the heart, &c. See FOXGLOVE PILLS.

Pills, Din'ner. *Syn.* PILULÆ DICTÆ ANTECIBUM, L.; GRAINS DE SANTÉ, Fr. *Prep.* 1. Aloes, 1 dr.; rhubarb and extract of gentian, of each, ½ dr.; ipecacuanha and capsicum, of each, 12 grs.; syrup of ginger, q. s. to mix. For 3½-gr. pills.

2. (Dr. Baillie's.) See page 922.

3. (BATH DIGESTIVE PILLS.) See page 923.

4. (PILLS OF ALOES AND MASTIC; LADY CRESPIGNY'S PILLS, LADY HESKETH'S P., LADY WEBSTER'S P., DIGESTIVE P., STOMACH P., PILULÆ ALOËS ET MASTICHES, P. A. CUM MASTICHE, P: STOMACHICÆ MESUES; GRAINS DE VIE, GRAINS DE MESUE.) From aloes (powdered), 6 drs.; powdered mastic and petals of red roses, of each, 2 drs.; syrup of wormwood, q. s. to form a pill-mass. For 3-gr. pills. In small doses, they excite the appetite; in larger ones, they produce a bulky and copious evacuation. This is the formula of the old Paris Codex. Rhubarb is now frequently substituted for the rose petals.

5. (Sir C. Bell's.) From sulphate of quinine, 4 grs.; mastic, 6 grs.; rhubarb, 50 grs.; syrup of orange peel, q. s. to mix. For 12 or, preferably, 18 pills.

6. (Sir Chas. Clarke's.) From extract of chamomile, ½ dr.; myrrh and rhubarb (in powder), of each, 20 grs.; powdered Socotrine aloes, 10 grs.; oil of chamomile, 8 drops; mucilage, q. s. to form 20 pills. "These pills, which were originally prescribed by Sir Chas. Clarke, are much used in London." (Redwood.)

7. (Frank's.) From aloes and jalap, of each, 4 parts; rhubarb, 1 part; syrup of wormwood, q. s. For 3-gr. pills.

8. (P. Cod.) Aloes, 6 drs.; extract of cinchona bark, 3 drs.; cinnamon, 1 dr.; syrup of wormwood, q. s.

The *dose* of the above is 3 to 5 grs., about an hour before dinner, to promote the appetite; or, as a purgative, 10 to 15 grs.

Pills, Diuret'ic. *Syn.* PILULÆ DIURETICÆ, L. *Prep.* 1. From powdered foxglove, 12 grs.; calomel, powdered squills, and opium, of each, 4 grs.; conserve of hips, q. s. For 12 pills.

2. (Dr. A. T. Thomson.) Mercurial pill, 1 dr.; powdered squills, 20 grs.; confection of roses, q. s.; divided into 20 pills. The *dose* of either of the above is 1 pill, twice or thrice daily; in dropsy, &c.

Pills, Dixon's. According to Dr. Paris, these pills consist of aloes, scammony, rhubarb, and a little tartar emetic, beaten up with syrup. "The following formula produces a pill precisely similar to this nostrum:—Take of compound extract of colocynth (Ph. L. 1836), 4 drs.; powdered rhubarb, 2 drs.; potassio-tartrate of antimony, 8 grs.; syrup of buckthorn, q. s.; mix, and divide into 120 pills. Aperient and diaphoretic.—*Dose.* 2 or 3, at bedtime." (Cooley). Although a nostrum, it is really an excellent medicine, adapted for numerous cases.

Pills, Duchesne's. *Prep.* From aloes and gum ammoniacum, of each, 30 grs.; mastic and myrrh, 10 grs.; carbonate of potassa and saffron, of each, 3 grs.; syrup, q. s. In the dyspepsia of hysterical patients, in engorgements of the abdominal viscera, following intermittent fevers, &c.

Pills, Dys'entery. *Syn.* PILULÆ DYSENTERICÆ, L. *Prep.* Pure alumina and tannic acid, of each, 20 grs.; antimonial powder, 15 grs.; castor oil, ½ dr.—*Dose.* 5 to 10 grs.; frequently.

Pills of Elate'rium. *Syn.* PILULÆ ELATERII, L. *Prep.* (Radius.) Elaterium, 6 grs.; extract of gentian and Castile soap, of each, 9 grs.; mix, and divide into 12 pills.—*Dose.* 1 to 4; in obstinate constipation, and as a purge in dropsy, &c.

Pills, Emet'ic. *Syn.* PILULÆ EMETICÆ, P. CUPRI SULPHATIS COMPOSITÆ, L. *Prep.* (Swediaur.) Sulphate of copper and ipecacuanha, equal parts; syrup or conserve of roses, q. s. For 5-gr. pills.—*Dose.* 1 pill, repeated every 15 minutes, until vomiting comes on. See EMETICS.

Pills, Epilep'sy. *Syn.* PILULÆ ANTEPILEPTICÆ, P. AD EPILEPSIAM, L. *Prep.* 1. (Griffith.) Powdered indigo, 75 grs.; assafœtida, 15 grs.; Russian castor, 7 grs.; mix, and divide the mass into 20 pills.—*Dose.* 1, every hour.

2. (Récamier.) Oxide of iron, 9 grs.; camphor and extract of belladonna, of each, 6 grs. For 12 pills.—*Dose.* 1 to 3, every 3 or 4 hours.

Pills of Er'got of Rye. *Syn.* PILULÆ ERGOTÆ, P. SECALIS CORNUTI, L. *Prep.* 1. (Dewees.) Powdered ergot, ½ dr.; extract of gentian, 1 dr.; divide into 15 pills. In obstructed and painful menstruation, hæmorrhages, &c.—*Dose.* 1 pill, thrice daily.

2. (Lallemande.) Aloes, ergot, and rue, of each, 8 grs.; for 12 pills. As the last.

Pills of Er'gotine. *Syn.* PILULÆ ERGOTINÆ, L. *Prep.* (Bonjean). Ergotine (Bonjean's), 24 grs.; liquorice powder, 40 grs.; syrup, q. s. For 24 pills.—*Dose.* 3 to 6, daily; as an internal hæmostatic, &c.

Pills, Everlast'ing. *Syn.* PERPETUAL PILLS; PILULÆ ÆTERNÆ, P. PERPETUÆ, L. Small spheres of metallic antimony. They possess the property of purging as often as swallowed, but have now long fallen into disuse.

Pills, Expec'torant. *Syn.* PILULÆ EXPECTORANTES, L. *Prep.* 1. Myrrh, 1½ dr.; powdered squills, ½ dr.; extract of henbane, 2 drs.; syrup, q. s.; divide into 30 pills.—*Dose.* 2, night and morning.

2. (A. T. Thomson.) Powdered squills and extract of hemlock, of each, ½ dr.; ammoniacum, 1½ dr.; divide into 30 pills. *Dose.* 2, twice or thrice a day. In chronic coughs, asthma, &c., after an aperient. See PECTORAL PILLS, &c.

Pills, Family Antibil'ious. *Syn.* ALOE PILLS; ALOËS ROSATA, PILULÆ ALOËS ROSATÆ, L. *Prep.* Socotrine or hepatic aloes, 3 oz.; juice of roses, 1 pint; dissolve by heat, strain through a piece of coarse flannel, evaporate to a proper consistence, and form it into pills. Purgative, in doses of 5 to 15 grs.

Pills, Fe'ver. *Syn.* PILULÆ FEBRIFUGÆ, L. Of these, the principal are those containing antimonials, bark, quinine, and salicine (which *see*).

Pills, Fordyce's. An active purgative, closely resembling in composition the compound gamboge pill of the Ph. L.

Pills, Dr. Fothergill's. *Prep.* (Cooley). Aloes, 4 drs.; extract of colocynth and scammony, of each, 1 dr.; diaphoretic antimony, 30 grs.; syrup, q. s. For 3½-gr. pills. A diaphoretic aperient.—*Dose.* 1 to 4 pills, at bedtime.

Pills of Fox'glove and Hen'bane. *Syn.* PILULÆ DIGITALIS ET HYOSCYAMI, L. *Prep.* (Dr. A. T. Thomson). Powdered foxglove, 4 grs.; powdered camphor, 12 grs.; extract of henbane, 18 grs. For 6 pills.—*Dose.* 1 or 2, at bedtime; as a sedative in maniacal and spasmodic affections, &c.

Pills of Fox'glove and Squills. *Syn.* PILULÆ DIGITALIS ET SCILLÆ (Ph. E.), L. *Prep.* (Ph. E.) Powdered foxglove and squills, of each, 1 part; aromatic electuary (Ph. E.), 2 parts; conserve of red roses, q. s.; divide into 4-gr. pills. A valuable diuretic in dropsies. *Dose.* 1 to 2 pills.

Pills, Frank's. See DINNER PILLS.

Pills, Frankfort. These are the Pilules Angeliques noticed among PATENT MEDICINES, formed into 2-gr. pills, and silvered.

Pills of Fuligoka'li. *Syn.* PILULÆ FULIGOKALI, L. *Prep.* (Deschamps). Fuligokali, 5 dr.; starch, 2½ dr.; powdered tragacanth, 10 grs.; syrup, q. s. For 100 pills, which must be covered with 2 or 3 coats of gum, and preserved from the air. The pills of sulphuretted fuligokal (Pilulæ Fuligokali Sulphurati) are prepared in a similar manner.

Pills, Fuller's. *Syn.* BENNET PILLS; PILULÆ BENEDICTÆ, L. *Prep.* (Cooley.) Aloes and sulphate of iron, of each, ½ dr.; myrrh and senna, of each, 20 grs.; assafœtida and galbanum, of each, 10 grs.; mace and saffron, of each, 6 grs.; syrup, q. s.; mix and divide into 4-gr. pills. Antispasmodic, emmenagogue, and tonic, and slightly aperient.—*Dose.* 1 to 4, according to the object in view.

Pills, Gairthorn's Mild Provi''sional. *Prep.* (Cooley). Compound gamboge pill, 60 grs.; aqueous extract of aloes, 40 grs.; sulphate of potassa and extract of senna, 30 grs.; compound scammony powder, 15 grs.; balsam of Peru, 6 or 8 grs.; emetic tartar, 3 grs.; mix, and divide into 36 pills. Purgative.—*Dose.* 1, 2, or more, when required.

Pills of Gal'banum (Compound). *Syn.* PILULA GALBANI COMPOSITA (Ph. L.), PILULÆ G. COMPOSITÆ, L. *Prep.* 1. (Ph. L.) Myrrh and prepared sagapenum, of each, 3 drs.; prepared galbanum and soft soap, of each, 2 drs.; prepared assafœtida, 1 dr.; treacle, q. s. to form a pill-mass.

2. (Ph. L. 1836.) As the last, omitting the soap.

3. (Ph. D. 1826.) As the Ph. L., except that treacle is substituted for syrup.

Obs. These pills are stimulant, expectorant

antispasmodic, and emmenagogue.—*Dose.* 10 to 20 grs.; in hysteria, chronic coughs, chlorosis, amenorrhœa, &c.

Pills of Galbanum with Iron. *Syn.* PILULÆ GALBANI CUM FERRO, L. *Prep.* (Guy's Hosp.) Compound galbanum pill, 2 parts; precipitated sesquioxide of iron, 1 part; water, q. s. to form a mass. For 4½-gr. pills. An excellent tonic emmenagogue.—*Dose.* 10 to 20 grs.; in chlorosis, amenorrhœa, &c., when chalybeates are not contra-indicated.

Pills of Gam'boge (Compound). *Syn.* GAMBOGE PILLS, FORDYCE'S P.; PILULÆ CAMBOGIÆ COMPOSITA (Ph. L.), P. CAMBOGIÆ (Ph. E.), L. *Prep.* 1. (Ph. L.) Powdered Socotrine or hepatic aloes, 3 drs.; powdered gamboge, 2 drs.; powdered ginger, 1 dr.; soft soap (Ph. L.), 4 drs.; mix, and beat them to a pill-mass. The formulæ of the Ph. L. 1836 and Ph. D. 1826 are precisely similar.

2. (Ph. E.) Gamboge, East Indian or Barbadoes aloes, and aromatic powder, of each (in powder), 1 part; Castile soap, 2 parts; syrup, q. s.

Obs. Both the above are active cathartics. —*Dose.* 5 to 15 grs., at bedtime; in obstinate constipation, &c.

Pills of Gen'tian (Compound). *Syn.* PILULÆ GENTIANÆ COMPOSITÆ, L. *Prep.* (W. Cooley.) Extract of gentian, 1 dr.; powdered rhubarb and cardamoms, of each, ½ dr.; ipecacuanha, 12 grs. For 3-gr. pills. Stomachic.—*Dose.* 2 or 3, twice or thrice daily, to improve the appetite and digestion.

Pills, Gout. *Syn.* PILULÆ ANTARTHRITICÆ, L. *Prep.* 1. (Bouchardat.) Extract of colchicum and compound extract of colocynth, of each, 1 dr.; aqueous extract of opium, 3 grs.; mix, and divide into 3-gr. pills.—*Dose.* 1 or 2, according to their purgative action, as required.

2. (Sir H. Halford's.) From acetic extract of colchicum, ½ dr.; Dover's powder and compound extract of colocynth, of each, 18 grs. For 12 pills.—*Dose.* 1 pill.

3. (Lartigue's.) From compound extract of colocynth, 20 grs.; alcoholic extract of colchicum seeds and alcoholic extract of digitalis, of each, 1 gr. For 2-gr. pills.—*Dose, &c.* As the last.

4. (St. George's Hosp.) Acetic extract of colchicum, 12 grs.; Dover's powder, 30 grs. Mix and divide into 12 pills.—*Dose.* 2 pills.

5. (Sir C. Scudamore's.) From acetic extract of colchicum, 1 dr.; powdered marshmallow-root, q. s. to form a mass. For 40 pills. —*Dose.* 1 to 3, or more, with caution, as required.

6. (Trousseau & Reveil.) Powdered colchicum seeds, ½ dr.; powdered digitalis and sulphate of quinine, of each, 15 grs.; calomel and extract of colocynth, of each, 8 grs.; syrup, q. s. For 20 pills.—*Dose.* 1 to 4, during the day, at the commencement of an attack of gout. Other formulæ for gout pills will be found under the respective names.

Pills, Dr. Griffitt's. Powdered rhubarb, 1½ dr.; sulphate of iron, ½ dr.; Castile soap, 40 grs.; water, q. s. to form a mass, For 48 pills. An excellent remedy in costiveness, with loss of tone of the bowels.—*Dose.* 2 to 4, at bedtime.

Pills of Gua'iacum (Compound). *Syn.* PILULÆ GUAIACI COMPOSITÆ, L. *Prep.* 1. Powdered resin of guaiacum, 1 dr.; oxysulphide of antimony, 40 grs.; oil of cajeput, 12 drops; extract of gentian, q. s. to form a mass. For 4-gr. pills.—*Dose.* 3 to 6, thrice daily; in gout, rheumatism, secondary syphilis, various obstinate cutaneous affections, &c.

2. (St. B. Hosp.) Guaiacum, 30 grs.; ipecacuanha and opium, of each, 3 grs.; syrup, q. s. For 12 pills.—*Dose.* 1 to 3. As the last.

Pills, Halford's. See GOUT PILLS.

Pills, Dr. Hamilton's. The same as the colocynth and henbane pill of the Ph. E. The compound pills of gamboge, now vended under the title of 'MORISON'S NO. 2 PILLS,' were long known in Scotland as Dr. Hamilton's Pills.

Pills, Head'ache. *Syn.* CEPHALIC PILLS; PILULÆ CEPHALICÆ, P. ANTICEPHALALGICÆ, L. *Prep.* 1. Caffeine, 15 grs.; aloes, 20 grs.; conserve of hips, q. s. For 12 pills.—*Dose.* 1, occasionally; when only one side of the head is affected.

2. (Broussais.) Extract of opium, 6 grs.; extracts of belladonna and henbane, of each, 15 grs.; extract of lettuce 30 grs.; butter of cacao, 4 drs. For 120 pills —*Dose.* 1, twice or thrice daily; in headache, accompanying spasmodic affections, &c.

3. (Dr. Wilson Philip.) Powdered nutmeg and rhubarb, of each, 20 grs.; extract of chamomile, 20 grs.; oil of peppermint, 10 or 12 drops. For 30 pills.— *Dose.* 1 to 3, thrice daily; in nervous headaches.

Pills, Helvetius's. *Syn.* PILULÆ ALUMINIS HELVETII, L. *Prep.* Alum, 2 drs.; dragon's blood, 1 dr.; honey of roses, to mix. For 48 pills. Astringent.

Pills of Hem'lock (Compound). *Syn.* PILULA CONII COMPOSITA (B. P., Ph. L.), L. *Prep.* (Ph. L.) Extract of hemlock, 5 drs.; powdered ipecacuanha, 1 dr.; treacle, q. s. Antispasmodic, expectorant, and narcotic.—*Dose.* 4 to 8 grs. (B. P. 5 to 10 grs.), twice or thrice daily; in hooping-cough, bronchitis, incipient phthisis, &c.

Pills of Henbane (Compound). *Syn.* PILULÆ HYOSCYAMI ET ZINCI, L.; PILULES DE MEGLIN, Fr. *Prep.* (P. Cod.) Extracts of henbane and valerian, and oxide of zinc, equal parts. For 3-gr. pills.—*Dose.* 1 to 10; as an anodyne or sedative in neuralgia, nervous attacks, &c.

Pills, Lady Hesketh's. See DINNER PILLS.

Pills, Hoffmann's. See PILLS OF CORROSIVE SUBLIMATE.

Pills, Holloway's. See PATENT MEDICINES.

Pills, Hooper's Female. *Prep.* 1. (Gray.) Sulphate of iron and water, of each, 8 oz.;

dissolve, add, Barbadoes aloes, 2½ lbs.; white canella, 6 oz.; myrrh, 2 oz.; opopanax, 1 oz.

2. (Phil. Coll. of Pharm.) Barbadoes aloes, 8 oz.; dried sulphate of iron, 2½ oz.; myrrh, extract of black hellebore, and Castile soap, of each, 2 oz.; canella and ginger, of each, 1 oz.; water, q. s.; divide the mass into 2½- or 3-gr. pills, and put 40 into each box. Cathartic and emmenagogue.—*Dose.* 2, or more. "If we omit the soap, lessen the quantity of extract of hellebore, and increase that of the aloes, we think the form will be nearer that of the original." (Cooley.)

Pills, Humphrey's. See PECTORAL PILLS.

Pills, Hunter's. See RENAL PILLS.

Pills, Hydragogue. See BONTIUS's PILLS, &c.

Pills, Hydropho'bia. *Syn.* PILULÆ AD RABIEM, L. *Prep.* (Werlhoff.) Cantharides (in very fine powder), 2 grs.; belladonna and calomel, of each, 4 grs.; camphor, 8 grs.; mucilage, q. s. For 12 pills.—*Dose.* 2 to 3, twice daily.

Pills of In'dian Hemp. *Syn.* PILULÆ CANNABIS INDICÆ, L. *Prep.* From alcoholic extract of Indian hemp, ½ dr.; sugar of milk, 1 dr.; mucilage, q. s. For 48 pills. An excellent pill for soothing pain and quieting the system, acting without causing headache or constipation of the bowels.—*Dose.* 1 pill, increased to 2 or more, as necessary. (See page 602.)

Pills of In'digo. See EPILEPSY PILLS.

Pills of I'odide of Arsenic. *Syn.* PILULÆ ARSENICI IODIDI, L. *Prep.* 1. (Dr. Neligan.) Iodide of arsenic, 2 grs.; manna, 40 grs.; mucilage, q. s.; mix, and divide into 20 pills.

2. (Gardiner.) Iodide of arsenic, 1 gr.; extract of hemlock, 20 grs. For 12 pills.—*Dose.* 1 pill, twice or thrice daily; in lepra, psoriasis, and some other scaly skin diseases.

Pills of Iodide of Iron. *Syn.* PILULÆ FERRI IODIDI, L. *Prep.* 1. Unoxidized iron filings (recently levigated), 20 grs.; iodine, 40 grs.; distilled water, ½ dr.; mix in a cold wedgwood-ware mortar, and triturate them together until the red colour of the mixture has entirely disappeared; then add, of powdered gum, 20 grs.; powdered sugar, 1 dr.; liquorice powder, q. s. to form a mass, and divide it into 48 pills. Each pill contains 1 gr. of dry iodide of iron.—*Dose.* 1 to 6 pills, twice or thrice a day.

2. (Ph. U. S.) Protosulphate of iron, 60 grs.; iodide of potassium, 80 grs.; (both in fine powder;) mix, add of powdered tragacanth, 10 grs.; powdered sugar, 30 grs.; and form the whole into a mass with syrup, q. s. For 40 pills. Each pill contains nearly 2 grs. of the dry iodide, or about 2½ grs. of the common hydrated iodide of the shops.—*Dose,* 1 to 3, as the last.

Obs. The above pills are reputed alterative, tonic, and emmenagogue, and are found peculiarly useful in indurations, scrofula, chlorosis, leucorrhœa, &c., when the administration of chalybeates is not contra-indicated.

Pills of Iodide of Lead. *Syn.* PILULÆ PLUMBI IODIDI, L. *Prep.* From iodide of lead, 15 grs.; powdered sugar, 1½ dr.; mucilage, q. s. For 60 pills.—*Dose.* 1 pill, gradually increased to 3, or more, twice a day; in scrofula, scirrhus, &c. (See page 684.)

Pills of Iodide of Mer'cury. *Syn.* PILULÆ HYDRARGYRI IODIDI, L. *Prep.* 1. (Ph. L. 1836.) Green iodide of mercury and powdered ginger, of each, 1 dr.; conserve of hips, 3 drs.—*Dose.* 2 to 5 grs., twice or thrice daily, as an alterative in scrofula and scrofulous syphilis, &c.

2. (COINDET'S PILLS.) From green iodide of mercury, 1 gr.; extract of liquorice, 20 grs.; mix, and divide into 8 pills.—*Dose.* 2 to 4, as the last. Pills of red iodide of mercury are made in the same way, but, owing to its greater activity, only one fourth of the above quantity of iodide must enter into their composition.

Pills of Iodide of Potas'sium. *Syn.* PILULÆ POTASSII IODIDI, L. *Prep.* 1. Iodide of potassium and powdered starch, of each, ½ dr.; conserve of hips, q. s. For 36 pills.—*Dose.* 1 to 6, thrice daily; in glandular indurations and enlargements, goiture, scrofula, &c.

2. (Voght.) Iodide of potassium, 15 grs.; burnt sponge and extract of dulcamara, of each, 5 drs.; water, q. s. For 180 pills.—*Dose.* 4 to 6, twice a day; as the last.

Pills of I'odine. *Syn.* PILULÆ IODINII, L. *Prep.* (Radius.) Iodine, 6 grs.; extract of gentian, 1 dr.; powdered gum, q. s. For 24 pills.—*Dose.* 1 to 3; in scrofula, &c.; also, in mercurial and scorbutic salivation.

Pills of Iod'oform. *Syn.* PILULÆ IODOFORMI, L. *Prep.* (Bouchardat.) Iodoform, ½ dr.; extract of wormwood (or gentian), 1 dr.; mix, and divide into 36 pills.—*Dose.* 1, twice or thrice daily; in scrofula, &c.

Pills of Ipecac'uanha (Compound). *Syn.* PILLS OF IPECACUANHA WITH SQUILLS, P. OF I. AND OPIUM; PILULA IPECACUANHÆ CUM SCILLÂ (Ph. L.), P. IPECACUANHÆ ET OPII (Ph. E.), L. *Prep.* 1. (Ph. L.) Compound powder of ipecacuanha (Dover's powder), 3 drs.; powdered ammoniacum and squills (freshly powdered), of each, 1 dr.; treacle, q. s. to form a pill-mass. Anodyne, sudorific, and expectorant.—*Dose.* 5 to 16 grs.; in chronic coughs and asthma, &c.

2. (Ph. E.) Dover's powder, 3 parts; conserve of red roses, 1 part; mix, and divide into 4-gr. pills. Resembles Dover's powder in its effects. It is hence regarded by many as a useless preparation.

Pills of I'ron (Compound). *Syn.* PILULA FERRI COMPOSITA (Ph. L.), P. F. CUM MYRRHÂ, L. *Prep.* (Ph. L.) Myrrh (in powder), 2 drs.; carbonate of soda, 1 dr.; rub them together in a warm mortar, then add of sulphate of iron, 1 dr., and again triturate; lastly, add of treacle, 1 dr., and beat all together, to form a pill-mass. An excellent mild chalybeate tonic and emmenagogue, similar in its properties to

'Griffith's Mixture.'—*Dose.* 5 to 15 grs., two or three times a day.

Pills, Italian Black. *Syn.* PILULÆ ITALICÆ NIGRÆ, P. ALOETICÆ FERRATÆ, L. *Prep.* (Ph. Bor.) Powdered aloes and dried sulphate of iron, equal parts; beaten up with rectified spirit, q. s., and divided into 2- or 2½-gr. pills. See PILLS OF ALOES AND IRON.

Pills of Jal'ap. *Syn.* PILULÆ JALAPÆ, L. *Prep.* 1. (Ph. E. 1783.) Extract of jalap, 2 drs.; aromatic powder, 1 dr.; syrup, q. s.

2. (Ph. Bor.) Soap of jalap, 3 parts; powdered jalap, 1 part; beat them to a pill-mass. —*Dose.* (Of either) 10 to 15 grs.

Pills, James's Analep'tic. *Prep.* 1. Antimonial powder, guaiacum, and pill of aloes with myrrh, equal parts; syrup, q. s.

2. (Cooley.) Antimoniai powder (James's), pill aloes with myrrh, and compound aloes powder, of each, 2 parts; powdered ammoniacum, 1 part; beaten up with tincture of castor, q. s., and divided into 3½-gr. pills. A diaphoretic purge.—*Dose.* 2 to 4 pills.

Pills, Dr. J. Johnson's. *Prep.* From compound extract of colocynth, 2 drs.; calomel, ½ dr.; potassia-tartrate of antimony, 2 grs.; oil of cassia, 12 drops. For 4 dozen pills. An excellent alterative and diaphoretic aperient.—*Dose.* 1 to 3 pills.

Pills, Kaye's. See WORSDELL'S PILLS.

Pills, Keyser's. *Prep.* (Guibourt.) Red oxide of mercury, 1½ oz.; distilled vinegar (dilute acetic acid), 1 pint; dissolve, add to the resulting solution, manna, 2 lbs., and triturate for a long time before the fire, until a proper consistence is attained; lastly, divide the mass into pills of 1½ gr. each.

Obs. Keyser's pills were once celebrated throughout Europe as a remedy possessing extraordinary virtue, and so highly were they prized that the method of preparing them was purchased by the French government for the benefit of the nation. Richard, who first published a full account of them, concludes by observing that he considers this compound to be, without exception, the most effectual remedy for syphilis hitherto discovered. In this country, however, it has long sunk into comparative disuse with the faculty; probably from pills of acetate of suboxide of mercury being erroneously employed under the name, whereas according to Robiquet, acetate of protoxide of mercury (called by him the 'peroxide') forms the basis of the original preparation. The *dose* is 1 to 2, night and morning, as an alterative; and 2 to 6, twice a day, as a sialogogue. (See page 753.)

Pills, King's. See PATENT MEDICINES.

Pills, Kitchener's. *Syn.* DR. KITCHENER'S PERISTALTIC PERSUADERS; PILULÆ RHEI ET CARUI, L. *Prep.* From powdered Turkey rhubarb, 2 drs.; simple syrup, 1 dr.; oil of caraway, 10 or 12 drops. For 40 pills. An admirable stomachic, dinner, or laxative pill, according to the quantity taken.—*Dose.* 2 to 6. "From 2 to 4 will generally produce one additional motion within 12 hours. The best time to take them is early in the morning."

Pills, Klein's. *Prep.* From ammoniacum and extract of centaury, of each, ½ dr.; Castile soap, 1 dr.; oil of amber, 3 drops. For 2-gr. pills. Stomachic, emmenagogue, and pectoral. —*Dose.* 2 to 6 pills.

Pills of Lac'tate of Iron. *Syn.* PILULÆ FERRI LACTATIS, L. *Prep.* (Cap.) Lactate of protoxide of iron and powdered marsh-mallow root, equal parts; clarified honey, q. s. For 3-gr. pills. One of the most valuable of the chalybeates.— *Dose.* 1 to 2, three or four times a day.

Pills of Lactuca''rium. *Syn.* PILULÆ LACTUCARII, L. *Prep.* 1. (Brera.) Lactucarium, 18 grs.; conserve of elder-berries and extract of liquorice, of each, q. s. For 12 pills.— *Dose.* 1 to 2 pills, every three or four hours; in dry asthma, obstinate coughs without expectoration, &c.

2. (Dr. Duncan.) Lactucarium, 12 grs.; liquorice powder, 20 grs.; simple syrup, q. s. For 12 pills.—*Dose.* 1 to 2 pills, every hour, as an anodyne, or to induce sleep.

Pills, Lartigue's. See GOUT PILLS.

Pills of Lead. *Prep.* 1. See PILLS OF ACETATE OF LEAD.

2. (Opiated; PILULÆ PLUMBI OPIATÆ — Ph. E.; PILULA PLUMBI CUM OPIO—B. P.) Acetate of lead, 6 parts; opium, 1 part; conserve of red roses, about 1 part; beat them to a proper mass, and divide this into 4-gr. pills. "This pill may also be made with twice the quantity of opium." In hæmorrhages, obstinate diarrhœa, dysentery, spitting of blood, and other cases demanding the use of a powerful astringent. It has also been highly extolled in cholera.—*Dose.* 1 to 3 pills, twice or thrice daily, washed down with water soured with pure vinegar.

Pills, Lee's Antibil'ious. *Prep.* ('Amer. Journ. of Pharm.') Aloes, 12 oz.; scammony, 6 oz.; calomel, 5 oz.; gamboge, 4 oz.; jalap, 3 oz.; Castile soap and syrup of buckthorn, of each, 1 oz.; mucilage, 7 oz.; beat them together, and divide the mass into 5-gr. pills. A powerful cathartic, and, from containing mercury, not adapted for frequent use. See WYNDHAM'S PILLS.

Pills, Lewis's Al'terative and Liver. These "for the most part resemble SCOTT'S BILIOUS AND LIVER PILLS. They are, however, of a more drastic and powerful character, and frequently operate with considerable violence."

Pills, Lockstadt's. *Prep.* (Phœbus.) Sulphate of quinine, 3 grs.; aromatic powder, 10 grs.; essential oil of almonds, 1 drop; extract of gentian, q. s. For 10 pills.—*Dose.* 1 to 2, thrice daily, as a stomachic tonic; or the whole at once, before an expected attack of an ague or intermittent.

Pills, Lockyer's. *Prep.* From panacea of antimony, 6 grs.; powdered white sugar, 4 drs.; mucilage, q. s. For 48 pills. Cathartic and emetic.—*Dose.* 1 to 4 pills.

Pills, Dr. Lynn's. *Prep.* From pill of aloes with myrrh and compound extract of colocynth, of each, 1 dr.; calomel, ½ dr. For 4 dozen pills. Aperient and antibilious.—*Dose.* 1 to 3; in costiveness, biliousness, &c.

Pills of Man"ganese. These are chiefly prepared from the recently precipitated carbonate (PILULÆ MANGANESII CARBONATIS), the iodide (P. M. IODIDI), the chloride (P. M. CHLORIDI), the phosphate (P. M. PHOSPHATIS), the sulphate (P. M. SULPHATIS), and the double sulphate of manganese and iron (P. M. ET FERRI SULPHATIS). The best excipients are conserve of roses or of hips and liquorice powder. See MANGANESE and its salts.

Pills, Mar'tial. *Syn.* PILLS OF IRON AND WORMWOOD; PILULÆ FERRI CUM ABSINTHIO, P. MARTIALES, L. *Prep.* (Sydenham.) Levigated iron-filings, 1 dr.; extract of wormwood, q. s. Tonic and hæmatinic.—*Dose.* 5 to 10 grs., twice a day.

Pills, Matthew's. *Syn.* PILULÆ MATTHÆI, P. PACIFICÆ, L. *Prep.* 1. (Dr. Paris.) Black hellebore, Castile soap, liquorice, opium, saffron, and turmeric, equal parts; made into pills with oil of turpentine.

2. (Ph. E. 1744.) Opium and saffron, of each, 1 dr.; castor, 2 drs.; soap of turpentine, 3 drs.; balsam of copaiba (or oil of turpentine), q. s. to form a mass. Alterative and anodyne. —*Dose.* 3 to 10 grs.

Pills, McKinsey's. See MCKINSEY'S KATAPOTIA, among PATENT MEDICINES.

Pills, Meglin's. *Syn.* PILULES DE MEGLIN, Fr. See PILLS OF HENBANE (Compound).

Pills, Mercu"rial. *Syn.* BLUE PILL; PILULA HYDRARGYRI (B. P.), PILULÆ HYDRARGYRI (Ph. L.), PILULÆ H. (Phr. E. & D.), P. MERCURIALES, L.; PILULES MERCURIELLES, Fr. *Prep.* 1. (Ph. L.) Mercury, 4 drs.; confection of roses, 6 drs.; rub them together until globules can no longer be seen; then add of liquorice powder, 2 drs., and beat the whole together, so that a proper mass may be formed.

2. (Ph. E.) As the last; afterwards dividing the mass into 5-gr. pills.

3. (Ph. D.) As the Ph. L. formula, but taking four times the quantity of the respective ingredients.

4. (B. P.) Mercury, 2; confection of roses, 3; decorticated liquorice root, in fine powder, 1; rub the mercury with the confection of roses until metallic globules are no longer visible, then add the liquorice, and mix the whole well together.—*Dose.* 3 to 6 grs. as an alterative, 10 grs. as a purgative.

Obs. The remarks under 'MERCURIAL OINTMENT' (page 850), for the most part, also apply here. This pill, when properly prepared, presents no globules of mercury when moderately rubbed on a piece of white paper, and immediately communicates a white stain to a piece of bright gold or copper. It possesses considerable density, and has a dark blue or slate colour. It contains 1-3rd of its weight of mercury, which may be ascertained from its sp. gr.; or, more exactly, by an assay for the metal. It is the mildest and the most extensively used of all the mercurial preparations. —*Dose.* As an alterative, 1 to 3 grs.; as a purgative, 10 to 15 grs.; and as a sialogogue, 5 or 6 grs., or more, twice or thrice daily. To prevent it affecting the bowels, it is commonly combined with either rhubarb or opium. A blue pill taken over-night, and a black draught in the morning, is a popular remedy in bilious complaints. See ABERNETHY MEDICINES.

4. (Collier.) Mercury, 2 drs.; sesquioxide of iron, 1 dr.; confection of red roses, 3 drs.; triturated, as before, until the globules disappear. An excellent extemporaneous substitute for the common mercurial pill. The addition of only a few grs. of the sesquioxide of iron to 1 oz. of conserve, renders the latter capable of rapidly killing a large quantity of quicksilver.

5. (Tyson.) Gray oxide of mercury (prepared by decomposing calomel with liquor of potassa to which a little liquor of ammonia has been added), 2 drs.; confection of roses, 6 drs.; powdered chamomiles, 1 dr.; mix. As a substitute for the College pill.

6. ('Pharm. Journ.') Stearin, 1 dr.; rub it in a warm mortar till it assumes the consistence of thick cream, then add of mercury, 4 drs., and again triturate until the globules disappear; next further add, of confection of roses and wheaten flour, of each, 3 drs., powdered gum, 1 dr., and form the whole into a pill-mass. As a substitute for the College pill.

7. (PILULÆ HYDRARGYROSÆ—P. Cod.) Mercury and honey, of each, 6 drs.; triturate till the globules are extinguished, then add of aloes, 6 drs.; rhubarb, 3 drs.; scammony, 2 drs.; black pepper, 1 dr.; and make a pill-mass as before. Contains 1-4th part of quicksilver. Alterative and aperient.—*Dose.* 5 to 10 grs. BELLOSTE'S, BARBAROSSA'S, SÉDILLOT'S, and MORELOT'S PILLS, are nearly similar compounds. See PILLS OF CALOMEL and CORROSIVE SUBLIMATE, &c.

Pills, Mercurial (Arabic). *Syn.* PILULÆ MERCURIALES ARABICÆ, L. *Prep.* Take of quicksilver and corrosive sublimate, of each, ½ dr.; triturate them patiently together until the globules disappear; then add, of agaric, pellitory, and senna, of each, 1 dr.; honey, q. s. to make a pill-mass. For 3½-gr. pills.—*Dose.* 2 a day. Employed in the 'traitement arabique' for the cure of obstinate cutaneous diseases.

Pills, Mitchell's. *Prep.* Aloes, ½ dr.; rhubarb, 1 dr.; calomel, 6 grs.; emetic tartar, 2 grs. For 36 pills. An alterative aperient.—*Dose.* 2 to 4 pills.

Pills, Moat's. Similar to MORISON'S PILLS.

Pills, Morison's. *Prep.*—*a.* (No. 1 Pills.) From aloes and cream of tartar, equal parts,

made into a mass with either syrup or mucilage. A mild aperient.

b. (No. 2 pills.) From colocynth, 1 part; gamboge, 2 parts; aloes, 3 parts; and cream of tartar, 4 parts; made into a mass with syrup, as the last. An active purgative, often acting with great violence. Both No. 1 and No. 2 are divided into 3-gr. pills, of which 4 dozen are put into each thirteen-penny-halfpenny box. The proper dose of either is 1 to 3 or 4 pills; but they are often given by the Morisons in doses of 12, 20, 30, or even more, daily. For the history of these pills and their proprietors, see 'Anat. of Quackery,' or 'Med. Circ.,' ii, 9-27.

Pills of Mor'phia. *Syn.* PILULÆ MORPHIÆ, L. *Prep.* (Magendie.) Morphine, 1 gr.; conserve of roses (stiff), q. s. For 6 (or, better, 8) pills.—*Dose.* 1 pill; as an anodyne or soporific.

Pills, Moseley's. *Prep.* Finest Turkey rhubarb, 60 grs.; Jamaica ginger, 30 grs.; sugar, 20 grs.; (all in powder;) tincture of rhubarb, q. s. to form a mass. For 4-gr. pills. A mild and excellent medicine, closely resembling KITCHENER'S PERISTALTIC PERSUADERS.

Pills of Musk. *Syn.* PILULÆ MOSCHI, L. *Prep.* (Dupuytren.) Opium, 2 grs.; musk (genuine), 8 grs.; camphor (in powder), 24 grs.; syrup, q. s. For 8 pills. Antispasmodic and stimulant.—*Dose.* 1 to 3, thrice daily, in low nervous affections; or the whole during the day, in hospital gangrene, &c.

Pills of Myrrh. See PILLS OF ALOES AND MYRRH.

Pills, Napier's Neuroton'ic. Of these, like MORISON'S PILLS, there are No. 1 and No. 2. The first is a simple stomachic aperient; the other, a stimulant tonic. They both owe their sale and reputed virtues to extensive advertising. ('Anat. of Quackery.')

Pills, Napoleon's. See PECTORAL PILLS.

Pills, Neuralg'ia. *Syn.* PILULÆ ANTINEURALGICÆ, L. *Prep.* 1. (Marchal De Calvi.) Aqueous extract of opium, 4 grs.; sulphate of quinine, 16 grs.; powdered cinnamon, powdered orange leaves, and extract of valerian, of each, 20 grs.; syrup of belladonna, q. s. For 3 dozen pills.—*Dose.* 1, hourly.

2. (Trousseau & Reveil.) Extracts of opium and stramonium, of each, 8 grs.; oxide of zinc, 2 drs.; syrup, q. s. For 40 pills.—*Dose.* 1, every two or three hours, gradually increased in frequency until there is some considerable disorder of vision, &c. Both of the above should be used with care. See MEGLIN'S PILLS, &c.

Pills of Ni'trate of Bismuth. *Syn.* PILULÆ BISMUTHI TRISNITRATIS, L. *Prep.* From trisnitrate of bismuth and powdered rhubarb, equal parts; syrup of orange peel, q. s. to form a mass. For 3-gr. pills.—*Dose,* 1 to 2, every two hours; as a tonic, stomachic, and antispasmodic, in dyspepsia, debility, spasms, &c.

Pills of Nitrate of Sil'ver. *Syn.* PILULÆ ARGENTI NITRATIS, L. *Prep.* 1. (St. B. Hosp.) Nitrate of silver (crystallised), 12 grs.; liquorice powder, 24 grs.; treacle, q. s. For 12 pills.—*Dose.* 1 pill, twice or thrice a day; in chronic epilepsy and some other spasmodic disorders.

2. (Dr. A. T. Thomson.) Nitrate of silver, 6 grs.; crum of bread, q. s. (say ½ dr.); mix, and divide into 12 pills.—*Dose.* 1, every six hours.

Obs. To prevent the blue or slate coloured tinge of the skin, so often produced by the continued use of the salts of silver, 8 drops of diluted nitric acid in 1 fl. oz. of water should be taken after each pill.

Pills, Norton's Chamomile. *Prep.* From aqueous extract of aloes, 1 dr.; extract of gentian, 3 drs.; mix, and drive off the excess of moisture by the heat of a water bath; then add of essential oil of chamomiles, 20 drops, and divide the mass into 60 pills. To preserve their aromatic properties, they should be kept in a dry glass bottle or a well-covered earthenware pot.—*Dose.* 1, as a dinner pill; or 2, night and morning, as a stomachic tonic. ('Anat. of Quackery.')

Pills of Nux Vom'ica. *Syn.* PILULÆ NUCIS VOMICÆ, L. *Prep.* 1. Nux vomica and aloes (both in powder), equal parts; syrup, q. s. For 3-gr. pills.—*Dose.* 1 to 3, twice or thrice daily, carefully watching the effects; in nervous derangement, general debility, impotence, paralysis, &c.

2. Alcoholic extract of nux vomica, 1 part; powdered sugar, 2 parts; beaten up with rectified spirit, q. s. For 2½-gr. pills.—*Dose.* 1 to 2; as the last.

3. (Mondière.) Alcoholic extract, 6 grs.; levigated black oxide of iron, 1 dr.; syrup, q. s. In atonic incontinence of urine, amenorrhœa, &c.

Pills, Odontal'gic. *Syn.* PILULÆ ODONTALGICÆ, L. *Prep.* (Ph. Bor.) Powdered opium and extracts of belladonna and henbane, of each, 10 grs.; oil of cloves, 20 drops; powdered pellitory of Spain, ½ dr.; beat them to a mass, and divide it into 1-gr. pills; keep these in a corked phial.

Pills, Opiated Lead. See PILLS OF LEAD.

Pills of O''pium. *Syn.* ANODYNE PILLS, NIGHT P., THEBAIC P.; PILULÆ OPII (Ph. U. S.), P. O. or THEBAICÆ (Ph. E.), L. *Prep.* 1. (Ph. E.) Opium and conserve of red roses, of each, 1 part; sulphate of potash, 3 parts; rub them together to a proper mass, and divide into 5-gr. pills.—*Dose.* 1 to 2 pills, as an anodyne or soporific. Each pill contains 1 gr. of opium, or double the quantity in the same pill of the previous edition of the Ph. E.

2. (Ph. U. S.) Powdered opium, 1 dr.; Castile soap, 12 grs.; water, q. s. For 60 pills. As the last.

Pills of Ox-Gall. *Syn.* BILE PILLS; PILULÆ FELLIS BOVINI, P. BILIS, L. *Prep.* 1. From inspissated ox-gall formed into pills by the addition of any simple powder; or the harder extract beaten up with a little proof spirit.

Powdered rhubarb is frequently used for the purpose. For 3-gr. pills.—*Dose.* 1 to 6; in constipation, flatulence, &c., arising from a deficiency of bile.

2. (Compound.) From inspissated ox-gall, 1 dr.; powdered rhubarb, ½ dr.; powdered ipecacuanha and capsicum, of each, 15 grs.; oil of caraway, 12 drops. For 48 pills.—*Dose.* 1 to 4; in loss of appetite and dyspepsia, with torpor of the bowels, &c. See CONSTIPATION, GALL, &c.

Pills of Ox'ide of Gold. *Syn.* PILULÆ AURI OXYDI, L. *Prep.* (Magendie.) Teroxide of gold, 5 grs.; extract of mezereon, 2 drs.; mix, and divide into 60 pills. Each pill contains 1/12 gr. of teroxide.—*Dose.* 1 to 3; in scrofula, syphilis, malignant fevers, &c.

Pills of Oxide of Mercury. See MERCURIAL PILLS.

Pills of Oxide of Sil'ver. *Syn.* PILULÆ ARGENTI OXYDI, L. *Prep.* From oxide of silver, 6 grs.; powdered rhubarb and extract of gentian, of each, 12 grs. For 1 dozen pills.—*Dose.* 1 pill, twice or thrice daily; in gastralgia, hæmorrhages, nervous affections, &c. Milder than the pills of nitrate of silver.

Pills of Oxide of Zinc. *Syn.* PILULÆ ZINCI OXYDI, L. *Prep.* From oxide of zinc, powdered cascarilla, and conserve of hips, equal parts. For 3½-gr. pills. Tonic and antispasmodic.—*Dose.* 1 to 3, thrice daily; in dyspepsia, gastric or spasmodic coughs, epilepsy, chorea, &c.

Pills, Parr's Life. *Prep.* Aloes, 7 lbs.; rhubarb and jalap, of each, 5 lbs.; (all in powder;) extract of gentian, 3½ lbs.; soft soap, ½ lb.; liquorice powder, treacle, and moist sugar, of each, 4½ lbs.; oil of cloves, 10 oz.; oil of caraway, 3½ oz.; mix, and beat the whole to a proper mass with syrup bottoms, q. s., and divide it into 3½-gr. pills. "There are about 4 dozen in each 1s. 1½d. box, weighing (dry) barely 3 grs. each." A good stomachic and aperient pill, but possessing none of the extraordinary virtues ascribed to it by its proprietors. ('Med. Circ.,' ii, 146, 167, &c.)

Pills of Paullin'ia. *Syn.* GUARANA PILLS; PILULÆ GUARANÆ, P. PAULLINIÆ, L. *Prep.* 1. Paullinia mixed up with syrup of orange peel, and the mass divided into 2½-gr. pills.—*Dose.* 2 to 8.

2. (Dr. Gavrelle.) Extract of guarana, 1 dr.; liquorice powder, q. s. For 40 pills.—*Dose.* 3 to 6, daily.

Obs. These pills are highly esteemed on the Continent as a tonic and astringent, in diseases of the bowels and bladder, in chlorosis, debility, &c.

Pec'toral Pills. *Syn.* BREATH PILLS; PILULÆ PECTORALES, L. *Prep.* 1. Compound squill pill, 1 dr.; gum benzoin, ½ dr.; powdered ipecacuanha and extract of henbane, of each, 15 grs.; syrup, q. s. For 3-gr. pills.—*Dose.* 2 to 4, three or four times a day; in asthmas, chronic bronchial affections, coughs, &c.

2. (Dr. Copland.) Camphor (in powder), 10 grs.; ipecacuanha, 15 grs.; extract of hemlock, 1 dr.—*Dose.* 3 to 6 grs.; in irritating and spasmodic coughs, &c.

3. (Haggart.) Powdered ipecacuanha and squills, of each, ½ dr.; acetate of morphia, 6 grs.; Castile soap, 3 drs.; mix, and divide into 72 pills. A most excellent medicine, at once soothing and expectorant.—*Dose.* 1 to 2, thrice a day, or oftener.

4. (HUMPHRIES' COUGH PILLS.) From powdered ipecacuanha, 15 grs.; compound squill-pill, 1 dr.; compound extract of colocynth, ½ dr. For 3½-gr. pills.—*Dose.* 2 pills, night and morning.

5. (Dr. Latham.) Compound powder of ipecacuanha, 1 dr.; fresh squill and gum ammoniacum, of each, 20 grs.; calomel, 4 grs. For 20 pills. A most valuable pectoral and expectorant.—*Dose.* 1 pill, thrice daily; in bronchitis, coughs, &c., after the more active inflammatory symptoms have subsided.

6. (Napoleon's.) From ipecacuanha, 30 grs.; squills and ammoniacum, of each, 40 grs.; (all in powder;) mucilage, q. s. to mix. For 24 pills. It is said that this was a favourite remedy with the Emperor Napoleon I for difficulty of breathing, bronchitis, and various affections of the organs of respiration.—*Dose.* 2 pills, night and morning.

7. (Dr. Paris.) Powdered squills, ½ dr.; powdered myrrh, 1½ dr.; extract of henbane, 40 grs.; water (or simple syrup), q. s. to mix. For 4-gr. pills.—*Dose.* 2 pills, night and morning. As No. 2.

8. (Ph. L. 1746.) Gum ammoniacum, 4 drs.; gum benzoin, 3 drs.; gum myrrh, 2 drs.; saffron, 1 dr.; anisated balsam of sulphur, ½ dr.; syrup of tolu, q. s. to mix.—*Dose.* 5 to 15 grs.

9. (Richter.) Assafœtida and valerian, of each, ½ dr.; castor, 15 grs.; powdered squills and sesquicarbonate of ammonia, of each, 8 grs.; extract of aconite (alcoholic), 3 grs. For 4-gr. pills.—*Dose.* 1 to 3 pills, night and morning; in spasmodic affections of the respiratory organs.

Pills, Perpet'ual. See EVERLASTING PILLS.

Pills, Peter's. *Prep.* (Cooley.) Aloes, 3 drs.; gamboge, jalap, and scammony, of each, 2 drs.; (all in powder;) calomel, 1 dr.; beaten up with rectified spirit, q. s. A powerful cathartic.—*Dose.* 1 to 3 pills.

Pills of Pip'erine. *Syn.* PILULÆ PIPERINÆ, L. *Prep.* From piperine, ½ dr.; extract of cinchona, q. s. For 30 pills.—*Dose.* 1 pill, every two hours, during the intermission of an ague; also as an aphrodisiac and a remedy in piles.

Pills of Pitch. *Syn.* PILULÆ PICIS NIGRÆ, L. *Prep.* From black pitch and powdered black pepper, equal parts; beaten together in a warm mortar, and divided into 4-gr. pills.—*Dose.* 2 pills, night and morning; in piles, &c.

Pitschaft's Eccoprot'ic Pills. *Prep.* From strained aloes and disulphate of quinine, equal

parts; made into 2-gr. pills. A tonic and stomachic aperient.—*Dose.* 2 to 4, at bedtime; in torpor of the large intestines, the dyspepsia of the debilitated, &c.

Plummer's Pills. See PILLS OF CALOMEL (Compound).

Pills, Pur'gative. *Syn.* PILULÆ PURGANTES, L. *Prep.* 1. (Dr. Robinson.) Aqueous extract of aloes, 1 dr.; powdered scammony, ½ dr.; balsam of Peru, 10 or 12 grs.; oil of caraway, 9 or 10 drops; mix, and divide into 30 pills. A warm, stimulating aperient, highly recommended to excite the peristaltic action of the bowels of the aged, sedentary, and debilitated.—*Dose.* 1 to 4 pills, as required.

2. (Trousseau & Reveil.) Resin of jalap, 1 dr.; scammony, ½ dr.; extract of colocynth, 6 grs.; excipient, as required. For 20 (or, better, 24) pills.—*Dose.* 1, "every two hours, in the morning, fasting, until they operate." For other formulæ see APERIENT and CATHARTIC PILLS and PILLS OF ALOES, JALAP, COLOCYNTH, &c.

Pills of Quinine'. See PILLS OF SULPHATE OF QUININE.

Pills, Reece's. See CHIRATTA PILLS.

Pills, Re'nal. *Syn.* PILULÆ RENALES, L. *Prep.* 1. Squills, myrrh, and digitalis, of each (in powder), 10 grs.; extract of rhubarb and mercurial pill, of each, 15 grs.; powdered nitre, 20 grs.; oil of juniper, 10 or 12 drops. For 24 pills. Alterative, diuretic, and tonic.—*Dose.* 3 to 6, thrice a day. Hunter's Renal Purifying Pills are similar, but omitting the mercurial pill. De Roos' Renal Pills contain a preparation of copaiba.

Pills, Rheu'matism. *Syn.* PILULÆ ANTIRHEUMATICÆ, L. *Prep.* 1. Gum guaiacum, 1 dr.; nitrate of potassia, 1½ dr.; (both in powder;) soft soap (Ph. L.), ½ dr.; oil of cajeput, 16 drops. For 4 dozen pills.—*Dose.* 2 to 6, night and morning; in chronic rheumatism, and rheumatic gout. Their action is accelerated by the copious use of lemon juice during the day.

2. (Beasley.) Extract of artichoke, ½ dr.; powdered sarsaparilla, 20 grs.; oil of sassafras, 1 drop. For 12 pills.—*Dose.* 1 pill, thrice daily.

Pills of Rhu'barb. *Syn.* PILULÆ RHEI (Ph. E.), L. *Prep.* 1. (Ph. E.) Powdered rhubarb, 9 parts; acetate of potassa, 1 part; conserve of red roses, 5 parts; mix, and divide into 5-gr. pills. A stomachic and gentle aperient, particularly useful in atonic dyspepsia.—*Dose.* 2 to 4 pills.

2. (Ph. U. S.) Powdered rhubarb, 6 drs.; Castile soap, 2 drs.; beaten up with water, q. s., and divide into 120 pills. As the last.

Pills of Rhubarb (Compound). *Syn.* AROMATIC PILLS, BALSAMIC LAXATIVE P., EDINBURGH P., STOMACHIC P.; PILULA RHEI COMPOSITA (B. P., Ph. L.), PILULÆ R. COMPOSITÆ (Ph. E. & D.), P. STOMACHICÆ, P. AROMATICÆ, L. *Prep.* 1. (Ph. L.) Powdered rhubarb, 4 drs.; powdered Socotrine aloes, 3 drs.; powdered myrrh, 2 drs.; soft soap, (Ph. L.), ½ dr.; oil of caraway, 15 drops; treacle, q. s. to form a mass.

2. (Ph. L. 1836.) Powdered rhubarb, 1 oz.; aloes, 6 drs.; myrrh, 4 drs.; Castile soap, 1 dr.; oil of caraway, ½ fl. dr.; syrup, q. s.

3. (Ph. E.) Powdered rhubarb, 12 parts; aloes, 9 parts; myrrh and Castile soap, of each, 6 parts; conserve of red roses, 5 parts; oil of peppermint, 1 part; mix, and divide into 5-gr. pills. The oil of peppermint may be omitted, when so preferred.

4. (Ph. D.) Rhubarb, 1½ oz.; hepatic aloes, 9 drs.; myrrh and Castile soap, of each, in fine powder, 6 drs.; oil of peppermint, 1 fl. dr.; treacle, 2 oz.; mix, and beat the whole to a uniform mass.

5. (Ph. U. S. & Ph. E. 1817.) Rhubarb, 8 drs.; aloes, 6 drs.; myrrh, 4 drs.; oil of peppermint, ½ fl. dr.; syrup of orange peel, q. s.; mix, and divide into 240 pills.

6. (B. P.) Rhubarb, in fine powder, 3 oz.; Socotrine aloes, in fine powder (some physicians prefer the aqueous extract.—*Squire*), 2½ oz.; myrrh, in fine powder, 1½ oz.; hard soap, 1½ oz.; English oil of peppermint, 1½ dr.; treacle, by weight, 4 oz.; reduce the soap to fine powder and triturate it with the rhubarb, aloes, and myrrh; add the treacle and oil, and beat into a mass.—*Dose.* 5 to 10 grs.

Obs. The above are tonic, stomachic, and gently laxative; extremely useful for obviating costiveness and giving tone to the stomach and bowels.—*Dose.* 6 or 8 to 20 grs. The London pill is not only the most agreeable, but it keeps the best.

Pills of Rhubarb and Car'away. See KITCHENER'S PILLS.

Pills of Rhubarb and Chamo'mile. *Syn.* SPEEDIMAN'S PILLS; PILULÆ RHEI ET ANTHEMIDIS, L. *Prep.* From aloes, myrrh, rhubarb (each in powder), and extract of chamomile, of each, 1 dr.; essential oil of chamomile, 10 or 12 drops. For 4-gr. pills. An excellent tonic and stomachic aperient, particularly useful in the dyspepsia and loss of appetite of hard drinkers.—*Dose.* 1 to 3 pills, either before dinner or at bedtime.

Pills of Rhubarb and Copai'ba. *Syn.* PILULÆ RHEI ET COPAIBÆ, P. R. BALSAMICÆ, L. *Prep.* (Swediaur.) Powdered rhubarb and gum, equal parts; balsam of capaiba, q. s.

Pills of Rhubarb and Gin'ger. *Syn.* STOMACH PILLS; PILULÆ RHEI ET ZINGIBERIS, L. *Prep.* From powdered rhubarb, 1 dr.; powdered ginger, ½ dr. Castile soap, 20 grs.; tincture or essence of ginger, q. s. to form a mass. For 30 pills.—*Dose.* 1 to 6.

Pills of Rhubarb and Ipecac'uanha. *Syn.* PILULÆ RHEI ET IPECACUANHÆ, L. *Prep.* From rhubarb, ½ dr.; ipecacuanha, 15 grs.; opium, 5 grs.; (each in powder;) oil of cinnamon, 6 drops; syrup, q. s. For 18 pills.—*Dose.* In loss of appetite and spasmodic dyspepsia, 1 to 3 pills, twice a day; in dysentery,

diarrhœa, &c., to relieve tormina and tenesmus, 1 every two hours.

Pills of Rhubarb and I'ron. *Syn.* PILULÆ RHEI ET FERRI (Ph. E.), L. *Prep.* (Ph. E.) Dried sulphate of iron, 4 parts; extract of rhubarb, 10 parts; conserve of red roses, 5 parts; beat them to a proper mass, and divide this into 5-gr. pills.—*Dose.* 2 to 4 pills; in the atonic dyspepsia of debilitated subjects, in chlorosis, &c.

Pills of Rhubarb and Ox-gall. *Syn.* PILULÆ RHEI ET FELLIS BOVINI, L. *Prep.* From powdered rhubarb, gum ammoniacum, and inspissated ox-gall, equal parts; beaten up with a little tincture of ginger or proof spirit, and the mass divided into 2½-gr. pills. In dyspepsia and constipation dependent on a torpid action of the liver.—*Dose.* 2 to 6 pills.

Pills of Rhubarb and So'da. *Syn.* PILULÆ RHEI ET SODÆ, P. R. COMP. CUM SODÂ, L. *Prep.* (Guy's Hosp.) Dried carbonate of soda, powdered rhubarb, and extract of gentian, equal parts. For 4½-gr. pills.—*Dose.* 2 to 4 pills; in acidity, heartburn, diarrhœa, loss of appetite, &c.

Pills, Richter's. See PECTORAL PILLS.

Pills, Dr. Robinson's. See PURGATIVE PILLS.

Pills, Rudius's. *Syn.* RUDIUS'S EXTRACT; PILULÆ RUDII, EXTRACTUM RUDII, L. *Prep.* 1. Colocynth pulp, 6 drs.; agaric, black hellebore, and turpethum root, of each, 4 drs.; cinnamon, mace, and cloves, of each, 40 grs.; rectified spirit, ½ pint; digest for 4 days, express the tincture, and evaporate it to a proper consistence for making pills. Formerly esteemed one of the most safe and certain cathartics in troublesome constipation.—*Dose.* 5 to 20 grs.

2. (Ph. E. 1783.) Black hellebore and colocynth, of each, 2 oz.; water, 4 pints (o. w. m.); boil to a quart, strain, evaporate to the consistence of honey, and add, of aloes, 2 oz.; scammony (powdered), 1 oz.; next remove the vessel from the fire, and further add of sulphate of potassa, 2 drs.; oil of cloves, 1 dr.; and form the whole into a pill-mass. Resembles the last (nearly).

Pills, Rufus's. See PILLS OF ALOES WITH MYRRH.

Pills of Saf'fron. *Syn.* PILULÆ CROCI, L. *Prep.* From hay saffron, 1 dr.; myrrh, ½ dr.; oil of cajeput, 6 drops; syrup of saffron, q. s. For 36 pills.—*Dose.* 1 to 3 or 4, occasionally; as a stimulant in low spirits, hypochondriasis, &c.

2. (Phœbus.) Saffron, myrrh, and sulphur, equal parts; inspissated bile, q. s. For 2-gr. pills.—*Dose.* 2 to 12 daily; as an emmenagogue.

Pills of Sagape'num (Compound). *Syn.* PILULÆ SAGAPENI COMPOSITÆ, L. *Prep.* (Ph. L. 1836.) Sagapenum, 1 oz.; aloes, ½ dr.; syrup of ginger, q. s.—*Dose.* 5 to 20 grs.; as a stimulant antispasmodic laxative, in dyspepsia with flatulence, flatulent colic, &c.

Pills of Sal'icin. *Syn.* PILULÆ SALICINÆ, L. *Prep.* From salicin, ½ dr.; powdered rhubarb, 20 grs.; extract of gentian, q. s. to mix. For 4-gr. pills.—*Dose.* 2 to 4, every three hours, during the apyrexia of intermittents.

Pills of Scam'mony (Compound). *Syn.* PILULÆ SCAMMONII COMPOSITÆ, L. *Prep.* (St. B. Hosp.) Scammony, 24 grs.; ginger, 20 grs.; aloes and gamboge, of each, 12 grs.; treacle, q. s.; mix, and divide into 12 pills. A powerful cathartic and vermifuge.—*Dose.* 1 to 3 pills.

Scot's Pills. *Prep.* From aloes, 9 lbs.; jalap, 3 lbs.; gamboge and ginger, of each, ½ lb.; beaten with treacle, q. s. See ANDERSON'S SCOT'S PILLS.

Dr. Scott's Bil'ious and Liver Pills. *Prep.* (Cooley.) Compound extract of colocynth (Ph. L. 1836), 8 oz.; powdered rhubarb, 4 oz.; powdered myrrh, 2 oz.; soft soap, ½ oz.; oil of caraway, 2½ drs.; strong syrup of saffron, q. s. to form a pill-mass. "There are twenty-five 3½-gr. pills in each 1s. 1½d. box." "It has been stated that these pills contain a minute portion of antimony." ('Anat. of Quackery.')

Sed'ative Pills. *Syn.* PILULÆ SEDATIVÆ, L. *Prep.* 1. Hydrochlorate of morphia, 6 grs.; powdered sumbul, 20 grs.; alcoholic extract of Indian hemp, ½ dr. For 2-gr. pills.—*Dose.* 1 to 3, twice or thrice daily; in excessive nervous irritability, painful menstruation, &c.

2. (U. C. Hosp.) Camphor, 1 dr.; reduce it to powder by means of rectified spirit, 3 or 4 drops; add of extract of henbane, 20 grs., and divide the mass into 20 pills. To allay pain and excitement, &c.—*Dose.* 1 to 2 pills.

3. To either of the above, add of powdered rhubarb and extract of gentian, of each, 20 grs., and divide the mass into 4-gr. pills.—*Dose.* 1 to 4 pills; when, besides the other symptoms, the stomach and bowels are disordered.

Sedillot's Febrifuge Pills. *Prep.* From powdered opium, 3 grs.; sulphate of quinine, 12 grs.; confection of opium, 10 grs., or q. s. For 12 pills.—*Dose.* 1 to 2, every second hour, during the intermission of an ague.

Pills of Sen'na. *Syn.* PILULÆ SENNÆ, P. S. COMPOSITÆ, L. *Prep.* 1. Powdered senna, 1 dr.; extract of rhubarb, ½ dr.; powdered capsicum, 4 grs.; oil of juniper, 6 or 8 drops. For 3-gr. pills. An aperient well suited for females.—*Dose.* 5 to 8 pills.

2. (Hufeland.) Powdered senna, 1 dr.; extract of dandelion, q. s. to mix. For 30 pills. As the last.

Smith's Pills. *Prep.* From powdered aloes, 4 drs.; jalap, 2 drs.; ginger and soft soap, of each, 1 dr.; oil of juniper, ½ dr.; emetic tartar, 6 grs. For 120 pills. Laxative and diuretic.—*Dose.* 1 to 4, at bedtime, or early in the morning.

Dr. Hugh Smith's Pills. See STOMACH PILLS.

Pills of Soap. *Syn.* PILULÆ SAPONIS, P. CUM SAPONE, L. *Prep.* (P. Cod.) White Castile soap, 32 parts; powdered marsh-mallow root, 4 parts; powdered nitrate of potassa, 1 part; beat them to a mass, and divide this into 4-gr. pills. In habitual costiveness, calculary affections, &c.—*Dose.* 1 to 6 pills, twice or thrice a day.

Pills of Soap (Compound). *Syn.* PILLS OF SOAP AND OPIUM, LAUDANUM PILLS; PILULA SAPONIS COMPOSITA (B. P., Ph. L.), PILULÆ SAPONIS CUM OPIO, L. *Prep.* 1. (Ph. L.) Opium and liquorice, of each (in powder), 2 drs.; soft soap (Ph. L.), 6 drs.; beat them to a uniform mass.

2. (Ph. D. & Ph. U. S.) Opium (in fine powder), ½ oz.; Castile soap, 2 oz.; distilled water, ½ fl. dr., or q. s.; reduce the soap to powder, mix it with the other ingredients, and beat the whole together, as before. See PILLS OF OPIUM.

Obs. The above pills contain 1-5th part of their weight in dry opium. The dose is 3 to 10 grs., in the usual cases in which the administration of opium is indicated. Mr. Skey, the eminent surgeon of St. Bartholomew's Hospital, has shown the great value of this pill in promoting the healing of obstinate ulcers, more especially those of the legs.

Pills of Soda. *Syn.* PILULÆ SODÆ CARBONATIS, L. *Prep.* (Ph. E. 1817.) Exsiccated carbonate of soda, 4 parts; Castile soap, 3 parts; syrup, q. s. to form a mass. Antacid and slightly laxative.—*Dose.* 10 to 20 grs. This pill was a great favourite of the once celebrated Dr. Beddoes.

Speediman's Pills. *Prep.* (Cooley.) Aloes, 3 drs.; rhubarb, myrrh, (all in powder,) and extract of chamomile, of each, 1 dr.; oil of chamomile, 20 drops. For 4-gr. pills. An excellent aperient, tonic, and stomachic.—*Dose.* 2 to 4 pills, as a purgative; 1, as a stomachic or dinner pill.

Splenet'ic Pills. *Syn.* PILULÆ ANTISPLENETICÆ, L. *Prep.* (Saunders.) Strained aloes and gum ammoniacum, of each, 3 drs.; myrrh and bryony, of each, ½ dr. For 4-gr. pills.—*Dose.* 3 to 5. "Extolled in amenorrhœa and hypochondriasis." (Dr. R. E. Griffith.)

Pills of Squill (Compound). *Syn.* COUGH PILLS, PILLS OF SQUILLS AND GINGER; PILULA SCILLÆ COMPOSITA (B. P., Ph. L.), PILULÆ SCILLÆ COMPOSITÆ (Ph. D.), P. SCILLÆ (Ph. E.), L. *Prep.* 1. (Ph. L.) Freshly powdered squills, 1 dr.; powdered ginger and powdered ammoniacum, of each, 2 drs.; mix, add, of soft soap (Ph. L.), 3 drs.; treacle, 1 dr.; and beat the whole together, so that a mass may be formed.

2. (Ph. E.) Squills, 5 parts; ammoniacum, ginger, (all in fine powder,) and Spanish soap, of each, 4 parts; conserve of red roses, 2 parts; mix, as before, and divide the mass into 5-gr. pills.

3. (Ph. D.) Squills (in fine powder), 2½ drs.; ammoniacum, ginger, and Castile soap, of each (in fine powder), 2 drs.; treacle, ½ oz.

4. (B. P.) Squill (in fine powder), 1½; ginger (in fine powder), 1; ammoniacum (in powder), 1; hard soap (in powder), 1; treacle (by weight), 2, or a sufficiency; mix the powders, add the treacle, and beat into a mass.—*Dose.* 5 to 10 grains.

Obs. Compound squill pill is a most useful expectorant, in chronic coughs, asthmas, bronchial affections, difficulty of breathing, &c.; and, combined with calomel and foxglove, and, occasionally, with croton oil, as a diuretic, &c., in dropsies. Unfortunately, however, it soon spoils; and, therefore, to be effective as a remedy, it must be recently prepared. As an expectorant, it should not be administered until the inflammatory symptoms have been subdued by purgatives or bleeding. A little powdered opium, or extract of henbane, is occasionally added, to allay irritation.—*Dose.* 5 to 20 grs., twice or thrice a day, accompanied by an occasional aperient.

Stahl's Pills. See APERIENT PILLS.

Starkey's Pills. *Prep.* (Original formula.) Extract of opium, 4 oz.; mineral benzoar and nutmeg, of each, 2 oz.; saffron and Virginian snake-root, of each, 1 oz.; Starkey's soap, ½ lb.; oil of sassafras, ½ oz.; tincture of antimony (Old Ph.), 2 fl. oz. Anodyne, diaphoretic, &c.—*Dose.* 3 to 10 grs. The formula already given under MATTHEW'S PILLS is erroneously assigned to this pill by some writers.

Mrs. Stephen's Pills. This once celebrated remedy for stone was prepared from the calcined shells of eggs and snails, made into 3-gr. pills with soft soap. Its active ingredients were, consequently, lime and potash.

Stim'ulant Pills. *Syn.* PILULÆ STIMULANTES, L. *Prep.* 1. Capsicum, ½ dr.; nitrate of silver, 2 grs.; conserve of hips, q. s. For 12 pills.—*Dose.* 2 to 4, washed down with a spoonful of warm spirit-and-water, and repeated hourly, until reaction ensues; in cholera, &c.

2. (A. T. Thomson.) Strychnine, 1 gr.; acetic acid, 1 drop; crum of bread, 20 grs.; mix very carefully, and divide the mass into 10 pills.—*Dose.* 1, every six hours; in paralysis arising from lead.

Stoerck's Pills. *Syn.* PILULÆ CONII, P. CICUTÆ, L. *Prep.* From extract of hemlock, 1 dr.; powdered hemlock, q. s. to make a mass. For 2-gr. pills.—*Dose.* 1 to 4, twice a day; in various glandular and visceral enlargements, pulmonary affections, cancer, scrofula, neuralgia, &c.

Stomach Pills. *Syn.* PILULÆ STOMACHICÆ, L. *Prep.* 1. Ipecacuanha, 10 grs.; sumbul and extract of rhubarb, of each, 30 grs.; powdered quassia, 20 grs.; oil of sassafras, 6 drops; beaten up with essence of ginger (strongest), q. s. For 3-gr. pills.—*Dose.* 1 to 3, thrice daily; in loss of appetite, flatulence, dyspepsia, &c.

2. (Dr. Hugh Smith's.) From aloes, rhubarb, ginger, (all powdered,) and sagapenum

of each, 1 dr.; oils of peppermint and cloves, of each, 10 drops; balsam of Peru, q. s. to mix. For 5-gr. pills.—*Dose.* 2 or 3 nightly; or 1 to 2, before dinner. For other formulæ, see DINNER, APERIENT, COMPOUND RHUBARB, ALOES AND MASTIC PILLS, &c.

Pills of Sto'rax (Compound). *Syn.* STORAX PILLS; PILULA STYRACIS COMPOSITA (Ph. L.), PILULÆ STYRACIS (Ph. E.), L. *Prep.* 1. (Ph. L.) Prepared storax, 6 drs.; saffron and powdered opium, of each, 2 drs.; beat them together to a uniform mass. Contains 1-5th of its weight of opium.

2. (Ph. E.) Opium and saffron, of each, 1 part; extract of styrax, 2 parts; beat them to a uniform mass, and divide this into 4-gr. pills. Contains 1-4th part of opium.

Obs. The storax is here chiefly employed to disguise the odour and taste of opium. The name of the preparation has been chosen so that the word 'opium' may not appear in the prescription, a point highly necessary with certain patients.—*Dose.* 3 to 10 grs.; as compound soap pill, and as an anodyne and expectorant in chronic coughs, &c.

Pills of Stramo"nium. *Syn.* PILULÆ STRAMONII, L. *Prep.* 1. Stramonium seeds (in powder), 12 grs. (or leaves, 25 grs.); powdered camphor and extract of seneka root, of each, 1 dr.; powdered savine, 1½ dr.; oil of cajeput, 15 drops. For 2½-gr. pills.—*Dose.* 2 to 4, thrice daily; in rheumatism, &c.

2. (Sir H. Halford.) Extract of stramonium and liquorice powder, of each, 1 dr.; powdered Castile soap, 2 drs.; mucilage, q. s. to mix. For 60 pills.—*Dose.* 1, night and morning; in asthmas, &c.

Pills of Strych'nine. *Syn.* PILULÆ STRYCHNIÆ, L. *Prep.* (Magendie.) Strychnine, 2 grs.; conserve of hips, 36 grs.; (liquorice powder, q. s.;) mix very carefully, divide the mass into 24 pills, and silver them.—*Dose.* 1 pill, night and morning; in amaurosis, impotence, paralysis, &c.

Pills of Sul'phate of I'ron. *Syn.* PILULÆ FERRI SULPHATIS (Ph. E.), L. *Prep.* 1. (Ph. E.) Dried sulphate of iron and conserve of red roses, of each 2 parts; extract of dandelion, 5 parts. For 5-gr. pills. A useful chalybeate tonic.—*Dose,* 1 to 2, twice or thrice daily; in dyspepsia, chlorosis, amenorrhœa, &c.

2. (Ph. E. 1817.) Sulphate of iron (dried), 1 oz.; extract of chamomile, 1½ oz.; oil of peppermint, 1 dr.; syrup, q. s. As the last.

3. (Ph. U. S.) As No. 1, but substituting extract of gentian for extract of dandelion. For other formulæ, see HOOPER'S PILLS, &c.

Pills of Sulphate of Quinine'. *Syn.* PILULÆ QUINIÆ SULPHATIS, P. Q. DISULPHATIS, L. *Prep.* 1. Sulphate of quinine, 20 grs.; extract of gentian, 40 grs. For 20 pills.

2. (Ph. U. S.) Sulphate of quinine, 2 drs.; powdered gum, ½ dr.; strained honey, q. s. For 120 pills. Each pill contains 1 gr. of the sulphate or disulphate of quinine.—*Dose.* 1 or 2, twice a day, as a tonic and stomachic; 6 to 12, every two or three hours, during the remissions of agues.

Obs. Various additions are often made to the above formulæ, according to the indications, by which numerous other useful pills are produced. Thus, potassio-tartrate of antimony is frequently added in obstinate intermittents; iodide of potassium, in scrofulous affections; foxglove, in the hectic fever of phthisis; bitter tonics and aromatics, in dyspepsia, flatulence, &c.; carbonate of soda or magnesia, in acidity and heartburn; calomel, mercurial pill, in bilious affections; rhubarb and aloes, in bowelly affections; sulphate of iron and other chalybeates, in debility, amenorrhœa, and chlorosis; calomel, as an alterative; &c., &c.

Pills of Sulphate of Zinc. *Syn.* PILULÆ ZINCI SULPHATIS, P. Z. S. COMPOSITÆ, L. *Prep.* 1. Sulphate of zinc, 12 grs.; extract of gentian, ½ dr.; liquorice powder, q. s. For 20 pills. In dyspepsia, epilepsy, and various convulsive diseases.

2. (Dr. Paris.) Sulphate of zinc, 10 grs.; powdered myrrh, 1½ dr.; conserve of roses, q. s. For 30 pills.—*Dose.* 1 to 2, twice or thrice daily; in hooping-cough, &c.

Pills, Syph'ilis. *Syn.* PILULÆ ANTISYPHILITICÆ, L. See the various pills of mercury, gold, &c. The pills of corrosive sublimate commonly pass under this name.

Pills, Tangore. See ARSENICAL PILLS.

Pills of Tan'nic Acid. *Syn.* PILULÆ TANNINI, P. ACIDI TANNICI, L. *Prep.* From tannic acid or tannin and powdered sugar, of each, ½ dr.; conserve of roses, q. s. For 24 pills. —*Dose.* 1 or 2 pills, thrice daily, in diarrhœa; or 2, every three hours, in internal hæmorrhages, spitting of blood, &c.

Pills of Tar. *Syn.* PILULÆ PICIS LIQUIDÆ, L. *Prep.* From tar, 1 dr.; powdered gentian, ½ dr., or q. s. For 24 pills. Stimulant, diuretic, and sudorific.—*Dose.* 1 to 4, thrice a day; in dropsies, worms, ichthyosis, and several other skin diseases, &c.

Pills of Tarax'acum. *Syn.* PILULÆ TARAXACI, L. *Prep.* 1. Extract of dandelion, 1 dr.; powdered rhubarb, q. s.; divide into 3½-gr. pills. In dyspepsia, &c., complicated with congestion of the liver.

2. (St. Marie.) Extract of dandelion and Castile soap, equal parts; liquid acetate of potassa, q. s. to mix. For 4-gr. pills. As a diuretic in dropsy.

3. Extract of dandelion, 1 dr.; mercurial pill, 20 grs.; powdered digitalis, 15 grs.; liquorice powder, q. s. For 24 pills.—*Dose.* 1, afterwards increased to 2 or 3; in dropsy connected with liver disease.

Pills, Thomson's Stomach and Liver. *Prep.* From extract of dandelion, 1 dr.; scammony and rhubarb, of each, 15 grs. For 14 pills.—*Dose.* 2 pills, night and morning; in hysteria, hypochondriasis, and chronic inflammation of the liver or kidneys.

Pills, Tonic. *Syn.* PILULÆ TONICÆ, L. *Prep.* 1. Sulphate of iron, ginger, and myrrh, (all in powder,) equal parts; conserve of roses, q. s.; mix, and divide into 4-gr. pills.—*Dose.* 1, twice a day; in debility, chlorosis, &c.

2. Powdered myrrh and sulphate of iron, of each, 1 dr.; disulphate of quinine, ½ dr.; powdered capsicum, 15 grs.; conserve of roses, q. s. to mix. For 60 pills.—*Dose.* 1 or 2, twice or thrice a day; in debility, dyspepsia, ague, &c.

3. (Dr. Collier.) Tartrate of iron and extract of gentian, of each, 1 dr.; oil of cinnamon, 2 drops. For 30 pills.—*Dose.* 3 to 6, three or four times a day. A good stomachic tonic.

4. (Dr. Collier.) Oxide of zinc, ½ dr. (or sulphate of zinc, 20 grs.); myrrh, 2 drs.; camphor, 20 grs.; confection of hips, to mix. For 40 pills.—*Dose.* 1 or two pills, three times a day; in epilepsy, chorea, and other nervous disorders, debility, &c.

5. (Dr. A. T. Thomson.) Rhubarb and ginger, of each, ½ dr.; extract of chamomile, 1 dr.; divide into 30 pills.—*Dose.* 2 or 3, twice a day; in dyspepsia and chlorosis.

6. (Dr. A. T. Thomson.) Sesquioxide of iron and extract of hemlock, of each, 1 dr.; mix, and divide into 20 pills.—*Dose.* 1 or 2, twice a day; in fluor albus, scrofula, &c. Several other formulæ for tonic pills will be found under the names of the leading ingredients, &c. (See *above*.)

Pills of Vale″rian (Compound). *Syn.* PILULÆ VALERIANÆ COMPOSITÆ, L. *Prep.* (Dupuytren.) Powdered valerian, ½ dr.; castor and white oxide of zinc, of each, 20 grs.; syrup, q. s. to mix. For 18 pills.—*Dose.* 2 or 3, thrice daily; in hysteria, hypochondriasis, chlorosis, hemicrania, &c.

Pills of Vale″rianate of Zinc. *Syn.* PILULÆ VALERIANAS, L. *Prep.* From valerianate of zinc and powdered gum, of each, 15 grs.; conserve of hips, q. s. to form a mass. For 18 pills. *Dose.* 1 pill, twice daily; in nervous headache, neuralgia, hysteria, &c.

Pills, Vallet's. See PILLS OF CARBONATE OF IRON.

Pills, Vance's. See APERIENT PILLS.

Pills of Vera′trine. *Syn.* PILULÆ VERATRINÆ, L. *Prep.* 1. (Magendie.) Veratrine, ½ gr.; powdered gum arabic and syrup of gum, of each, q. s. to form 6 pills. (See *below*.)

2. (Turnbull.) Veratrine, 1 gr.; extract of henbane and liquorice powder, of each, 12 grs.; mik, and divide into 12 pills.—*Dose.* 1 pill, every 3 hours; in dropsy, epilepsy, hysteria, paralysis, nervous palpitations, &c. This should be prepared and used with great caution.

Pills, Ward's Red. *Syn.* WARD'S ANTIMONIAL PILLS. *Prep.* From glass of antimony (finely levigated), 4 oz.; dragon's blood, 1 oz.; mountain wine, q. s. to form a mass. For 1½-gr. pills. Emetic. "They are recommended in obstinate rheumatic affections, in foulness of the stomach and bowels, &c. Their action is often of a very unpleasant character." ('Anat. of Quackery.')

Pills, Lady Webster's. See DINNER PILLS.

Pills, Whitehead's Essence of Mustard. Balsam of tolu, with resin. (Dr. Paris.)

Pills, Whytt's. *Prep.* (Radius.) Aloes, chloride of iron, and extract of horehound, of each ½ dr.; assafœtida, 1½ dr. For 2-gr. pills.—*Dose.* 2 to 5, thrice daily; in leucorrhœa, chlorosis, hysteria, &c., with constipation.

Pills, Worm. *Syn.* PILULÆ ANTHELMINTICÆ, P. VERMIFUGÆ, L. *Prep.* 1. Calomel, 1 oz.; sugar, 1½ oz.; mucilage, q. s.; mix, and divide into 240 pills.—*Dose.* 1 to 2, overnight, followed by a strong dose of castor oil early the next morning.

2. Gamboge, 6 grs.; calomel, 5 grs.; mucilage, q. s.; divide into 3 pills. For a morning's dose, fasting.

3. Extract of wormwood, calomel, and powdered scammony, equal parts. For 4-gr. pills.—*Dose.* 2 to 1, as the last. For ascarides, and other small worms.

4. (Bresmer.) Powdered aloes and tansy seed, of each, ½ dr.; oil of rue, 9 or 10 drops. For 12 pills.—*Dose.* 3 to 6, in the morning, fasting, and repeated in two or three hours.

5. (Phœbus.) Iron filings, ½ dr.; assafœtida, 1½ dr.; essential oil of tansy, 10 or 12 drops; extract of wormwood, q. s.; mix, and divide into 80 pills. *Dose.* 6 pills, thrice daily.

6. (Peschier.) Ethereal extract of male fern, 30 drops; extract of dandelion, 1 dr.; powdered rhizomes of male fern, q. s. to mix. For 30 pills. In tape-worm.—*Dose.* 6 to 15, at bedtime; the dose being repeated in the morning, and then followed in an hour by a strong dose of castor oil.

Pills, Wordsell's (Kaye's). *Prep.* (Cooley.) Powdered aloes, gamboge, and ginger, equal parts; together with a very small quantity of diaphoretic antimony, beaten into a mass with either syrup or treacle, and divided into 2½-gr. pills. "There are about 4½ dozen pills in each 1s. 1½d. box." "The *dose*, as given in the directions, is from 2 to 8 pills (or even 10 to 12) daily." ('Anat. of Quackery.') They frequently operate with great violence.

Pills, Wyndham's (Lee's). *Prep.* (Cooley.) Aloes and gamboge, of each (in powder), 3 oz.; Castile soap and extract of cow-parsnip, of each, 1 oz.; nitre, ½ oz. For 5-gr. pills. A powerful drastic cathartic.—*Dose.* 1 to 3 pills.

Pills of Zinc. See PILLS OF OXIDE, SULPHATE, and VALERIANATE OF ZINC, &c.

PIMAR'IC ACID. A resin acid first obtained by Laurent from the turpentine of *Pinus maritima* (Bordeaux turpentine), by the action of hot alcohol.

PIMEN'TO. *Syn.* ALLSPICE, CLOVE PEPPER, JAMAICA P., PIMENTO BERRIES; PIMENTA (B.P., Ph. L. E. & D.), PIPER CARYOPHYLLATUM, P. JAMAICENSE, P. ODORATUM, PIMENTÆ

BACCÆ, L. "The dried unripe berries of the allspice tree, *Eugenia pimenta*, from the West Indies"—B. P. "The immature fruit of *Eugenia pimenta* (Myrtus pimenta, *Linn.*)"—Ph. L. It possesses a mixed odour of cinnamon, cloves, and nutmegs, which, with its other properties, it for the most yields to alcohol, ether, and water. It is a stimulant and tonic, and is much esteemed as an adjuvant in medicines prescribed in dyspepsia, flatulence, gout, hysteria, &c.; and also to cover the taste of disagreeable medicines.—*Dose.* 5 to 30 grs., bruised or in powder. See ESSENCE, OILS (Volatile), SPIRITS, and WATERS.

PIM'PLES. See ERUPTIONS (Papular).

PINCH'BECK. A gold-like alloy of copper and zinc. See DUTCH GOLD.

PINE APPLE. *Syn.* ANANAS. The fruit of *Ananassa sativa*, a plant of the natural order *Bromeliaceæ*. It is astringent, esculent, and possesses a rich flavour and odour. In Europe it is chiefly used as a delicacy for the table; but in tropical climates it is said to be valuable in renal diseases. See ESSENCE, &c.

PI'NEY TAL'LOW. *Syn.* PINEY RESIN, P. DAMMAR. An oleo-resinous substance obtained from the fruit of *Vateria indica*, a tree common in Malabar, by boiling it with water. It is intermediate between fat and wax, makes good soap and excellent candles. It melts at 98° Fahr. Sp. gr. ·9250 to ·9265.

PI'NIC ACID. The portion of common resin or colophony which is soluble in cold alcohol of sp. gr. ·833.

PINK. A well-known shade of light red. The name is also applied to several pigments, consisting of whiting stained with liquid dyes. See RED and YELLOW PIGMENTS, &c.

PINK DYE. *Prep.* From washed saffiower, 2 oz.; salt of tartar, ½ oz.; cold water, 1 quart; digest for 3 hours, express the liquor, and strain it. *Used* as a cosmetic, and to dye silk stockings, &c., of a rose colour. The colour is brought out by afterwards applying to, or passing the articles through, water soured with lemon juice. See SAUCERS (Pink).

PIP'ERINE. $C_{17}H_{19}NO_3$. *Syn.* PIPERINA, PIPERINUM, L. *Prep.* (P. Cod.) Alcoholic extract of black pepper is treated with a weak solution of caustic potassa (1 to 100), and the residuum, after being washed with cold water, is dissolved in alcohol; the solution is next agitated with a little animal charcoal, and the filtrate is allowed to evaporate spontaneously; the product may be purified by the re-solution in alcohol, and re-crystallisation.

Prop., &c. Colourless, or only slightly yellow; tasteless; inodorous; fusible; and crystallisable; insoluble in water; freely soluble in strong spirit, and in the acids; very feebly basic; (a few definite compounds have, however, been obtained with difficulty;) reddened by oil of vitriol. It has been much employed in Italy and on the Continent as a febrifuge.—*Dose.* 2 to 10 grs., frequently repeated, during the apyrexia of intermittents.

Obs. An assay for its piperine is the only certain method of testing the quality of either black or white pepper. For this purpose a weighted quantity of the sample is reduced to powder, and is exhausted with alcohol of the sp. gr. ·833; the mixed tinctures are then evaporated to an extract, which is treated as above. See PEPPER.

PIPES. (In confectionery.) These are formed from any of the common lozenge-masses, by rolling them into cylinders of about the thickness of a goose-quill. They are frequently medicated.

PISTA'CHIO NUTS. *Syn.* PISTACIA NUTS; NUCES PISTACIÆ, L. The kernels of the fruit of *Piscatia vera* (Linn.), one of the turpentine trees. They closely resemble almonds, but are sweeter, and form a green emulsion with water. *Used* in confectionery and perfumery, and also as a dessert fruit.

PITCH. *Syn.* BLACK PITCH, BOILED P., STONE P., WOOD P.; PIX (Ph. L.), PIX NIGRA, L. "A dry bitumen prepared from liquid pitch." (Ph. L.) The residuum from boiling tar in an open iron pot, or in a still, until the volatile and liquid portion is driven off. The volatile products principally consist of crude pyroligneous acid and oil of tar. Pitch is chiefly employed in ship-building. As a medicine, it is stimulant and tonic, and has been used internally in some skin diseases, and in piles. An ointment made of it is also extensively used in cutaneous affections of the scalp.—*Dose.* 10 grs. to ½ dr.

Burgundy Pitch. *Syn.* WHITE PITCH, BURGUNDY PINE RESIN; PIX BURGUNDICA, (B.P., Ph. L. E. & D.), L. "Impure resin prepared from the turpentine of *Abies excelsa*," or Norway spruce fir. (Ph. L.) "A concrete resinous exudation, probably, in a great measure, from *Abies excelsa*. (Ph. E.) It is chiefly used in plasters.

Obs. The importation of this substance has for some years past been gradually lessening in amount, in consequence of the substitution for it of a fictitious pitch, made by melting common resin with linseed oil, and colouring the mass with annotta or palm oil. The physiological action of the two articles is, however, considerably different, since Burgundy pitch acts upon the skin as a powerful local irritant, exciting a slight degree of inflammation, and not unfrequently producing a pimply eruption and an exudation of purulent matter. It is celebrated for its effects when employed as a plaster in all cases where warmth, support, and long adhesion to the skin, are desirable; and in the latter quality no substance equals it. The factitious Burgundy pitch has similar properties, but in an immensely less degree.

PREPARED BURGUNDY PITCH (PIX BURGUNDICA PRÆPARATA—Ph. L.) is ordered to be obtained in the same way as that adopted for strained ammoniacum. This

plan is, however, seldom, if ever, adopted in trade.

Burgundy Pitch (Facti"tious). *Syn.* PIX BURGUNDICA FACTITIA, L. *Prep.* By melting good yellow resin, 1 cwt., with linseed oil, 1 gall., and palm oil (bright), q. s. to colour. The mixture is allowed to cool considerably, and is then pulled with the hands in the same way as lead plaster is treated; after which it is placed in 'bladders' or 'stands' for sale.

Obs. The product of the above formula is the 'Burgundy pitch' of the shops. The 'pulling' or 'working' destroys the translucency of the resin, and imparts to it the peculiar semi-opacity of foreign Burgundy pitch. Cold water is commonly employed to cool it down. Annotta is often substituted for palm oil as a colouring substance. The addition of some of the 'droppings' or 'bottoms' of Canada balsam, Chio turpentine, oil of juniper, &c., renders this article nearly equal to foreign pitch; but in commerce this is never attempted, the aim being only the production of a lively colour with moderate toughness. A common melting-pan and fire (if clean, and carefully managed) will succeed sufficiently; but, both for safety and convenience, steam is preferable, and on the large scale, almost indispensable. A good workman can pull and put into stands or casks about 5 cwt. daily; or from 1½ cwt. to 3 cwt. in bladders, the latter quantity depending on the size of the bladders. (See *above*.)

Can'ada Pitch. *Syn.* HEMLOCK GUM, H. PITCH. Similar to Burgundy pitch; but from the *Abies Canadenses*, or hemlock spruce fir.

Jews' Pitch. Asphaltum.

Min'eral Pitch. Indurated mineral bitumen. See ASPHALTUM, BITUMEN, &c.

PIT'COAL. *Syn.* COAL; HOUILLE, Fr.; STEINKOHLE, Ger. This article has been truly described as the most valuable of all those mineral substances from which Great Britain derives its prosperity, and the one which may be regarded as the main support of the whole system of British production. It fuses the metals, it produces the steam which sets our machinery in motion, and, in short, it may be said to render all the resources of this country available for use.

The more important kinds of coal may be classified as follows:—1. Lignite or brown coal (see page 691).—2. Bituminous or caking coals. The most widely diffused and valuable of English coals. They are subdivided into:—*a*. Caking coal. Splinters on heating, but the fragments then fuse together in a semi-pasty mass. The chief sources of this valuable variety of coal are the Newcastle and Wigan districts. *b*. Cherry coal or soft coal. Lustre very bright; does not fuse, ignites well and burns rapidly. Glasgow, Staffordshire, Derbyshire, Nottingham, Lancashire, &c. *c*. Splint, rough, or hard coal. Black and glistening; does not ignite readily, but burns up to a clear hot fire. It constitutes the bulk of the great coal fields of North and South Staffordshire, and occurs in the Glasgow district, in Shropshire, Leicestershire, Warwickshire, &c. *d*. Cannel or parrot coal. Dense and compact, having a shelly fracture, and taking a polish-like jet. Splinters in the fire, and burns clearly and brightly. Wigan and other parts of Lancashire, West Glasgow, &c. The curious deposit at Bathgate, near Edinburgh, commonly known as 'Boghead cannel coal,' or 'Torbanehill mineral,' differs considerably from the ordinary 'cannels.'—3. Anthracite or stone-coal. The densest, hardest, and most lustrous of all kinds of pit-coal. Burns with little flame or smoke, but gives great heat. South Wales, Devonshire, &c.—4. Steam coal. Approaches nearly to anthracite. Admirably adapted for steam-vessels. South Wales, Tyne district. &c.

The quality of coal may be ascertained by either directly testing its heating power or by chemical analysis. In the investigations undertaken at the Museum of Economic Geology, under the directions of Sir H. De la Beche, and which furnished the materials for the celebrated 'Admiralty Reports,' three different methods were adopted for this purpose.[1] These consisted in—the determination of the quantity of water which a given weight of the coal was capable of converting into steam—the quantity of litharge which it was capable of reducing to the metalic state, and, lastly,—its ultimate analysis by combustion with oxide of copper. See ORGANIC SUBSTANCES.

The quantity of sulphur in coal is another matter of importance that may be determined by chemical analysis. (See SULPHUR.) The presence of more than 1% of sulphur renders coal unfit for the economical production of good light-gas, and more than 2% of sulphur renders it objectionable for use as domestic fuel. In like manner, coals containing mineral ingredients in excess are to be avoided, not merely on account of the quantity of ashes left by them, but for their tendency to vitrify upon the bars of the furnace, and to produce what is technically called 'clinkers.' The presence of much silica or alumina, and more particularly of any of the salts of lime, in 'steam coal,' is, on this account, highly objectionable.

For some further information connected with this subject, see ANTHRACITE, CHIMNEYS, COKE, FUEL, GAS, LIGNITE, OILS, (Mineral), ORGANIC SUBSTANCES, &c.

PLAICE. The *Platessa vulgaris*, a well-known flat fish, common to both the English and Dutch coasts. Its flesh is good, and easy of digestion, but more watery than that of the flounder.

PLAS'TER. (In building, &c.) See MORTAR.

Plaster of Paris. Calcined sulphate of lime. See ALABASTER, GYPSUM, LIME, &c.

PLASTER. (In pharmacy.) *Syn.* EM-

[1] See Watts's 'Dict. of Chemistry,' vol. i, page 1088.

PLASTRUM, L. Plasters (emplastra) are external applications that possess sufficient consistence not to adhere to the fingers when cold, but which become soft and adhesive at the temperature of the human body.

Plasters are chiefly composed of unctuous substances united to metallic oxides, or to powders, wax, or resin. They are usually formed, whilst warm, into ½-lb. rolls, about 8 or 9 inches long, and wrapped in paper. When required for use, a little is melted off the roll by means of a heated iron spatula, and spread upon leather, linen, or silk. The less adhesive plasters, when spread, are usually surrounded with a margin of resin plaster, to cause them to adhere.

In the preparation of plasters, the heat of a water bath, or of steam, should alone be employed. On the large scale, well-cleaned and polished copper or tinned copper pans, surrounded with iron jackets, supplied with high-pressure steam, are used for this purpose. The resins and gum resins that enter into their composition are previously purified by straining. After the ingredients are mixed, and the mass has acquired sufficient consistence by cooling, portions of it are taken into the hands, anointed with a little olive oil, and well pulled or worked until it becomes solid enough to admit of being formed into rolls. To promote the cooling of the plaster it is usual to plunge it into cold water, and to expose it to the action of the fluid by working it about under the surface, after which it is well pulled in the hands to remove the superfluous water; but this process must not, on any account, be practised on compound plasters, containing odorous substances, or substances soluble in water. These should be suffered to cool on an oiled marble slap, until sufficiently 'stiff' to be formed into rolls. Many plasters, as those of lead and resin, derive much of their whiteness and beauty from the treatment just referred to. White plasters are not, however, always the best; but they are those which are most admired, and the most sought after in trade.

Plasters are preserved by enveloping the rolls with paper, to exclude the air as much as possible, and by keeping them in a cool situation. A few, as those of belladonna and ammoniacum with mercury, are commonly placed in pots. When kept for any length of time, they are all more or less apt to become hard and brittle, and to lose their colour. When this is the case, they should be remelted by a gentle heat, and sufficient oil added to the mass to restore it to a proper consistence.

The operation of spreading plasters for use requires skill and experience on the part of the operator. Various textures are employed for the purpose, of which linen or cotton cloth, or leather, are those most generally employed. Silk and satin are used for 'court plaster.' The shape and size must be regulated by the part to which they are to be applied.

On the large scale plasters are spread by means of a 'spreading machine.'

Compound plasters are now much less frequently employed in medicine than formerly. Those principally in use are such as afford protection to sores and abraded surfaces, and give support to the parts. A few, however, which contain acrid, stimulating, and narcotic substances, and operate as rubefacients, blisters, or anodynes, are still retained in the Pharmacopœias.

Plaster of Ac'onite. *Syn.* EMPLASTRUM ACONITI, L. *Prep.* (Curtis.) Gently evaporate tincture of aconite to the consistence of a soft extract, then spread a very small portion over the surface of a common adhesive plaster, on either calico or leather. Mr. Curtis has strongly recommended this plaster in neuralgia. A little of the alcoholic extract may be employed instead of that obtained fresh from the tincture.

Adhe"rent Plaster. See SOAP PLASTER (Compound).

Adhe'sive Plaster. See RESIN PLASTER, COURT P., &c.

Ammoni'acal Plaster. *Syn.* DR. KIRKLAND'S VOLATILE PLASTER; EMPLASTRUM AMMONIÆ, E. A. HYDROCHLORATIS, L. *Prep.* Take of lead plaster, 1 oz.; white soap (shaved fine), ½ oz.; melt them together, and, when nearly cold, add of sal ammoniac (in fine powder), 1 dr. Stimulant and rubefacient. Dr. Paris, who highly recommends it in pulmonary affections, employs double the above proportion of sal ammoniac. Its efficacy depends on the gradual extrication of free ammonia by the decomposition of the sal ammoniac, on which account it is proper to renew the application of it every 24 hours.

Plaster of Ammoni'acum. *Syn.* EMPLASTRUM AMMONIACI (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L. & E.) Ammoniacum (strained), 5 oz.; dilute acetic acid (distilled vinegar), 8 fl. oz. (9 fl. oz.—Ph. E.); dissolve, and, frequently stirring, evaporate by a gentle heat, to a proper consistence.

2. (Ph. D.) Gum ammoniacum (in coarse powder), 4 oz.; proof spirit, 4 fl. oz.; dissolve by the aid of a gentle heat, and evaporate, as before.

Obs. This plaster is adhesive, stimulant, and resolvent, and is employed in scrofulous and indolent tumours, white swellings, &c. In the Ph. D. 1826 vinegar of squills was ordered instead of distilled vinegar.

Plaster of Ammoniacum with Hem'lock. *Syn.* EMPLASTRUM AMMONIACI CUM CICUTÂ, L. *Prep.* (Ph. E. 1744.) Gum ammoniacum, 8 oz.; vinegar of squills, q. s. to dissolve; hemlock juice, 4 oz.; gently evaporate, as before. In cancerous and other painful tumours. A better plan is to add 1 dr. of extract of hemlock to 1½ oz. of strained ammoniacum (previously reduced to a proper consistence with a

little distilled vinegar), melted by a very gentle heat.

Plaster of Ammoniacum with Mer'cury. *Syn.* EMPLASTRUM AMMONIACI CUM HYDRARGYRO (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L. & E.) Olive oil, 1 dr.; heat it in a mortar, add of sulphur, 8 grs.; triturate; further add of mercury, 3 oz.; again triturate, and, when the globules are extinguished, add it to ammoniacum (strained), 1 lb. (12 oz., B. P.), previously melted by a gentle heat, and mix them well together.

2. (Ph. D.) From ammoniacum plaster, 4 oz.; mercurial plaster, 8 oz.; melted together by a gentle heat, and then stirred constantly until nearly cold.

3. (*Wholesale.*) Take of mercury, 38 oz.; prepared sevum, 5 oz.; triturate, as last, and add the mixture to strained ammoniacum, 10 lbs., previously sufficiently softened by a gentle heat. Possesses a fine blue colour, and is quickly made.

Obs. This plaster cannot be rolled till considerably cooled, and neither this nor the simple plaster must be put into water. It is powerfully discutient, and is applied to indurated glands, indolent tumours, &c.

An'odyne Plaster. See OPIUM PLASTER, BELLADONNA P., &c.

Antimo"nial Plaster. *Syn.* EMPLASTRUM ANTIMONIALE, E. ANTIMONII POTASSIO-TARTRATIS, L. *Prep.* (U. C. Hosp.) By sprinkling tartar emetic, in very fine powder, on the surface of a spread Burgundy pitch (or common adhesive) plaster. It has been successfully applied to the nape of the neck, in the scarlatina of children; also the chest, in phthisis; and, with the addition of a little opium, in rheumatic affections of the joints.

Aromat'ic Plaster. *Syn.* STOMACH PLASTER; EMPLASTRUM AROMATICUM, L. *Prep.* (Ph. D. 1826.) Strained frankincense (thus), 3 oz.; bees' wax, ½ oz.; melt them together, and, when the mass has considerably healed, add, of powdered cinnamon, 6 drs.; oils of allspice and lemons, of each 2 drs. Stimulant; applied over the stomach in dyspepsia, spasms, nausea, flatulence, &c. Camphor, 1 dr., is commonly added.

Plaster of Assafœtida. *Syn.* ANTIHYSTERIC PLASTER, ANTISPASMODIC P.; EMPLASTRUM ASSAFŒTIDÆ (Ph. E.), E. ANTIHYSTERICUM, &c., L. *Prep.* (Ph. E.) From lead plaster and strained assafœtida, of each, 2 oz.; strained galbanum and bees'-wax, of each, 1 oz.; melted together. Antispasmodic; applied to the stomach or abdomen in spasms, hysteria, &c.; and to the chest in hooping-cough.

Baynton's Adhesive Plaster. *Prep.* From yellow resin, 1 oz.; lead plaster, 1 lb.; melted together. Recommended for bad legs, and other like sores.

Plaster of Belladon'na. *Syn.* EMPLASTRUM BELLADONNÆ (B. P., Ph. L. E. & D.), L. *Prep.* (Ph. L.) Soap plaster, 3 oz.; melt it by the heat of a water bath; add of extract of belladonna (deadly nightshade), 3 oz.; and keep constantly stirring the mixture until it acquires a proper consistence.

2. (Ph. E.) Resin plaster, 3 oz.; extract of belladonna, 1½ oz.; as the last.

3. (Ph. D.) Resin plaster, 2 oz.; extract of belladonna, 1 oz.

4. (B. P.) Extract of belladonna, 3; resin plaster, 3; rectified spirit, 6; rub the extract and spirit together in a mortar, and when the insoluble matter has subsided, decant the clear solution, remove the spirit by distillation or evaporation, and mix the alcoholic extract thus obtained with the resin plaster melted at the heat of a water bath, continuing the heat until with constant stirring the plaster has acquired a suitable consistence.

Uses, &c. As a powerful anodyne and antispasmodic; in neuralgia and rheumatic pains, and as an application to painful tumours. The plaster of the shops is usually deficient in extract. The following formula is in common use in the wholesale trade:—Lead plaster and resin plaster, of each, 2½ lbs.; extract of belladonna, 1¾ lb. This plaster must not be 'pulled' in water.

Berg's Antirheumat'ic Plaster. *Syn.* GOUT PAPER; EMPLASTRUM ANTIRHEUMATICUM, CHARTA ANTIRHEUMATICA, L. *Prep.* By digesting euphorbium, 2 parts, and cantharides, 1 part, (both in powder,) in rectified spirit, 10 parts, for eight days; adding to the strained liquid, black resin and Venetian turpentine, of each, 4 parts; assisting the mixture by a gentle heat. Two or three coats of the product are successively spread over the surface of thin paper. *Used* in gout and rheumatism. ('Anat. of Quackery.')

Black Diach'ylon Plaster. See COURT PLASTER.

Plaster of Black Pitch. *Syn.* EMPLASTRUM PICIS NIGRÆ, L. *Prep.* (Ph. Wirtem.) Black pitch, black resin, and bees' wax, of each, 8 parts; suet, 1 part; melted together. Rubefacient and stimulant.

Blistering Plaster. See PLASTER OF CANTHARIDES.

Bree's Antiasthmatic Plaster. *Prep.* From lead plaster, 1 oz.; olive oil, 1 dr.; melted together, and, when somewhat cooled, mixed with powdered camphor, 2 drs.; powdered opium, 1 dr., and at once spread on leather.

Brown Plaster. *Syn.* EMPLASTRUM FUSCUM, L.; ONGUENT DE LA MÈRE, Fr. This is noticed at page 862. The butter, lard, oil, suet, and wax, should be first melted together, and the heat gradually increased until they begin to smoke; the litharge is then to be sifted in, and the stirring and heat continued until the mixture assumes a brown colour; the pitch is next added, and the whole stirred for some time longer.

Brown Diach'ylon Plaster. See PLASTER OF GALBANUM.

Plaster of Bur'gundy Pitch. *Syn.* CEPHALIC PLASTER. *Prep.* [illegible]

polished, and of these 1 dozen are put into each box.

3. (Le Foret.) Galbanum plaster, 2 oz.; melt by a very gentle heat; add, sal ammoniac and saffron, of each, ½ oz.; powdered camphor, 2 oz.; and, when nearly cold, stir in of liquor of ammonia, 2 oz. Applied, spread on leather, to the corn only, as it will blister the thinner skin surrounding its base.

4. (Ph. Sax.) Galbanum plaster, 1 oz.; pitch, ½ oz.; lead plaster, 2 drs.; melt them together, and add verdigris and sal ammoniac (in fine powder), of each, 1 dr. For other formulæ, see VERDIGRIS PLASTER (*below*), and CORNS.

Plaster, Court. *Syn.* STICKING PLASTER, ISINGLASS P.; EMPLASTRUM ICHTHYOCOLLÆ, E. ADHESIVUM ANGLICUM, L. *Prep.* 1. Isinglass, 1 part; water, 10 parts; dissolve, strain the solution, and gradually add to it of tincture of benzoin, 2 parts; apply this mixture, gently warmed, by means of a camel-hair brush, to the surface of silk or sarcenet, stretched on a frame, and allow each coating to dry before applying the next one, the application being repeated as often as necessary; lastly, give the prepared surface a coating of tincture of benzoin or tincture of balsam of Peru. Some manufacturers apply this to the unprepared side of the plaster, and others add to the tincture a few drops of essence of ambergris or essence of musk.

2. (Deschamps'.) A piece of fine muslin, linen, or silk, is fastened to a flat board, and a thin coating of smooth, strained flour paste is given to it; over this, when dry, two coats of colourless gelatine, made into size with water, q. s., are applied warm. Said to be superior to the ordinary court plaster.

3. (Liston's.) Soak isinglass, 1 oz., in water, 2½ fl. oz., until it becomes swollen and quite soft; then add of proof spirit, 3½ fl. oz., and expose the mixture to the heat of hot water, frequently stirring, until the union is complete; lastly, apply four coats of the solution to the surface of oiled silk nailed to a board, by means of a soft brush.

4. (Dr. Paris.) Black silk or sarcenet is strained and brushed over 10 or 12 times with the following composition:—Gum benzoin, ½ oz.; rectified spirit, 6 oz.; dissolve. In a separate vessel dissolve of isinglass, 1 oz., in as little water as possible; strain each solution, mix them, decant the clear portion, and apply it warm. When the last coating is quite dry, a finishing coat is given with a solution of Chio turpentine, 4 oz., in tincture of benzoin, 6 oz.

Obs. The common 'COURT PLASTER' of the shops is generally prepared without using spirit, and with merely sufficient tincture of benzoin, or other aromatic, to give it an agreeable odour. Formerly, black silk or sarcenet was exclusively employed as the basis of the plaster, but at the present time checkered silk is also much in favour. 'FLESH-COLOURED COURT PLASTER' is likewise fashionable. 'TRANSPARENT COURT PLASTER' is prepared on oiled silk. 'WATERPROOF COURT PLASTER' is simply the common plaster which has received a thin coating of pale drying oil on its exposed surface. The FINEST COURT PLASTER of the West-end houses is now prepared on gold-beaters' skin (or the prepared membrane of the cæcum of the ox), one side of which is coated with the isinglass solution, as above, and the other with pale drying oil or a solution of either gutta percha or caoutchouc in chloroform, or in bisulphuret of carbon.

Plaster of Cro'ton Oil. *Syn.* EMPLASTRUM CROTONIS, E. OLEI TIGLII, L. *Prep.* (Bouchardat.) To lead plaster, 4 parts, melted by a very gentle heat, add of croton oil, 1 part. A powerful counter-irritant; it also generally acts powerfully on the bowels.

Plaster of Cum'in. *Syn.* EMPLASTRUM CUMINI (Ph. L.), E. CYMINI, L. *Prep.* 1. (Ph. L.) Burgundy pitch, 3 lbs.; bees' wax, 3 oz.; melt, add of cumin seed, caraways, and bay-berries, of each (in powder), 3 oz.; next add of olive oil and water, of each, 1½ fl. oz., and evaporate to a proper consistence.

2. (Wholesale.) From yellow resin, 7 lbs.; bees' wax and linseed oil, of each, ½ lb.; powdered cumin and caraway seeds, of each, 7 oz.; mix.

Obs. This is a mere revival of the formula of the Ph. L. 1724. In that of the Ph. L. 1788 no water was ordered, and the powders simply stirred into the melted mass shortly before it cools; the common practice in all laboratories.

Cumin plaster is carminative, stimulant, and discutient. It is applied over the regions of the stomach and bowels in colic, dyspepsia, and flatulence, and is also applied to indolent tumours. It has long been a favourite remedy with the lower classes.

Delacroix's Agglu'tinative Plaster. *Syn.* EMPLASTRUM GLUTINANS SANCTI ANDREÆ À CRUCE, E. PICIS CUM ELEMI; L. EMPLÂTRE D'ANDRÉ LE LA CROIX, Fr. *Prep.* (P. Cod.) From Burgundy pitch, 25 parts; gum elemi, 6 parts; Venice turpentine and oil of bays, of each, 3 parts; melted together, and strained.

Plaster, Diach'ylon. See LEAD PLASTER.

Plaster, Diapal'ma. See PALM PLASTER.

Plaster of El'emi. *Syn.* EMPLASTRUM ELEMI, L. *Prep.* From wax plaster, 3 parts; gum elemi, 1 part; melted together by a gentle heat. Stimulant and discutient. *Used* for issues, &c.

Plaster of Euphor'bium. *Syn.* EMPLASTRUM EUPHORBII, L. *Prep.* 1. (Guy's Hosp.) Burgundy pitch plaster, 8 oz.; melt, and add of euphorbium (in powder), 1 dr.

2. (CAPUCHIN PLASTER—Ph. Wirt.) Burgundy pitch and bees' wax, of each, 3 oz.; Venice turpentine, 1 oz.; melt them together, add, gum ammoniacum, olibanum, mastic, and lapis calaminaris, of each, 1 oz.; euphorbium,

possesses the property of condensing gases, more especially oxygen, into its pores, and afterwards giving it out to various oxidisable substances. When placed in contact with a solution of formic acid, it converts it, with copious effervescence, into carbonic acid; alcohol, dropped upon it, becomes changed by oxidation into acetic acid, the rise of temperature being often sufficient to cause inflammation; exposed to a red heat, it shrinks in volume, assumes the appearance of common spongy platinum, and, for the most part, loses these peculiarities. That prepared with zinc explodes, when heated, like gunpowder. The spongy platinium is obtained by igniting the ammonium platinic chloride at a red heat.

The salts of platinum are recognised as follows:—Sulphuretted hydrogen throws down from neutral and acid solutions of the platinic salts a blackish-brown precipitate, which is only formed after a time in the cold, but immediately on heating the liquid. Ammonium sulphide also gives a blackish-brown precipitate, which completely redissolves in a large excess of the precipitant, provided the latter contains an excess of sulphur.

Chloride of ammonium and chloride of potassium give yellow crystalline precipitates, insoluble in acids, but soluble in excess of the precipitate, upon the application of heat, and decomposable by heat, with production of spongy platinum. Ammonia and potassium hydrate also give similar precipitates in solutions previously acidulated with hydrochloric acid.

Estim. This may be effected by throwing down the metal under the form of chloride of ammonium and platinum, which, after being washed on a filter with a little weak spirit to which a little of the precipitate has been added, and afterwards with the spirit alone, may be carefully dried at 212° Fahr., and weighed. Or, the precipitate may be ignited in a platinum crucible, and weighed under the form of a spongy platinum. 193·25 grs. of the platinic and ammonium chlorides are equivalent to 98·75 grs. of metallic platinum.

Uses. Platinum is valuable for the formation of crucibles, capsules, and other utensils or instruments intended to be exposed to a strong heat, or to the action of acids. Platinic chloride and the platinic and sodium chloride are much used in chemical analysis. Both of these are also used in medicines with the same intentions, and in the same doses, as the corresponding salts of gold. These compounds are poisonous. The antidotes and treatment are similar to those described under GOLD.

Concluding remarks.—Daville and Debray have recently introduced a method of refining platinum, which has already done much to extend the useful applications of the metal. The process consists in submitting the crude metal to the action of an intensely high temperature, obtained by the combustion of hydrogen (or coal-gas) with oxygen, in a crucible of lime. By this means large quantities of platinum (50 lbs. or more) can be kept fused until the sulphur, phosphorus, arsenic, and osmium, generally occurring in crude platinum, are oxidised and volatilised, and the iron and copper are oxidised and absorbed by the lime forming the crucible. At the International Exhibition of 1862 an ingot of pure platinum, weighing over 2 cwt., was exhibited by Messrs. Johnson & Mathey, as an illustration of the practical results of this process.

Platinic Chloride. $PtCl_4$. *Syn.* BICHLORIDE OF PLATINUM, CHLORIDE OF PLATINUM, PERCHLORIDE OF P.; PLATINI BICHLORIDUM (Ph. L.), L. *Prep.* By dissolving platinum in nitro-hydrochloric acid, and evaporating the solution to dryness at a gentle heat. *Prop., &c.* Reddish-brown, deliquescent, and very soluble in both water and alcohol, yielding orange-coloured solutions. It combines with a variety of metallic chlorides to form 'double salts.' *Used* as a test in chemical analysis, and as an alterative in secondary syphilis, &c. —*Dose.* $\frac{1}{10}$ to $\frac{1}{4}$ gr., dissolved in distilled water, or made into a pill with syrup and liquorice powder. Some persons prescribe much larger doses, but unsafely. Hoefer recommends an ointment made with it as an application to indolent ulcers. In doses of 5 grs. and upwards, it acts as a violent caustic poison. This last salt is the 'chloride of platinum' of the shops, and the one used in the arts and medicine. It forms one of the tests included in the 'Appendix' to the Ph. L.

Platinic-Ammonium Chloride. $Pt(NH_4)_2Cl_6$, or $PtCl_4 2NH_4Cl$. *Syn.* AMMONIO CHLORIDE OF PLATINUM, PLATINO-CHLORIDE OF AMMONIUM. *Prep.* A solution of chloride of ammonium is added to a strong solution of platinic chloride, and the precipitate washed with dilute alcohol.

Prop. Minute, transparent, yellow octahedral crystals; very feebly soluble in water, less so in dilute alcohol, and insoluble in acids; heat converts it into spongy platinum.

Platinic-Potassium Chloride. PtK_2Cl_6, or $PtCl_4 2KCl$. *Syn.* PLATINO-CHLORIDE OF POTASSIUM, POTASSIO-CHLORIDE OF PLATINUM. *Prep.* A bright yellow, crystalline precipitate, formed whenever solutions of the chlorides of platinum and of potassium are mixed; or a salt of potassium, recrystallated with a little hydrochloric acid, is added to platinic chloride. It appearance, solubility, &c., it closely resembles ammonio-chloride of platinum.

Platinic-Sodium Chloride. $PtNa_2Cl_6$, or $PtCl_4 2NaCl$. *Syn.* CHLORIDE OF PLATINUM AND SODIUM, SODIO-CHLORIDE OF PLATINUM, PLATINO-BICHLORIDE OF SODIUM; PLATINI ET SODII CHLORIDUM, PLATINI SODIO-CHLORIDUM, &c., L. *Prep.* (Redwood.) Platinic chloride, 17 parts; chloride of sodium, 6 parts; dissolve the two salts separately in water, q. s., mix the solutions, and evaporate, that crystals may form. The crystals are large, transparent,

and of a yellow-red colour.—*Dose.* $\frac{1}{12}$ to $\frac{1}{2}$ gr.; in the same cases as the bichloride.

Platinous Oxide. PtO. *Syn.* OXIDE OF PLATINUM. *Prep.* By heating to below redness the platinic chloride and digesting with hydrate of potassium the residue.

Prop., &c. A black powder, soluble in excess of alkali, and freely so in the acids, forming brown solutions of the platinous salts. These are distinguished from solutions of the platinic salts by not being precipitated by chloride of ammonium. Platinous oxalate, in fine copper-coloured needles, may be obtained by heating platinic oxide in a solution of oxalic acid.

Platinic Oxide. PtO_2. *Syn.* BINOXIDE OF PLATINUM. *Prep.* 1. By exactly decomposing the platinic sulphate with nitrate of barium, and adding pure hydrate of sodium to the filtered solution, so as to precipitate only half the oxide. (Berzelius.)—2. By boiling platinic chloride with hydrate of sodium, in considerable excess, and then adding acetic acid.

Prop., &c. As the hydrate ($Pt(HO)_4$), it is a bulky brownish powder; this, when gently heated, becomes black and anhydrous. It forms salts with the acids, and combines with some of the bases. The salts have a red or yellow colour, and a remarkable tendency to form double salts with the alkaline salts.

Obs. Both the oxides of platinum are reduced to the metallic state on ignition.

Platinum, Spongy. *Prep.* 1. By heating ammonio-chloride of platinum to redness.

2. Crude bichloride of platinum and chloride of ammonium are separately dissolved in proof spirit, and the one solution added to the other as long as a precipitate forms; this is collected, and, whilst still moist, formed into little balls or pieces, which are then dried, and gradually heated to redness.

Prop., &c. These have been noticed above. Small balls of spongy platinum are used for the hydrogen instantaneous-light lamp (Dobereiner's lamp); but they are apt to absorb moisture from the atmosphere, and then lose their power of inflaming hydrogen, until they are re-dried and heated.

PLUG'GING. The introduction of a mass of lint, sponge, or other suitable material, into a wound or cavity, with the intention of arresting hæmorrhage. It is now seldom adopted, except in cases of bleeding from the nose, and that only after more approved methods have failed.

PLUM. A name applied to several varieties of the *Prunus domesticus* (Linn.), or wild plum. Among the cultivated varieties, the damson, greengage, French plum, magnum bonum or Mogul p., mirabelle p., Orleans p., and prune, are those best known. Grocers' 'plums' are raisins, or dried grapes.

PLUMBA'GO. *Syn.* GRAPHITE, BLACK-LEAD. One of the native forms of carbon. It contains from 95 to 100% of pure carbon; has a metallic lustre, and conducts electricity nearly as well as the metals. It was formerly regarded as a carbide of iron, but the iron generally found is now known to be merely in a state of mixture. There are two distinct varieties of graphite—crystallised or foliated graphite, obtained chiefly from Ceylon; and amorphous graphite (the ordinary plumago or black-lead), largely imported to this country from Germany. The Borrowdale mine in Cumberland, from which the finest black-lead was formerly derived, is now nearly exhausted. The foliated graphite of Ceylon and other parts is the principal material employed for making plumbago crucibles and other fire-resisting goods. The amorphous graphite is used for making black-lead pencils, polishing powder for stoves and grates ('lustre,' 'servant's friend,' &c.), and to diminish friction in heavy machinery (anti-friction powder). Its powder is also used to give conducting surfaces to articles on which it is desired to deposit copper by the electrotype. In medicine, plumbago has been used with apparent advantage, in herpes and several chronic skin diseases—externally, as an ointment made with four times its weight of lard; and internally, made into pills.

Purification. For medical and chemical use, graphite may be treated as follows:—

1. (Dumas and Stas.) Heat it to redness with caustic potassa, in a covered crucible, then wash it well with water, boil it in nitric acid, and in aqua regia, again wash it with water, dry it, and expose it at a white heat to a stream of dry chlorine gas; lastly, wash it with water, and again heat it to dull redness. In analysis.

2. (Ph. Bor.) Pure native plumbago, 1 lb., is boiled in water for 1 hour, then drained, and digested, for 24 hours, in a mixture of water, 8 oz.; nitric acid and hydrochloric acid, of each, 2 oz.; it is, lastly, well washed with water, and dried.

3. (Brodie's patent.) This process is only applicable to the hard varieties of graphite, as that of Ceylon. It consists in introducing coarsely powdered graphite, previously mixed with $\frac{1}{12}$th of its weight of chlorate of potassa, into 2 parts of concentrated sulphuric acid, which is heated in a water bath until the evolution of acid fumes ceases. The acid is then removed by water, and the graphite dried. Thus prepared, this substance, when heated to a temperature approaching a red heat, swells up to a voluminous mass of finely divided graphite. This powder, which is quite free from grit, may be afterwards consolidated by pressure, and used for making pencils or other purposes.

PLUM'BIC ACID. Binoxide of lead occasionally receives this name on account of its combining with some of the bases to form compounds which have been called plumbates.

PLUM'BUM COR'NEUM. See CHLORIDE OF LEAD.

PLUM'OSE AL'UM. The old name of the silky amianthine crystals of the double sulphate of aluminum and iron occasionally found on alum slate. Asbestos has also been so called.

PLUNKET'S CANCER REMEDY. See PLUNKET'S CAUSTIC.

POACH'ING. Amongst cooks, a peculiar method of cooking small articles by a slight boiling or stewing process.

POACHED EGGS are prepared by breaking them into a small saucepan or stewpan containing about ½ a pint of boiling water, to which a teaspoonful of common salt, and, occasionally, a little vinegar, is added, and gently simmering them for 3 or 4 minutes, or until sufficiently firm to bear removal with a spoon or 'slice.' Another method is to employ melted butter, instead of water, and to dress them either with or without stirring.

Poached eggs are commonly served on toast, or with fried ham or bacon, with spice or vegetable seasoning at will. They form an excellent breakfast, or 'make-shift dinner.'

PODOPH'YLLIN. *Syn.* RESIN OF PODOPHYLLUM; RESINA PODOPHYLLI (B. P.). Obtained from the root of the *Podophyllum peltatum* (Linn.), or may-apple, a substance officinal in the Ph. U. S.

Prep. 1. The alcoholic extract of may-apple is digested in cold ether, to remove fatty matter, and is then dissolved in rectified spirit; the solution is decoloured with a little animal charcoal, and filtered; it is, lastly, allowed to evaporate spontaneously.

2. (B. P.) Podophyllum, in coarse powder, 1 ℔; rectified spirit, 3½, or a sufficiency; distilled water and hydrochloric acid, of each a sufficiency; exhaust the podophyllum by percolation with the spirit; distil over the spirit; slowly pour the liquid remaining after the distillation of the tincture into three times its volume of water acidulated with $\frac{1}{24}$th part of its weight of hydrochloric acid, constantly stirring; let it stand 24 hours; collect the resin which falls, wash on a filter with distilled water, and dry in a stove. Cholagogue purgative; used as a substitute for calomel.—*Dose.* ½ to ½ gr., or even 2 grs. It is best to begin with ½ gr. (Squire.)

Prop., &c. An amorphous, grayish-white mass, soluble in alcohol, and slightly soluble in water. It is a safe and certain cathartic, superior in activity to resin of jalap.—*Dose.* ½ to 3 grs. See EXTRACT OF MAY-APPLE.

PODOPHYLLUM ROOT. *Syn.* PODOPHYLLI RADIX (B. P.). The dried rhizome of the *Podophyllum peltatum*; imported from North America. Active and certain cathartic.—*Dose.* 10 to 20 grs.

POIS'ON. *Syn.* TOXICUM, VENENUM, L. Any substance which, when swallowed, or applied in any particular way to the living body, disturbs, suspends, or destroys one or more of the vital functions. In sufficient quantity, or in small doses long continued, the common result of the administration of deleterious substances is either impaired vitality or death.

Poisons are classified by Orfila under four heads:—

1. IRRITANT POISONS, or such as inflame or corrode the parts with which they come in contact. Their chief effects are upon the alimentary canal, with, sometimes, ulceration of the tongue, fauces, and œsophagus. Nausea, vomiting, stomachic and intestinal pains, extreme anxiety and anguish, quick and feeble pulse, cold and clammy skin, and mucous, bilious, or bloody diarrhœa, are among the common leading symptoms. Arsenic, blue vitriol, verdigris, strong acids and alkalies, drastic purgatives, and numerous other substances, belong to this class.

2. NARCOTIC or STUPEFYING POISONS, or such as paralyse the functions of the nervous system, and produce headache, vertigo, confused vision, delirium, stupor, convulsions, coma, &c. It includes morphia, opium, henbane, oil of bitter almonds, prussic acid, &c.

3. NARCOTICO-ACRID POISONS, which produce at the same time narcotism and irritation of the parts which they touch. Alcohol, belladonna, cocculus Indicus, colchicum, foxglove, hemlock, poisonous fungi, strychnine, tobacco, veratrine, &c., are of this kind.

4. SEPTIC or PUTREFIANT POISONS, including all those which alter, liquefy, or cause the putrescence of the fluids of the body; as sulphuretted hydrogen, the gas from sewers and cesspools, putrefying organic matter, miasmata, &c.

The treatment of cases of poisoning varies with the substance occasioning it; and, with the proper antidotes, will be found noticed under the names of the various substances that exert a deleterious action on the animal body. It may here, however, be useful to remark, that in almost all cases of poisoning copious vomiting should be excited as soon as possible by the administration of a powerful emetic; its action being promoted by copious draughts of lukewarm water, tickling the throat with the finger, &c. Should this fail, but not otherwise, the stomach-pump should be had recourse to. The vomiting should be kept up and the stomach well washed out with bland albuminous or mucilaginous liquids, such as milk-and-water, barley water, sweetened water, flour-and-water, or any similar matters, as circumstances may afford. After the vomiting a brisk aperient draught, or clyster, may be administered, and nervous irritability or exhaustion allayed by means of ether, opium, wine, or warm spirit-and-water, as the case may require. Even in a suspected case of poisoning, when proper medical advice is not at hand, an emetic should be immediately taken or administered. Vomiting may be, in general, produced very promptly by merely swallowing a cupful of

the pommade should be opaque and white, it is assiduously stirred or beaten with a glass or wooden knife, or spatula, until it concretes; but when it is desired that it should appear transparent or crystalline, it is allowed to cool very slowly, and without being disturbed. To prevent the accession of rancidity, a little benzoic acid, gum benzoin, or nitric ether, may be added to the fat, whilst in the liquid state, as noticed under FAT and OINTMENT. Sometimes a small portion of white wax or bees' wax (according to the intended colour of the product) is melted with the fat, to increase its solidity. Some parties employ a few grains of powdered citric acid per ounce, in a like manner, with the intention of increasing the whiteness of the compound; but the practice is not to be commended, as pommades so prepared prove injurious to the hair.

The French perfumers, who are celebrated for the variety and excellence of their pommades, divide them into four classes:—

1. POMMADES BY INFUSION. These are made by gently melting in a clean pan, over a water bath, 2 parts of hog's lard, and 1 part of beef suet (both of the finest quality, and carefully 'rendered'), and adding thereto 1 part of the given flowers, previously carefully picked and separated from foreign matter; or, if the odorous substance is a solid, then coarsely bruised, but not reduced to fine powder. The mixture is next digested at a very gentle heat for from 12 to 24 hours, with occasional stirring, the vessel being kept covered as much as possible during the whole time. The next day the mixture is reheated, and again well stirred for a short time, after which it is poured into canvas bags, and these being securely tied, are submitted to powerful pressure, gradually increased, in a screw or barrel press. This operation is repeated with the same fat and fresh flowers, several times, until the pommade is sufficiently perfumed. A good pommade requires thrice to six times its weight in flowers to be thus consumed; or of the aromatic barks and seeds a corresponding proportion. The pommades of cassia, orange flowers, and several others kept by the French perfumers, are prepared in this manner.

2. POMMADES BY CONTACT (ENFLEURAGE). These are made by spreading, with a pallette knife, simple pommade (made with lard and suet as above) on panes of glass or pewter plates, to the thickness of a finger, and sticking the surface all over with the sweet-scented flowers. These last are renewed daily for one, two, or three months, or until the pommade has become sufficiently perfumed. On the large scale, the panes are placed in small shallow frames, made of four pieces of wood nicely fitted together, and are then closely piled one upon another. On the small scale, pewter plates are generally used, and they are inverted one over the other. In some of the perfumeries of France many thousands of frames are employed at once. The pommades of jasmin, jonquil, orange-flowers, narcissus, tuberose, violet, and of some other delicate flowers, are prepared in this manner.

3. POMMADES BY ADDITION. These are prepared by simply adding the fragrant essences or essential oils, in the required quantity, to the simple pommade of lard and suet to produce the proper odour. In this way the pomades of bergamotte, cédrat, cinnamon, lemons, lemon thyme, lavender, limettes, marjoram, Portugal, roses, rosemary, thyme, verbena, and about 40 others kept by the Parisian perfumers, are made.

4. MIXED POMMADES. Of these a great variety exists, prepared by the addition of judicious combinations of the more esteemed perfumes to simple pommade; or, by the admixture of the different perfumed pommades, whilst in the semi-liquid state. (See *below*.)

The COLOURED POMMADES derive their respective tints from tinctorial matter added to the melted fat before perfuming it. GREEN is given by gum guaiacum (in powder), or by the green leaves or tops of spinach, parsley, lavender, or walnut;—RED, by alkanet root and carmine;—YELLOW and ORANGE, by annatto or palm oil;—WHITE POMMADES are made with mutton suet, instead of beef suet. The BROWN and BLACK hard pomatums, vended under the name of 'COSMETIQUE,' are noticed at page 372. A few compound pommades are used as skin cosmetics.

Pommade. *Syn.* POMATUM. *Prep.* 1 (PLAIN POMATUM, SIMPLE P.)—*a*. From lard 2 lbs.; beef suet, 1 lb.; carefully rendered a above. The ordinary consistence for tem perate climates.

b. Lard and suet, equal parts. For warm climates. Both may be scented at will.

2. (SCENTED POMATUM.)—*a*. Plain pomatum 1 lb.; melt it by the least possible degree o heat, add of essence of lemon or essence o bergamot, 3 drs., and stir the mixture until it concretes. This forms the ordinary 'pomatum' of the shops.

b. Plain pomatum, 1½ lb.; essence of bergamot, 1½ dr.; essence of lemon, 1 dr.; oils of rosemary and cassia, or each, ½ dr.; oil of cloves, 20 drops. More fragrant than the last.

Pommade, Castor Oil. *Prep.* 1. From castor oil, 1 lb.; white wax, 4 oz.; melt them together, then add, when nearly cold, of essence of bergamot, 3 drs.; oil of lavender (English), ½ dr.; essence of ambergris, 10 drops. Supposed to render the hair glossy.

2. (Crystallised.) From castor oil, 1 lb.; spermaceti, 3 oz.; melt them together, by a gentle heat, add, of essence of bergamot, 3 drs. oil of verbena, lavender, and rosemary, of each, ½ dr.; pour it into wide-mouthed glass bottles, and allow it to cool very slowly and undisturbed.

Pommade, Cazenave's. *Prep.* From prepared beef marrow, 4 oz.; tincture of cantharides (P. Cod.), 3 to 4 drs.; powdered cin-

namon, ½ oz.; melt them together, stir until the spirit has, for the most part, evaporated, then decant the clear portion, and again stir it until it concretes. Recommended as a remedy for baldness and weak hair. It is to be used night and morning; the head being washed with soap-and-water, and afterwards with salt-and-water, before applying it. Dr. Cattell scents it with the oils of origanum and bergamot, instead of cinnamon.

Pommade Collante. *Prep.* 1. Oil of almonds, 3 oz.; white wax, ¾ oz.; melt them together, and add, of tincture of mastic (strong), 1 oz.; essence of bergamot, ½ dr. *Used* to stiffen the hair, and keep it in form.

2. Burgundy pitch (true), 3 oz.; white wax, 2 oz.; lard, 1 oz.; melt, and, when considerably cooled, stir in, of tincture of benzoin, 1 oz.; essence of bergamot, ½ dr. *Used* to fasten false curls.

Pommade, Cowslip. *Prep.* From plain pommade, 2 lbs.; essence of bergamot, 3 drs.; essence of lemon and essence of orange peel, of each, 1 dr.; huile au jasmin and essence de petit grain, of each, ½ dr.; essence of ambergris, 6 drops.

Pommade, Crystallised. *Prep.* From olive oil and spermaceti, as crystallised castor oil pommade, with scent at will.

Pommade d'Alyon. Ointment of nitric acid (page 853).

Pommade de Beaute. *Prep.* From oil of almonds, 2 oz.; spermaceti, 2 drs.; white wax, 1½ dr.; glycerin, 1 dr.; balsam of Peru, ½ dr.; mixed by a gentle heat. *Used* as a skin cōsmetic, as well as for the hair.

Pommade de Casse. *Prep.* From plain pommade, 1 lb.; palm oil, ½ oz.; melt, pour off the clear, and add oil of cassia and huile au jasmin, of each, 1 dr.; neroli, 20 drops; oil of verbena or lemon grass, 15 drops; otto of roses, 5 drops; and stir until nearly cold. Very fragrant.

Pommade d'Hebe. *Prep.* To white wax, 1 oz., melted by a gentle heat, add, of the juice of lily bulbs and Narbonne honey, each, 2 oz.; rose water, 2 drs.; otto of roses, 2 drops. Applied night and morning to remove wrinkles.

Pommade de Ninon de l'Enclos. *Prep.* Take of oil of almonds, 4 oz.; prepared lard, 3 oz.; juice of houseleek, 3 fl. oz. *Used* chiefly as a skin cosmetic. Said to be very softening and refreshing.

Pommade Divine. *Prep.* 1. Washed and purified beef marrow, 2 lbs.; liquid styrax, cypress wood, and powdered orris root, of each, 2 oz.; powdered cinnamon, 1 oz.; cloves and nutmegs, of each (bruised), ½ oz.; digest the whole together by the heat of a water bath for six hours, and then strain through flannel.

2. Plain pommade, 2 lbs.; essence of lemon and bergamot, of each, 2 drs.; oils of lavender and origanum, of each, 1 dr.; oils of verbena, cassia, cloves, and neroli, of each, 12 drops; huile au jasmin, 3 drs.; essence of violets, ½ oz.

Pommade, Dupuytren's *Prep.* 1. Take of prepared beef marrow, 12 oz.; melt, add of baume nerval (see page 852), 4 oz.; Peruvian balsam and oil of almonds, of each, 3 oz.; and, lastly, of alcoholic extract of cantharides, 36 grs.; (dissolve in) rectified spirit, 3 fl. drs. This is the original formula for this celebrated pommade. The following modifications of it are now commonly employed:—

2. (Cap.) Beef marrow, 2 oz.; alcoholic extract of cantharides, 8 grs.; rose oil, 1 dr.; essence of lemons, 30 drops.

3. (Guibourt.) Beef marrow and 'baume nerval' (page 852), of each, 1 oz.; rose oil, 1 dr.; alcoholic (or acetic) extract of cantharides, 6 grs.; (dissolved in) rectified spirit, q. s. These compounds are *used* to promote the growth of the hair and to prevent baldness, for which purpose they are usually coloured and scented according to the taste of the manufacturer. To be useful, they should be well rubbed on the scalp, at least once daily, for several weeks, and the head should be occasionally washed with soap-and-water.

Pommade, East India. *Prep.* Take of suet, 3 lbs.; lard, 2 lbs.; bees' wax (bright), ½ lb.; palm oil, 2 oz.; powdered gum benzoin, 3 oz.; musk (previously triturated with a little lump sugar), 20 grs.; digest the whole together in a covered vessel, by the heat of a water bath, for 2 hours, then decant the clear portion, and add, of essence of lemon, ½ oz.; oil of lavender, ¼ oz.; oils of cloves, cassia, and verbena, of each, ½ dr. A favourite pommade in the East Indies.

Pommade, Hard. *Syn.* HARD POMATUM, ROLL P. *Prep.* 1. Take of beef suet, 2 lbs.; yellow wax, ½ lb.; spermaceti, 1 oz.; powdered benzoin, ¼ oz.; melt them together, then add, of oil of lavender, 2 drs.; essence of ambergris, ½ dr. Before it concretes pour it into moulds of paper or tin foil.

2. Mutton suet and lard, of each, 1 lb.; white wax, 6 oz.; melt, and add, of essence of lemon, 2 drs.; oil of cassia, ½ dr. Other perfumes may be employed at will.

Hard pomatums are used to gloss and set the hair. They act both as 'pommade' and 'fixateur.' See COSMETIQUE.

Pommade, Macassar. *Prep.* From castor oil, 5 oz.; white wax, 1 oz.; alkanet root, ½ dr.; heat them together until sufficiently coloured, then strain, and add, oil of origanum and oil of rosemary, of each, 1 dr.; oil of nutmeg, ½ dr.; otto of roses, 10 drops. Said to be equal in efficacy to MACASSAR OIL.

Pommade, Marechal. Plain pommade scented by digesting it with *poudre marechale*.

Pommade, Marrow. *Syn.* MARROW POMATUM. *Prep.* From prepared beef marrow, ½ lb.; beef suet, ¼ lb.; palm oil, ½ oz.; melted together and scented at will.

Pommade, Millefleur. *Prep.* From plain pommade scented with a mixture of essence of

lemon and essence of ambergris, each, 4 parts; oil of lavender, 2 parts; oil of cloves and essence de petit grain, of each, 1 part; or with other like perfumes so proportioned to each other that no one shall predominate. Much esteemed.

Pommade, Roll. See HARD POMMADE.

Pommade, Roman. See *below*.

Pommade, Rose. *Syn.* ROSE POMATUM. This is plain pommade or hard lard, which has been well beaten with eau de rose, or, better still, scented with otto of roses. It is sometimes tinged with alkanet root.

Pommade, Soft. Plain pomatum scented at will.

Pommade, Soubeiran's. *Prep.* From beef marrow, 1½ oz.; oil of almonds, ½ oz.; disulphate of quinine, 1 dr. Recommended for strengthening and restoring the hair.

Pommade, Vanilla. *Syn.* ROMAN POMMADE, POMMADE À LA VANILLE, POMMADE ROMAIN. From plain pommade and pommade à la rose, of each, 12 lbs.; powdered vanilla, 1 lb.; heat them together in a water bath, stir constantly for 1 hour, let it settle for another hour, decant the clear, and add, oil à la rose, 2½ lbs.; bergamot, 4 oz.

POPPY. *Syn.* WHITE POPPY; PAPAVER SOMNIFERUM, L. The capsules or fruit ("mature"—Ph. L.; "not quite ripe"—Ph. E.) form the poppies or poppy-heads of the shops (PAPAVERIS CAPSULÆ; PAPAVER—Ph. L. E. & D.). They are anodyne and narcotic, similar to opium, but in only a very slight degree. The seeds (MAW SEED), which are sweet, oleaginous, and nutritious, are used as a substitute for almonds in confectionery and mixtures, and are pressed for their oil. See EXTRACT, OPIUM, and SYRUP.

Poppy, Red. *Syn.* CORN POPPY, CORN ROSE; PAPAVER RHŒAS, L. The fresh petals or flowers (RHŒADOS PETALA; RHŒAS—Ph. L. E. & D.) are reputed pectoral, but are chiefly employed on account of their rich colour. See SYRUP.

POP'ULIN. *Syn.* POPULINUM, L. A peculiar neutral, crystallisable substance, formerly supposed to be an alkaloid, found, associated with SALICIN, in the root-bark of the *Populus tremula* (Linn.), or aspen.

Prep. Concentrate the decoction by a gentle heat, and set it aside in a cool situation to crystallise; dissolve the crystals which are deposited in rectified spirit, decolour them by digestion with animal charcoal, filter, and again crystallise. To render them still purer, they may be redissolved and crystallised a second and a third time, if necessary.

Prop., &c. It resembles salicin in appearance and solubility, but, unlike that substance, has a penetrating sweet taste. Dilute acids convert it into benzoic acid, grape sugar, and saliretin; and with a mixture of sulphuric acid and bichromate of potassa it yields a large quantity of salicylous acid. It appears to be tonic, stomachic, and febrifuge.

POR'CELAIN. See POTTERY.

PORK. The value of pork as an article diet is well known. That from the young a properly fed animal is savoury, easy of dige tion, and, when only occasionally employe highly wholesome; but it is apt to disagr with some stomachs, and should, in such cas be avoided. To render it proper for food, should be thoroughly but not overcooke When salted, it is less digestible. The fr quent use of pork is said to favour obesit and to occasion disorders of the skin, especial in the sedentary.

POR'PHYRIZED, PORPHORIZA'TIO Words coined by recent pharmaceutical writer and possessing similar meanings to LEVIGATE and LEVIGATION.

PORPHY'ROXIN. A neutral crystallisab substance discovered by Merck in opium. is soluble in both alcohol and ether, insolub in water, and is characterised by assuming purplish-red colour when heated in dilu hydrochloric acid.

PORRI'GO. See RING-WORM.

POR'TER. This well-known beverage, n the common drink of the inhabitants of Lo don, by whom it is generally termed 'bee originated with a brewer named Harwood, 1722. Previously to this date, 'ale,' 'be and 'twopenny,' constituted the stock in tr of the London publican, and were dru either singly or together, under the names 'half-and-half' or 'three threads,' for wh the vendor was compelled to have recourse two or three different casks, as the case mi demand. The inconvenience and trouble t incurred led Mr. Harwood to endeavour produce a beer which should possess the flav of the mixed liquors. In this he succeeded well that his new beverage rapidly sup seded the mixtures then in use, and obtaine general preference among the lower classes the people. At first this liquor was cal 'entire' or 'entire butt,' on account of being drawn from one cask only, but it aft wards acquired, at first in derision, the n familiar name of 'porter,' in consequence its general consumption among porters a labourers. The word 'entire' is still, howe frequently met with on the signboards taverns about the metropolis.

The characteristics of pure and wholesc porter are its transparency, lively dark bro colour, and its peculiar bitter and slig burnt taste. Originally, these qualities w derived from the 'high-dried malt,' with wh alone it was brewed. It is now generally not entirely, made from 'pale' or 'amber ma mixed with a sufficient quantity of 'pat or 'roasted malt' to impart the necess flavour and colour. Formerly, this liquor 'vatted' and 'stored' for some time bef being sent out to the retailer, but the cha in the taste of the public during the quarter of a century in favour of the mil new porter has rendered this unnecessary.

best 'draught porter,' at the time of its consumption, is now only a few weeks old. In this state only would it be tolerated by the modern beer-drinker. The old and acid beverage that was formerly sold under the name of porter would be rejected at the present day, as 'hard' and unpleasant, even by the most thirsty votaries of malt liquor.

The 'beer' or 'porter' of the metropolitan brewers is essentially a weak mild ale, coloured and flavoured with roasted malt. Its richness in sugar and alcohol, on which its stimulating and nutritive properties depend, is hence less than that of an uncoloured mild ale brewed from a like original quantity of malt. For pale malt is assumed to yield 80 to 84 lbs. of saccharine per quarter; whereas the torrefied malt employed by the porter-brewers only yields 18 to 24 lbs. per quarter, and much of even this small quantity is altered in its properties, and is incapable of undergoing the vinous fermentation. In the manufacture of porter there is a waste of malt which does not occur in brewing ale; and the consumer must, therefore, either pay a higher price for it or be content with a weaker liquor.

The hygienic properties of porter, for the most part, resemble those of other malt liquors. Some members of the faculty conceive that it is better suited to persons with delicate stomachs and weak digestion than either ale or beer. That there may be some reason for this preference, in such cases, we are not prepared to deny, but undoubtedly, when the intention is to stimulate and nourish the system, ale is preferable. Certain it is, however, that the dark colour and strong taste of porter render its adulteration easier than that of ale, whilst such adulteration is more difficult of detection than in the paler varieties of malt liquors. "For medical purposes, 'bottled porter' (CERVISIA LAGENARIA) is usually preferred to 'draught porter.' It is useful as a restorative in the latter stages of fever, and to support the powers of the system after surgical operations, severe accidents, &c." (Pereira, ii, 982.) When 'out of condition' or adulterated, porter, more than perhaps any other malt liquor, is totally unfit for use as a beverage, even for the healthy; and when taken by the invalid, the consequences must necessarily be serious. Dr. Ure says that pure porter, "when drank in moderation, is a far wholesomer beverage for the people than the thin acidulous wines of France and Germany."

The manufacture of porter has been described in our article on BREWING, and is also referred to above. It presents no difficulty or peculiarity, beyond the choice of the proper materials. A mixture of 'brown' and 'black malt' is thought to yield a finer flavour and colour to the pale malt that gives the body to the liquor than when 'black' or 'roasted malt' is employed alone. The proportion of the former to the latter commonly varies from 1-6th to 1-4th. When 'black malt' is alone used, the proportion varies from the 1-10th to 1-15th. 1 lb. of 'roasted malt,' mashed with about 79 lbs. of pale malt, is said to be capable of imparting to the liquor the flavour and colour of porter. The following formulæ were formerly commonly employed in London:—

1. (DRAUGHT PORTER.) From pale malt, 3½ qrs.; amber malt, 3 qrs.; brown malt, 1½ qr.; mash at twice with 28 and 24 barrels of water, boil with brown Kent hops, 56 lbs., and set with yeast, 40 lbs. *Prod.* 28 barrels, or 3½ times the malt, besides 20 brls. of table-beer from a third mashing.

2. (BOTTLING PORTER; BROWN STOUT.) From pale malt, 2 qrs.; amber and brown malt, of each, 1½ qr.; mash at 3 times with 12, 7, and 6 brls. of water, boil with hops, 50 lbs., and set with yeast, 26 lbs. *Prod.* 17 brls., or 1½ times the malt.

The purity and quality of porter, as well as of other malt liquors, may be inferred in the manner noticed under BEER (see *page* 201); but can only be positively determined by a chemical examination. For this purpose several distinct operations are required:—

1. *Richness in* ALCOHOL. This may be correctly found by the method of M. Gay-Lussac; or, from the boiling-point. (See ALCOHOLOMETRY and EBULLIOSCOPE.) The method with anhydrous carbonate of potassa (see *g. a., page* 47) will also give results sufficiently near to the truth for ordinary purposes, when strong or old beer is operated on. The quantity of the liquor tested should be 3600 water-grains measure; and it should be well agitated, with free exposure to the air, after weighing it, but before testing it for its alcohol. The weight of alcohol found, multiplied by 1·8587, gives its equivalent in sugar. This may be converted into 'brewer's pounds' or density per barrel, as below.

2. *Richness in* SACCHARINE OR EXTRACTIVE MATTER. A like quantity of the liquor under examination, after being boiled for some time to dissipate its alcohol, is made up with distilled water, so as to be again exactly equal to 3600 water-grains measure. The sp. gr. of the resulting liquid is then taken, and this is reduced to 'brewer's pounds' per barrel, by multiplying its excess of density above that of water (or 1000) by 360, and pointing off the three right-hand figures as decimals.

3. ACETIC ACID OR VINEGAR. This is determined by any of the common methods of ACIDIMETRY (which *see*; see also ACETIMETRY). Each grain of anhydrous acetic acid so found represents 1·6765 gr. of sugar.

4. *Gravity of* ORIGINAL WORT. This is obtained by the addition of the respective quantities of saccharine matter found in Nos. 1, 2, and 3 (*above*). These results are always slightly under the true original density of the wort, as cane sugar appears to have been taken by the Excise as the basis of their calculations. More correctly, 12⅔ of proof spirit is equivalent to 19lbs. of saccharine per barrel. 10½lbs.

of saccharine are equiv. to 1 gall. of proof spirit.

5. *Detection of* NARCOTICS. This may be effected either by the method described under ALKALOID, or by one or other of the following processes:—

a. ½ gall. of the beer under examination is evaporated to dryness in a water bath; the resulting extract is boiled for 30 or 40 minutes in a covered vessel with 10 or 12 fl. oz. of alcohol or strong rectified spirit, the mixture being occasionally stirred with a glass rod, to promote the action of the menstruum; the alcoholic solution is next filtered, treated with a sufficient quantity of solution of diacetate of lead to precipitate colouring matter, and again filtered; the filtrate is treated with a few drops of dilute sulphuric acid, again filtered, and then evaporated to dryness; it may then be tested with any of the usual reagents, either in the solid state or after being dissolved in distilled water. Or, the extract, obtained as above, may be boiled as directed with rectified spirit, the solution filtered, the spirit distilled off, and a small quantity of pure liquor of potassa added to the aqueous residue, which is then to be shaken up with about 1 fl. oz. of ether; lastly, the ethereal solution, which separates and floats on the surface, is decanted, evaporated, and the residuum tested, as before. The alkaline liquid, from which the ether has been decanted, is then separated from any precipitate which may have formed, and both of these separately tested for alkaloids.

b. From 2 to 3 oz. of purified animal charcoal are diffused through ½ gall. of the beer, and is digested in it, with frequent agitation, for from 8 to 12 hours; the liquor is next filtered, and the charcoal collected on the filter is boiled with about ½ pint of rectified spirit; the resulting alcoholic solution is then further treated as above, and tested. This answers well for the detection of strychnine or nux vomica.

6. PICRIC ACID. This substance, which was formerly employed to impart bitterness to London porter in lieu of hops, may be detected as follows:—

a. A portion of the liquor agitated with a little solution of diacetate of lead loses its bitter flavour if it depends on hops, but retains it if it depends on picric acid.

b. Pure beer is decoloured and deodorised by animal charcoal; but beer containing picric acid, when thus treated, retains a lemon-yellow colour and the odour.

c. Unbleached sheep's wool, boiled for six or ten minutes, and then washed, takes a canary-yellow colour if picric acid be present. This test is so delicate that 1 gr. of the adulterant, in 150,000 grs. of beer is readily detected.

7. MINERAL MATTER.—*a.* A weighed quantity of pure beer evaporated to dryness, and then incinerated, does not furnish more than from ·20% to ·35% of ash, the quantity varying within these limits with the strength of the liquor and the character of the water used in brewing it.

b. A solution of this ash, made by decoction with distilled water, should be only rendered slightly turbid by solutions of acetate of lead, bichloride of platinum, nitrate of baryta, nitrate of silver, oxalate of ammonia, and sulphuretted hydrogen.

c. If the beer contained common salt, the above solution will give a cloudy white precipitate with a solution of nitrate of silver. Each grain of this precipitate is equivalent to ½ gr. of common salt (nearly).

d. If GREEN COPPERAS (sulphate of iron) be present, ferridcyanide of potassium gives a blue precipitate, and ferrocyanide of potassium a bluish-white one, turning dark blue in the air; solution of chloride of barium gives a white precipitate, each grain of which, after being washed, dried, and ignited, represents 1·188 gr. of crystallised protosulphate of iron.

e. The ash, digested in water slightly acidulated with nitric acid, and then boiled, yields a solution which, when cold, gives a black precipitate with sulphuretted hydrogen, and a white one with dilute sulphuric acid, if lead is present.

For further information connected with this subject, see ALCOHOLOMETRY, ALE, BEER, BREWING, MALT LIQUORS, &c.

PORT-FIRE. A paper tube, from 9 to 12 inches in length, filled with a slow burning composition of metal powder, nitre, and sulphur, rammed moderately hard, by a similar process to that adopted for small rockets. It is used in lieu of a touch-match, to fire guns, mortars, pyrotechnical devices, &c.

PORTLAND CEMENT. A species of mortar formed by calcining a mixture of limestone and argillaceous earth, and grinding the calcined mass to powder, in which state it must be preserved from the air. It is characterised by absorbing a large quantity of water, and by rapidly becoming solid, and, after a time, acquiring considerable hardness. See MORTAR and CEMENT.

POSOL'OGY. See *Dose*.

POS'SET. *Syn.* POSSETUM, L. Milk curdled with wine or any other slightly acidulous liquor. It is usually sweetened with either sugar or treacle, and is taken hot.

Prep. From new milk, ½ pint; sherry or marsala, 1 wine-glassful; treacle, 1 or 2 tablespoonfuls, or q. s.; heat them together in a clean saucepan until the milk coagulates. This is called 'treacle posset' or 'mop posset,' and, taken on retiring to rest, is highly esteemed in some parts of the country as a domestic remedy for colds. Lemon juice, strong old ale, or even vinegar, is occasionally substituted for wine, and powdered ginger or nutmeg added at will.

POT'ASH. The 'potash,' or 'potashes,' of commerce is an impure carbonate of potassa so named after the pots or vessels in which

was first made. The 'potash,' or 'potassa,' of the chemist, is the hydrate of potassium, a peculiar metal, which is more particularly referred to below. The word potash is vulgarly applied to the crude or commercial carbonate of potassium. See CARBONATE OF POTASSIUM, &c.

POTAS'SIUM. K. The metallic base of potash. It was discovered, in 1807, by Sir H. Davy, who obtained it by submitting moistened potassium hydrate, under a film of naphtha, to the action of a powerful voltaic current. It has since been procured by easier methods, of which the following, invented by Brunner, is the best.

Prep. An intimate mixture of carbonate of potassium and charcoal is prepared by calcining, in a covered iron pot, the crude tartar of commerce; when cold, it is rubbed to powder, mixed with 1-10th part of charcoal in small lumps, and quickly transferred into a retort of stout hammered iron; the latter may be one of the iron bottles in which quicksilver is imported, a short and somewhat wide iron tube having been fitted to the aperture; the retort, thus charged, is placed upon its side, in a furnace so constructed that the flame of a very strong fire, preferably fed with dry wood, may wrap round it, and maintain every part of it at a very high and uniform degree of heat. A copper receiver, divided in the centre by a diaphragm, is next connected to the iron pipe, and kept cool by the application of ice, whilst the receiver itself is partly filled with mineral naphtha, to preserve the newly formed potassium as it distils over. The arrangement of the apparatus being completed, the fire is gradually raised until the requisite temperature, which is that of full whiteness, is reached, when decomposition of the alkali by the charcoal commences, carbonic oxide gas is abundantly disengaged, and potassium distils over, and falls in large drops into the liquid. To render the product absolutely pure, it is redistilled in an iron or green-glass retort, into which some naphtha has been put, that its vapour may expel the air, and prevent the oxidation of the metal. The pieces of charcoal are introduced for the purpose of absorbing the melted carbonate of potassium, and preventing its separation from the finely divided carbonaceous matter. *Prod.* 3% to 4% of the weight of tartar acted on; 1 lb. yielded 280 grs.

Prop., &c. Pure potassium is a brilliant white metal, with a high lustre; at the common temperature of the air it is soft, and may be easily cut with a knife, but at 32° Fahr. it is brittle and crystalline; it melts completely at 136° Fahr., and in close vessels distils unaltered at a low red heat. Sp. gr. ·865. Its most remarkable property is its affinity for oxygen, which is so great that it takes it from most other substances containing it. Exposed to the air, its surface is instantly tarnished, and quickly becomes covered with a crust of oxide or hydrate. It inflames spontaneously when thrown on water, and burns with a beautiful purple or purple-red flame, yielding a pure alkaline solution. It can only be preserved in naphtha, rock oil, or some other fluid hydrocarbon.

The salts of potassium are all soluble in water, the tartrate, periodate, and fluosilicate being the least so; they are usually colourless, unless the acid be coloured, crystallise readily, and form numerous double compounds. They can be recognised as follows:—

Sulphuretted hydrogen, sulphide of ammonium, and carbonate of ammonium, do not affect them. A solution of tartaric acid, added, in excess, to moderately strong neutral or alkaline solutions of potassium salts, gives a quickly subsiding, gritty or crystalline, white precipitate, which is redissolved on heating the liquid, and again separates as it cools; and is also soluble in aqueous solutions containing free alkali, or free mineral acids. Platinic chloride produces, in neutral and acid solutions, a yellow crystalline precipitate. Alkaline solutions require to be first slightly acidulated with hydrochloric acid. The separation of the precipitate here, as well as that produced by tartaric acid, is promoted by violent agitation and friction against the sides of the vessel, and the delicacy of both is increased by the addition of some alcohol. When converted into carbonate by igniting with excess of carbonate of ammonium and alcohol, and treated with sulphuretted hydrogen solution and nitroprusside of sodium, gives a splendid violet colour, turning through red to green on standing.

Potassium salts give with sodium periodate and hydro-fluosilicic acid, white precipitates soluble in much water.

Heated in the inner flame of the blowpipe on platinum wire, they impart a violet coloration, masked, however, by a mere trace of sodium salts.

Potassium, Acetate of. $KC_2H_3O_2$. *Syn.* ACETATE OF POTASH, POTASSIC ACETATE; POTASSÆ ACETAS (B. P., Ph. L. E. D.). *Prep.* (Ph. L.) Acetic acid, 26 fl. oz.; distilled water, 12 fl. oz.; mix, and add, gradually, carbonate of potassium, 1 lb., or q. s. to saturate the acid; next, filter the solution, and evaporate it by the heat of a sand bath, gradually applied, until the salt is dried.

Prop., &c. Acetate of potassium, prepared as above, occurs in shining white masses, having a foliated soft texture, a slight but peculiar odour, and a warm sharp taste; it deliquesces in the air; dissolves in rather less than its own weight of water, and in about twice its weight of alcohol; and by exposure to a red heat is converted into pure carbonate of potassium. In trade it is preserved in well-corked and sealed bottles.

Pur. It is entirely soluble in water, and in rectified spirit. These solutions neither

affect litmus nor turmeric, nor are they disturbed by either chloride of barium or nitrate of silver; but if from a stronger solution anything is thrown down by nitrate of silver, the same is again dissolved on the addition of water or dilute nitric acid. Sulphuric acid being added, the vapour of acetic acid is evolved. 100 grs. of this salt, digested in sulphuric acid, the solution evaporated, and the residuum dried at a high temperature, furnish 88·8 grs. of sulphate of potassium.

Uses, &c. Acetate of potassium has been found useful in dropsies, febrile affections, jaundice, scurvy, calculus, and several chronic skin diseases. During its exhibition the urine becomes at first neutral, and then alkaline, owing to the salt being converted into carbonate of potassium in the system.—*Dose.* As a diaphoretic and antiscorbutic, 15 to 20 grs.; as a diuretic, 20 to 60 grs.; as an aperient, 2 to 3 drs.; in each case dissolved in some bland liquid, or in the infusion of some mild vegetable bitter.

Potassium, Arseniate of. KH_2AsO_4. *Syn.* ARSENIATE OF POTASSA, MONOPOTASSIC ARSENIATE, POTASSIUM DYHYDRIC ARSENIATE; POTASSÆ BINARSENIAS, L. *Prep.* Take of arsenious acid (white arsenic) and nitrate of potassium, of each, in powder, 1 part; heat the mixture to dull redness in a glass flask, until it fuses and red vapours cease to be evolved; dissolve the residuum, when cold, in boiling distilled water, 50 parts; concentrate the solution by evaporation, and set it aside to crystallise.

Prop., &c. This salt forms large crystals, which are permanent in dry air, soluble in about 4½ parts of water, and insoluble in alcohol. It is reputed tonic, alterative, and antiperiodic.—*Dose.* $\frac{1}{10}$ to $\frac{1}{5}$ gr., dissolved in sweetened water. It is also used to form a resist-paste in calico-printing, and in the manufacture of cobalt-blue.

Potassium, Borate of. $K_4B_4O_8$. *Syn.* POTASSÆ BORAS, L. *Prep.* From dry carbonate of potassium and dry boracic acid, equal parts, reduced to powder, and heated to redness in a covered crucible; the sublimed mass, when cold, being dissolved in boiling water, and the filtered solution concentrated by evaporation, and then set aside to crystallise; or at once completely evaporated to dryness.—*Dose.* 1 to 6 grs.; in calculi, &c.

Potassium, Borotartrate of. *Syn.* POTASSÆ BOROTARTRAS, CREMOR TARTARI SOLUBILIS, L.; CRÈME DE TARTRE SOLUBLE, Fr. *Prep.* (P. Cod.) Crystallised boracic acid, 1 part; bitartrate of potassium, 4 parts; water, 24 parts; dissolve by the aid of heat, in a silver basin, and, constantly stirring, evaporate the resulting solution, either to dryness, and then powder it, or merely to a syrupy consistence, when it may be spread upon plates, and dried in scales, by the heat of a stove. It must afterwards be preserved from the air.

Prop, &c. A white, deliquescent powder, freely soluble in water. It has been used as solvent for lithic calculi, and in gout, &c.-*Dose.* 15 to 30 grs. In doses of 2 to 3 drs. it laxative, and is very popular as such on tl Continent.

Potassium, Bromide of. KBr. *Syn.* POTASS BROMIDUM (B. P.). *Prep.* Exactly as tl iodide, which it resembles in its characte only being somewhat less soluble in water ar more in alcohol. Employed in similar cas and given in similar doses to the iodide.

Potassium, Carbonate of. K_2CO_3. *Sy* CARBONATE OF POTASSA, SUBCARBONATE C POTASSA, SALT OF TARTAR; POTASSÆ CARB NAS (B.P., Ph. L. E. D.). Impure or cruc carbonate of potassium is chiefly imported fro America and Russia, and is obtained by lix viating wood ashes, and evaporating the sol tion to dryness. The mass is then transferr into iron pots, and is kept in a state of fusic for several hours, until it becomes quiescen when the heat is withdrawn, and the whole left to cool. It is next broken up and packc in air-tight barrels, and in this state const tutes the 'potashes' or 'potash' of con merce. Another method is to transfer th black salts, or product of the first evaporatio from the kettles to a large oven or furnace, constructed that the flame is made to pl over the alkaline mass, which is kept co stantly stirred by means of an iron rod. T ignition is continued until the impurities a burned out, and the mass changes from blackish tint to a dirty or bluish white. T whole is next allowed to cool, and is th broken into fragments, and packed in casks before. It now constitutes 'pearlash.'

When pearlash is dissolved in cold distill water, the solution depurated, filtered, and cr tallised, or simply evaporated to dryness, forms 'refined ashes,' or carbonate of pota sufficiently pure for most pharmaceutical a technical purposes. The granulated carbona of potash, salt of tartar, or prepared kali, the shops, is simply refined ashes whic during the evaporation, and more especial towards the conclusion of the desiccation, h been assiduously stirred, so that it may for small white granulations, instead of adherir together to form an amorphous solid mas In this state it constitutes the ordinary or carb nate of potassa of the Pharmacopœias. Ord nary potash or pearlash may be refined follows:—Raw potash, 10 parts, is dissolved cold water, 6 parts, and the solution is allow to remain for 24 hours, in a cool place; it then filtered, and somewhat concentrated evaporation, crystallisation being prevented continually stirring the mass until the whole nearly cold; it is next decanted into a strain and the mother-liquor allowed to drip off; t residuum is evaporated to dryness at a ge heat, and redissolved in [illegible] cold distilled water; the new solution, filtration, is again evaporated to dryness. T product is quite free from potassium sulpha

and is nearly free from both potassium chloride and silicates.

Potassium, Pure Carbonate of. CARBONATE OF POTASSA (POTASSÆ CARBONAS PURUM—Ph. E. & D., and Ph. L., 1836).—(Ph. L., 1836.) From bicarbonate of potassium, in crystals, heated to redness in a crucible.

(Ph. E.) As the last. Or, more cheaply, by dissolving bitartrate of potassium in thirty parts of boiling water, separating and washing the crystals which form on cooling, heating them in a loosely covered crucible to redness as long as fumes are discharged, breaking down the mass, and roasting it in an oven for two hours, with occasional stirring; lixiviating the product with (cold) distilled water, filtering the solution thus obtained, evaporating it to dryness, granulating the salt towards the close by brisk agitation, and, lastly, heating the granular salt thus obtained nearly to redness.

(Ph. D.) Bitartrate of potassium, 2 lbs., is exposed to a red heat in an iron crucible, as before; the powdered calcined mass is boiled for 20 minutes in water, 1 quart, the solution filtered, and the filter washed with water, 1 pint, to which ammonium sesquicarbonate, ½ oz., has been added; the mixed and filtered liquors are evaporated to dryness, and, a low red heat having been applied, the residuum is rapidly reduced to powder in a warm mortar, and at once enclosed in (dry and) well-stopped bottles.

Prop. These are well-known. It exhibits most of the properties of hydrate of potassium, but in a vastly less degree. It is very deliquescent, effervesces with acids, exhibits a marked alkaline reaction with test paper, is insoluble in alcohol, but dissolves in less than its own weight of water, its affinity for the last being so great that it takes it from alcoholic mixtures.

Pur., &c. Carbonate of potassium frequently contains an undue quantity of water, as well as silicic acid, sulphates, and chlorides. The water may be detected by the loss of weight the salt suffers when heated; the silica, by adding to it hydrochloric acid in excess, evaporating to dryness, and igniting the residuum, by which this contamination is rendered insoluble; the sulphates and chlorides may be detected by adding nitric acid in excess, and testing the liquid with nitrate of silver and chloride of barium. If the former produces a white precipitate, a chloride is present; and if the latter does the same, the contamination is a sulphate. Carbonate of potassium deliquesces in the air, and is almost entirely dissolved by water; in an open vessel it spontaneously liquefies. It changes the colour of turmeric brown. Supersaturated with nitric acid, neither carbonate of sodium nor chloride of barium throws down anything, and nitrate of silver very little. [illegible] which is so great that it [illegible] of water by a strong red heat loses 26·3 grs. of other carbonate anhydride when placed in contact with dilute sulphuric acid.

Potassium, Bicarbonate of. $KHCO_3$. *Syn.* POTASSIUM HYDROGEN CARBONATE, BICARBONATE OF POTASSA; POTASSÆ BICARBONAS (B.P., Ph. L. E. & D.). *Prep.* 1. (Ph. L. 1836.) Carbonate of potassium, 6 lbs.; distilled water, 1 gall.; dissolve, and pass carbonic anhydride (from chalk and sulphuric acid diluted with water) through the solution to saturation; apply a gentle heat, so that whatever crystals have been formed may be dissolved, and set aside the solution, that crystals may again form; lastly, the liquid being poured off, dry them.

2. (Ph. D.) Carbonic anhydride, obtained by the action of dilute hydrochloric acid on chalk (the latter contained in a perforated bottle immersed in a vessel containing the acid), is passed, by means of glass tubes connected by vulcanised India rubber, to the bottom of a bottle containing a solution of carbonate of potassium, 1 part, in water, 2½ parts; as soon as the air is expelled from the apparatus the corks through which the tubes pass are rendered air-tight, and the process left to itself for a week; the crystals thus obtained are then shaken with twice their bulk of cold water, drained, and dried on bibulous paper, by simple exposure to the air. From the mother-liquor, filtered, and concentrated to one half, at a heat not exceeding 110° Fahr., more crystals may be obtained. The tube immersed in the solution of carbonate of potassium will have to be occasionally cleared of the crystals with which it is liable to become choked, else the process will be suspended.

3. (Apothecaries' Hall, London.) Potassium carbonate, 100 lbs.; distilled water, 17 galls.; dissolve, and saturate the solution with carbonic anhydride, as in No. 1, when 35 to 40 lbs. of crystals of bicarbonate of potassium may be obtained; next dissolve carbonate of potassium, 50 lbs., in the mother-liquor, and add enough water to make the whole a second time equal to 17 galls.; the remaining part of the operation is then to be performed as before. This plan may be repeated again and again, for some time, provided the carbonate used is sufficiently pure.

4. (Ph. E.) Take of carbonate of potassium, 6 oz.; sesquicarbonate of ammonium, 3½ oz.; triturate them together, and, when reduced to a very fine powder and perfectly mixed, make them into a stiff paste with a very little water; dry this, very carefully, at a heat not higher than 140° Fahr., until a fine powder, perfectly devoid of ammoniacal odour, be obtained, occasionally triturating the mass towards the end of the process.

5. (Commercial.) From carbonate of potassium, in powder, made into a paste with water, and exposed for some time on shallow trays, in a chamber filled with an atmosphere of carbonic anhydride, generated by the combustion of either coke or charcoal, and purified by being forced through a cistern of cold water; the resulting salt is next dissolved in the least pos-

sible quantity of water at the temperature of 120° Fahr., and the solution filtered and crystallised.

Prop. It is soluble in 4 times its weight of water at 60° Fahr.; is fixed in the air, but loses carbonic acid below the temperature of a carbonate at a red heat. It possesses the general alkaline properties of carbonate of potassium, but in an inferior degree, having only a slightly alkaline taste, and, when absolutely pure, not affecting the colour of turmeric.

Pur. In a solution of pure bicarbonate of potassium, a solution of mercuric chloride merely causes an opalescence, or very slight white precipitate; if it contains carbonate, a brick-coloured precipitate is thrown down. From 100 grs. of the pure crystals of bicarbonate, 30·7 grs. of water and carbonic acid are expelled at a red heat. In other respects it may be tested like the carbonate.

Uses, &c. Bicarbonate of potassium is the most agreeable of all the salts of potassium, and is much used as an antacid or absorbent, and for making effervescing saline draughts. It has also been successfully employed in rheumatism, scurvy, gout, dyspepsia, and various other diseases in which the use of potassium is indicated. The *dose* is from 10 grs. to ½ dr.

20 grs. bicarbonate, in crystals,

are equivalent to

14 grs. of crystallised nitric acid,
15 grs. " tartaric acid, and
½ oz. of lemon juice.

Potassium, Chlorate of. $KClO_3$. *Syn.* CHLORATE OF POTASH; POTASSÆ CHLORAS (B. P., Ph. L. & D.), L. *Prep.* 1. Chlorine gas is conducted by a wide tube into a moderately strong and warm solution of hydrate or carbonate of potassium, until the absorption of the gas ceases, and the alkali is completely neutralised; the liquid is then kept at the boiling temperature for a few minutes, after which it is gently evaporated (if necessary) until a pellicle forms on the surface, and is next set aside, so as to cool very slowly; the crystals, thus obtained, are drained and carefully washed on a filter, with ice-cold water, and are purified by re-solution and recrystallisation. The product is chlorate of potassium. The mother-liquor, which contains much chloride of potassium mixed with some chlorate, is either evaporated for more crystals (which are, however, less pure than the first crop) or is preserved for a future operation.

Obs. The product of the above process is small, varying from 10 to 45% of the weight of the potassium consumed in it, according to the skill with which it is conducted; this apparent loss of potassium arises from a large portion of it being converted into chloride, a salt of comparatively little value. The following processes have been devised principally with the view of preventing this waste, or of em ing a cheaper salt of potassium than the bonate:—

2. A solution of chloride of lime is p pitated with a solution of carbonate of potas and the liquid, after filtration, saturated chlorine gas; it is then evaporated and tallised as before. Dr. Ure has suggeste substitution of sulphate of potassium fo carbonate, by which the process would be dered very inexpensive.

3. Carbonate of potassium, 69 parts of th or 82 parts of the granulated; hydrate o cium, 37 parts (dry fresh slaked lime); bo powder; are mixed together, and exposed t action of chlorine gas, to saturation; (th is absorbed with great rapidity, the tem ture rises above 212° Fahr., and water is f evolved); the heat, with free exposure, is maintained at 212° for a few minute remove some trace of 'hypochlorite'), the duum, consisting of chlorate of potassiu chloride of calcium, is treated with hot wate the chlorate of potassium crystallised out resulting solution, as before. This pr which is an excellent one (the loss of potas being for the most part avoided), has modified and improved by various autho as will be seen below.

4. A solution of chloride of lime (18 t Baumé) is heated in a leaden or cast-iron v and sufficient of a salt of potassium add raise the density of the liquid 3 or 4 hydro degrees; the solution is then quickly, but fully, concentrated until the gravity rises or 31° Baumé, when it is set aside to cr lise. A good and economical process.

5. Chloride of potassium, 76 parts, and calcium hydrate, 222 parts, are reduced thin paste with water, q. s., and a stre chlorine gas passed through the mixtu saturation; chloride of calcium and chlor potassium are formed; the last is then re by solution in boiling water, and is crysta as before. This process, which has re the approval and recommendation of L has long been practised in Germany, an originally introduced to this country b Wagenmann. The product is very larg of excellent quality.

Prop. White, inodorous, four- or six- pearly scales, soluble in about 20 parts o and 2½ parts of boiling water; in taste sembles nitre, but is somewhat more au at about 450° Fahr. it undergoes the ig fusion, and on increasing the heat alm redness effervescence ensues, and fully pure oxygen gas is given off, whilst th becomes changed into chloride of pota When mixed with inflammable substance triturated, heated, or subjected to a smar or strong pressure, or moistened with a s acid, it explodes with great violence.

Pur., tests, &c. The usual impurity o salt is chloride of potassium, arising from less or imperfect manipulation. We

present, a solution of nitrate of silver gives a curdy white precipitate, soluble in ammonia; whereas a solution of the pure chlorate remains clear.

Uses. Chlorate of potassium is principally used in the manufacture of lucifer matches, fireworks, oxygen gas, &c., and as an oxidising agent in calico printing. It was formerly used to fill percussion caps, but was abandoned for fulminating mercury, on account of its disposition to rust the nipples of the guns. As a medicine, it is stimulant and diuretic. It has been given in dropsy, syphilis, scurvy, cholera, typhus, and other depressing affections. It gives a fine artificial colour to the blood. (Stevens.)—*Dose.* 5 to 15 grs., in solution, twice or thrice a day.

Concluding remarks. Formerly, chlorate of potassium was a salt which was made only on the small scale, and chiefly used in experimental chemistry; now it is in considerable demand, and forms an important article of chemical manufacture. The latter has hence, of late years, received considerable attention and improvement in the leading laboratories of Europe. The chlorate requires to be handled with great care. It should never be kept in admixture with any inflammable substance, more especially with sulphur, phosphorus, or the sulphides, as these compounds are exploded by the most trivial causes, and, not unfrequently, explode spontaneously.

Potassium, Chloride of. KCl. *Syn.* CHLORIDE OF POTASSA. *Prep.* The chloride of potassium of commerce is usually a secondary product in the manufacture of chlorate of potassium and other substances. The mother-liquor of the former is evaporated to dryness and heated to dull redness, the calcined mass is then dissolved in water, the solution purified by defecation and evaporated down for crystals.

It can also be well prepared by neutralising boiling solution of carbonate of potassium by dilute hydrochloric acid, evaporating down, and crystallising.

Prop., &c. It closely resembles culinary salt in appearance; is anhydrous; dissolves in about 4 parts of cold and 2 of boiling water; has a slightly bitter, saline taste; fuses at a red heat; and is volatilised at a very high temperature. As a medicine, it is diuretic and aperient. It was formerly in high repute as a resolvent and antiscorbutic, and, particularly, as a remedy for intermittents. It is now seldom used.—*Dose.* 10 grs. to ½ dr., or more.

Potassium, Chromate of. K_2CrO_4. *Syn.* CHROMATE OF POTASSA, NEUTRAL CHROMATE OF P., MONOCHROMATE OF P., YELLOW C. OF P., SALT OF CHROME; POTASSÆ CHROMAS, P. C. FLAVA, L. This salt is only prepared on the large scale. Its source is 'CHROME ORE,' a natural octahedral chromate of iron, found in various parts of Europe and America. For medicinal purposes the commercial chromate is purified by solution in hot water, filtration, and recrystallisation.

Prep. 1. The ore, previously assayed to determine its richness, and freed as much as possible from its gangue, is ground to powder in a mill, and mixed with a quantity of coarsely powdered nitre rather less than that of the oxide of chromium which it contains; this mixture is exposed, for several hours, to a powerful heat on the hearth of a reverberatory furnace, during which time it is frequently stirred up with iron rods; the calcined mass is next raked out and lixiviated with hot water, and the resulting yellow-coloured solution evaporated briskly over a naked fire, or by the heat of high-pressure steam; chromate of potassium falls, under the form of a granular yellow salt, which is removed from time to time with a ladle, and thrown into a wooden vessel, furnished with a bottom full of holes (draining box), where it is left to drain and dry. In this state it forms the chromate of potassium of commerce. By a second solution and recrystallisation, it may be obtained in large and regular crystals. The next process has for its object the employment of a cheaper salt of potassa than the nitrate.

2. (Swindell & Co., *Patent* dated Nov., 1850.) A mixture of pulverised chrome ore and chloride of potassium is exposed to a full red heat, on the hearth of a reverberatory furnace, with occasional stirring for some time, when steam at a very elevated temperature is made to act on it, until the conversion is complete, known by assaying a portion of the mass; the chromate is then dissolved out of the residuum, as before. Common salt or hydrate of calcium may be substituted for chloride of potassium, when the chromates of sodium or calcium are respectively produced.

3. On the small scale, this salt may be prepared from the bichromate by neutralising it with hydrate of potassium.

Prop. Yellow; tastes cool, bitter, and disagreeable; soluble in 2 parts of water at 60° Fahr.; the crystals are efflorescent.

Pur. The salt of commerce is frequently contaminated with large quantities of sulphate or chlorate of potassium. To detect these, M. Zuber adds tartaric acid, dissolved in 50 parts of water, to a like solution of the sample. As soon as the decomposition is complete, and the colour verges towards the green, the supernatant liquor should afford no precipitate with solutions of the nitrates of silver and barium, whence the absence of chlorides and sulphates may be respectively inferred. The proportions are, 8 parts of tartaric acid to 1 part of the chromate. If saltpetre is the adulterating ingredient, the sample deflagrates when thrown upon burning coals.

Assay. 1. A solution of 50 grs. of the salt is treated with a solution of nitrate of barium, the precipitate digested in nitric acid, and the insoluble portion (sulphate of barium) washed, dried, and weighed. 117 grs. of this substance are equivalent to 89 grs. of sulphate of potassium.

2. The nitric solution, with the washings (see *above*), is treated with a solution of nitrate of silver, and the precipitate of chloride carefully collected, washed, dried, ignited, and weighed. 144 grs. of chloride of silver represent 76 grs. of chloride of potassium.

3. The nitric solution, with the washing (see *above*), after having any remaining barium thrown down by adding dilute sulphuric acid, in slight excess, is treated with ammonia, and the resulting precipitate of chromic oxide collected on a filter, washed, dried, carefully ignited in a silver, platinum, or porcelain crucible; and weighed. 40 grs. of this oxide represent 100 grs. of pure chromate of potassium. Any deficiency consists of impurities or adulterants.

Uses. Chromate of potassium is used in dyeing, bleaching, the manufacture of chromic acid, bichromate of potassium, &c. It is the common source of nearly all the other compounds of chromium. It is reputed alterative in doses of $\frac{1}{12}$ to $\frac{1}{4}$ gr.; and is emetic in doses of 1 to 4 grs. A solution in 8 parts of water is occasionally used to destroy fungus; 1 in 30 to 40 parts of water is also used as an antiseptic and desiccant.

Concluding remarks. The first process is undoubtedly the best, when expense is not an object. To reduce this, a mixture of 'potash' or 'pearlash,' with about $\frac{1}{2}$ of its weight of nitre, or 1-5th part of its weight of peroxide of manganese, may be substituted without much inconvenience. The assay of the chrome ore, alluded to above, may be made by reducing 100 grs. of it to powder, mixing it with twice its weight of powdered nitre, and a little hydrate of calcium, and subjecting the mixture to a strong red heat for 3 or 4 hours; the calcined mass may then be exhausted with boiling water, and the resulting solution, after precipitation with dilute sulphuric acid, in slight excess, and filtration, may be treated with rectified spirit, when its chromium may be thrown down by the addition of ammonia. (See *above*.) In the conversion of chrome ore into chromate of potassium, care should, in all cases, be taken that the proportion of nitre or alkali should be slightly less than what is absolutely required to saturate the ore, as the production of a neutral salt is thereby ensured; for should not the whole of the chromate be decomposed by the first calcination, it may easily be roasted a second time with fresh alkali, should the remaining quantity be thought worth the trouble. The nature of the furnace to be employed in the conversion is not of any great importance, so long as carbonaceous matters from the fire are entirely excluded, and the required temperature is attainable.

Potassium, Bichromate of. $K_2Cr_2O_7$, or K_2CrO_4,CrO_3. *Syn.* BICHROMATE OF POTASSA, RED CHROMATE OF POTASH, ACID C. OF P.; POTASSÆ BICHROMAS, L. *Prep.* 1. To a concentrated solution of yellow chromate of potassium, sulphuric acid, or, better, acetic acid, is added in quantity equal to one half that required for the entire decomposition of the salt; the liquid is then concentrated by evaporation, and slowly cooled, so that crystals may form.

2. (Jacquelain.) Chrome ore, finely ground and sifted, is mixed with chalk; the mixture is spread on a thin layer on the hearth of a reverberatory furnace, and heated to bright redness, with repeated stirring, for 9 or 10 hours. The yellowish-green product consists essentially of neutral chromate of calcium, mixed with ferric oxide. It is ground and stirred up with hot water, and sulphuric acid is added till a slight acid reaction becomes apparent, a sign that the neutral chromate has been converted into bichromate. Chalk is now stirred in to precipitate the ferric sulphate, and after a while the clear solution is run off into another vessel, where it is treated with carbonate of potassium, which precipitates the lime and leaves bichromate of potassium in solution. The solution is then evaporated to the crystallising-point. This process, when carried out on a large scale, is very economical.

Prop., &c. It forms very beautiful square tables, or flat four-sided prismatic crystals; permanent in the air; soluble in 10 parts of water at 60°, and in less than 3 parts at 212° Fahr.; it has a metallic, bitter taste, and is poisonous. It is chiefly *used* in dyeing and bleaching, and as a source of chromic acid. The tests, &c., are the same as for the yellow chromate.

Potassium, Citrate of. $K_3C_6H_5O_7$. *Syn.* POTASSÆ CITRAS, L. *Prep.* From a solution of citric acid neutralised with carbonate of potassium, evaporated, and granulated, or crystallised; very deliquescent. Or, extemporaneously, in the form of solution, by adding carbonate or bicarbonate of potassium to lemon juice, as in the common effervescing draught.

Potassium, Cyanate of. KCyO, or KCNO. *Prep.* 1. By roasting, at a red heat, dry ferrocyanide of potassium, in fine powder, upon an iron plate, constantly stirring it until it becomes fused into one mass, which must be reduced to fine powder, and digested in boiling alcohol, from which crystals of the cyanate will be deposited as the solution cools.

2. (Liebig.) A mixture of ferrocyanide of potassium, with half its weight of peroxide of manganese, may also be used to produce this salt, as the last; the compound should be kindled by a red-hot body, and allowed to smoulder away, after which it may be treated with alcohol, as before.

3. A mixture of ferrocyanide of potassium and litharge is heated as before, and dissolved out by alcohol, and crystallised.

Prop. Crystallisable colourless or white salt, readily soluble in alcohol and water, but readily decomposed when moist into bicarbonate of potassium and ammonia, or in solution into the carbonate of potassium and ammonium.

This salt is poisonous. The cyanates of silver, lead, and many other metals, may be made by adding a solution of cyanate of potassium to another of a neutral salt of the base.

Potassium, Cyanide of. KCN, or KCy. *Syn.* CYANIDE OF POTASH, CYANURET OF POTASSIUM; POTASSII CYANIDUM, P. CYANURETUM, L.

Prep. 1. (MEDICINAL CYANIDE OF POTASSIUM.)—*a.* A solution of pure hydrate of potassium, 2 parts, in highly rectified spirit, 7 parts, is placed in a receiver furnished with a safety tube, and surrounded with bruised ice; the beak of a tubulated retort containing ferrocyanide of potassium, in powder, 4 parts, is then adapted to it in such a manner that any gas or vapour evolved in the retort must traverse the solution in the receiver; the arrangement being complete, sulphuric acid, 3 parts, diluted with an equal weight of water, and allowed to cool, is cautiously poured into the retort, and the distillation conducted very slowly, a very gentle heat only being applied, as circumstances may direct; as soon as the force of ebullition in the retort has subsided, the distillation is complete, and the connection between the retort and receiver is broken; the contents of the receiver, now transformed into a mixture of a crystalline precipitate of cyanide of potassium, and an alcoholic solution of undecomposed hydrate of potassium, is carefully thrown on a filter, and the precipitate, after the mother-liquor has drained off, very cautiously washed with ice-cold and highly rectified spirit, and then drained, pressed, and dried on the same filter. The product is chemically pure, and equal to fully 10% of the ferrocyanide employed. This is a modification of what is commonly known as 'Wigger's process.'

b. Expose well-dried and powdered ferrocyanide of potassium to a moderate red heat, in a close vessel; when cold, powder the fused mass, place it in a funnel, moisten it with a little alcohol, and wash it with cold water; evaporate the solution thus formed to dryness, expose it to a dull red heat in a porcelain dish, cool, powder, and digest it in boiling rectified spirit; as the spirit cools, crystals of cyanide of potassium, nearly pure, will be deposited. The alcohol employed in both this and the preceding process may be recovered by distillation from calcined sulphate of iron.

2. (CRUDE OR COMMERCIAL CYANIDE—Liebig.) Commercial ferrocyanide of potassium, 8 parts, rendered anhydrous by gently heating it on an iron plate, is intimately mixed with dry carbonate of potassium, 3 parts; this mixture is thrown into a red-hot earthen crucible, and kept in a state of fusion, with occasional stirring, until gas ceases to be evolved, and the fluid portion of the mass becomes colourless; the crucible is then left at rest for a few minutes, to allow its contents to settle, after which the clear portion is poured from the heavy black sediment at the bottom, upon a clean marble slab, and the mass, whilst yet warm, broken up, and placed in well-closed bottles.

Obs. A cheap and excellent process. The product is said to contain about 1-8th part of cyanate of potassium, and, though not sufficiently pure for employment in medicine as potassium cyanide, is admirably adapted for the various technical applications of this substance, as in electro-plating, electro-gilding, photography, &c. It may also be advantageously substituted for the ferrocyanide in the preparation of hydrocyanic acid by the distillation of that substance along with dilute sulphuric acid.

Prop., &c. When pure, this salt is colourless and odourless; it forms cubic or octahedral crystals, which are anhydrous; it is freely soluble in water and in boiling alcohol, but most of it separates from the latter as the solution cools; it is fusible; and undergoes no change, even at a full red heat, in close vessels; it exhibits an alkaline reaction; when exposed to the atmosphere, it absorbs moisture, and acquires the smell of hydrocyanic acid. If it effervesces with acids, it contains carbonate of potassium, and if it be yellow it contains iron. It is employed in chemical analyses, and for the preparation of hydrocyanic acid; cyanide of sodium may be made in the same way. The *dose* is $\frac{1}{12}$ to $\frac{1}{4}$ gr., in solution; in the usual cases in which the administration of hydrocyanic acid is indicated.

Potassium, Ferricyanide of. K_3FeCy_6, or K_3, FeC_6N_6. *Syn.* FERRIDCYANIDE OF POTASSIUM, FERRICYANURET OF P., RED PRUSSIATE OF POTASH; POTASSII FERRICYANIDUM, P. PRUSSIAS RUBRUM, L. This important and beautiful salt was discovered by L. Gmelin. At first it was merely regarded as a chemical curiosity, but it is now extensively employed in dyeing, calico-printing, assaying, &c.

Prep. 1. Chlorine gas, prepared in the ordinary manner, is slowly passed into a cold solution of ferrocyanide of potassium, 1 part, in water, 10 parts, with constant agitation, until the liquid appears of a deep reddish-green colour, or of a fine red colour by transmitted light, and ceases to give a blue precipitate, or even a blue tinge, to a solution of ferric chloride, an excess of chlorine being carefully avoided; the liquor is next evaporated by the heat of steam or boiling water, until a pellicle forms upon the surface, when it is filtered, and set aside to cool; the crystals are afterwards purified by re-solution and re-crystallisation.—Another method is simply to evaporate the original solution to dryness, by a steam-heat, with agitation, then to redissolve the residuum in the least possible quantity of boiling water, and, after defecation or filtration, to allow the new solution to cool very slowly, that crystals may form.

2. (Extemporaneous.) Add nitric acid, very gradually, to a cold solution of ferrocyanide of potassium, with constant agitation, until a drop

the mixture ceases to impart a blue colour a solution of ferric chloride, carefully avoiding excess of acid. It may be at once used in lution, or evaporated, &c., as before.

Prop., &c. Magnificent regular prismatic , sometimes, tabular crystals, of a rich ruby-d tint; permanent in the air; combustible; ecomposed by a high temperature; soluble 4 parts of cold water; insoluble in alcohol. olours ferric salts a pale brown, gives with rrous salt a deep blue, and precipitates bis-uth salts pale yellow; cadmium and mer-uric salts, yellow; zinc salts, deep yellow; ercurous, cupric, molybdenic, silver, and ranic salts, reddish brown; cobalt salts, ark brown; manganous salts, brown; cupric lts, greenish; and nickelous salts, olive rown.

Potassium, Ferrocyanide of. K_4FeCy_6, or $K_4FeC_6N_6$. *Syn.* FERROCYANURET OF POTASSIUM, PRUSSIATE OF POTASH, YELLOW P. OF P.; POTASSÆ PRUSSIA FLAVA (B. P.), POTASSII FERROCYANIDUM (Ph. L. E. & D.), L. his valuable salt, the well-known 'prussiate f potash' of commerce, was discovered by the llustrious Scheele about the middle of the 18th entury. It is now only manufactured on the arge scale.

Prep. Good 'potash' or 'pearlash,' 2 parts, nd dried blood, horns, hoofs, woollen rags, or ther refuse animal matter, 5 or 6 parts, are educed to coarse powder, and mixed with ome coarse iron borings; the mixture is then njected into egg-shaped cast-iron pots in a tate of moderate ignition; the mass is frequently stirred with an iron spatula, so as to prevent it running together, and the calcination is continued until fetid vapours cease to be evolved, and flame is no longer seen on stirring the mixture, care being taken to exclude the air from the vessels as much as possible; during the latter part of the process the pots are kept constantly covered, and the ignited mass stirred less frequently; the hot pasty mass is then removed with an iron ladle, and excluded from the air until cold; it is next exhausted by edulcoration with boiling water, and the resulting solution, after defecation or filtration, is concentrated by evaporation, so that crystals may form as the liquid cools; these are redissolved in hot water, and the solution allowed to cool very slowly, when large and beautiful yellow crystals of ferrocyanide of potassium are deposited.—*Product.* 1 on of dried blood or woollen refuse, with 3 cwt. of pearlash, yields from 2 to 2½ cwt. of commercial ferrocyanide. The mother-liquor contains ulphate of potassium.

Prop. It forms large and very beautiful ellow crystals, which are permanent in the ir, and very tough and difficult to powder; it s soluble in 4 parts of cold and 2 parts of boiling water; has a mild saline taste; at a gentle eat loses water; at a higher temperature, n closed vessels, it is, for the most part, converted into cyanide of potassium, and, when exposed to the air, into cyanate of potassium. Precipitates solutions of antimonous, bismuth, mercurous, and zinc salts, white; cadmium salts, of a pale yellow; cuprous salts, white, turning red; ferrous salts, white, turning blue; lead salts, white; manganous salts, white, turning red; mercuric salts, white, turning bluish; nickelous salts, white, turning green; silver salts, white; stannous salts, white; cobalt salts, green; cupric salts, chocolate red; ferric salts, dark blue; palladous salts, green; stannic salts, yellow; uranic salts, reddish brown; and zinc salts, white.

Uses, &c. Ferrocyanide of potassium is chiefly used in dyeing and calico-printing, in the manufacture of Prussian blue, in electro-plating, and, in chemistry, as a test, and a source of hydrocyanic acid. As a medicine, it is said to be sedative and astringent, and in large doses purgative, but appears to possess little action. —*Dose.* 10 grs. to ½ dr., dissolved in water; in hooping-cough, chronic bronchitis, night-sweats, leucorrhœa, &c. D'Arcet swallowed a solution containing ½ oz. of this salt without experiencing any injurious effects.

Potassium, Hydrate of. KHO. *Syn.* POTASSA HYDRATE, HYDRATE OF POTASSA, POTASSA, CAUSTIC P., HYDRATED OXIDE OF POTASSIUM; POTASSA CAUSTICA (B. P.), POTASSA (Ph. E.), P. CAUSTICA (Ph. D.), P. HYDRAS (Ph. L.), P. FUSA. *Prep.* 1. (Ph. L.) Liquor of potassa, 1 gall.; evaporate the water in a clean iron vessel over the fire until, the ebullition being finished, the residuum of potassium hydrate liquefies; pour this into proper moulds.

2. (Ph. E. & D.) As the last, but pouring the fused hydrate upon a bright and clean iron plate (silver or iron dish—Ph. D.); as soon as it solidifies, break it quickly (into fragments), and put it into stoppered glass (green-glass—Ph. D.) bottles.

3. (Pure.) The hydrate, obtained as above, is dissolved in alcohol or rectified spirit, and, after repose for a few days in a closely stopped green-glass or silver vessel, the solution is decanted, and cautiously evaporated in a deep silver basin, out of contact with the air.

Prop., &c. When perfectly pure, it is white, solid, very soluble in water and in alcohol; very deliquescent; intensely acrid and corrosive; and exhibiting the usual signs of alkalinity in the highest degree. That of the shops has usually a grayish or bluish colour.

Potassium, Iodate of. KIO_3. *Syn.* POTASSÆ IODAS, L. *Prep.* Neutralise a hot solution of hydrate of potassium with iodine, evaporate to dryness by a gentle heat, powder the residuum, and digest it in alcohol, to remove iodide of potassium, dissolve the insoluble portion in hot water, and crystallise.

Obs. Iodate of potassium is resolved at a red heat into oxygen gas and iodide of potassium. It has been recommended in bronchocele.—*Dose.* 1 to 5 grs.

Potassium, Iodide of. KI. *Syn.* POTASSII IODIDUM (B. P., Ph. L. E. and D.).

1. (Ph. L. 1836.) Take of iron filings, 2 oz.; distilled water, 2 quarts; iodine, 6 oz.; mix them, and heat the solution until it turns green, and then add of carbonate of potassium, 4 oz., dissolved in water, 1 quart; filter, wash the residuum on the filter with water, evaporate the mixed filtered liquors and cystallise. Product, 1 oz. of iodine yields 1 oz. 45 grs. of iodide.

The formulæ of the Ph. D. and Ph. E. are very similar.

2. Add iodine to a hot solution of pure hydrate of potassium, until the alkali is perfectly neutralised, carefully avoiding excess, evaporate the liquid to dryness, and expose the dry mass to a gentle red heat in a platinum or iron crucible; afterwards, dissolve out the salt, gently evaporate, and crystallise. An excellent process, yielding a large product, but, if the ignition be not carefully managed, it is apt to contain a little undecomposed iodate. To obviate this, Mr. Scanlan proposes the addition of a little powdered charcoal to the mass before ignition, a plan adopted in the Ph. U.S.

3. Iodine is treated with a small proportion of phosphorus in water, and is thus converted into 'hydriodic acid;' hydrate of calcium is then added, and the 'iodide of calcium' formed is first fused, and then decomposed by sulphate of potassium into 'sulphate of calcium,' which is precipitated, and 'iodide of potassium,' which remains in solution, and may be crystallised, as in the other processes. This is a modification of a method devised by Liebeg.

Prop. It crystallises in cubes, which in the pure salt are extremely white, though frequently opaque; these are anhydrous; fuse when heated, without decomposition; dissolve in less than an equal weight of water, at 60° Fahr., and very freely in alcohol; and do not deliquesce in moderately dry air, unless they contain undecomposed hydrate of potassium. Its solution dissolves the iodine freely, and also, less readily, several of the insoluble metallic iodides and oxides.

Pur. It is entirely soluble in both water and alcohol. Its aqueous solution alters the colour of turmeric either not at all or but very slightly, nor does it affect litmus paper, or effervesce with acids. Nitric acid and starch being added together, it becomes blue. It is not coloured by the addition of tartaric acid with starch. No precipitate occurs on adding either a solution of hydrate of calcium or of chloride of barium. 100 grs., dissolved in water, by the addition of nitrate of silver, yield a precipitate of 141 grs. of iodide of silver.

Assay. The iodide of commerce frequently contains fully one half its weight of either chloride or carbonate of potassium, or both of them, with variable quantities of iodate of potassium, a much less valuable salt. The presence of these substances is readily detected by the above tests. As the first of these is only very slightly soluble in cold alcohol, and the others insoluble in that liquid, a ready method of determining the richness of a sample in pure iodide, sufficiently accurate for ordinary purposes, is as follows:—Reduce 50 grs. of the sample to fine powder, introduce this into a test tube with 6 fl. drs. of alcohol, agitate the mixture violently for one minute, and throw the whole on a weighed filter set in a covered funnel, observing to wash what remains on the filter with another fl. dr. of alcohol. The filtrate, evaporated to dryness, gives the quantity of pure iodide, and the filter, dried by the heat of boiling water, that of the impurities present in the sample examined, provided it contained no hydrate of potassium. The quantity of alkali, whether hydrate or carbonate, may be found by the common method of 'alkalimetry.'

Uses, &c. Chiefly in medicine and pharmacy.—*Dose.* 1 to 10 grs., twice or thrice daily, made into pills, or, better, in solution, either alone or combined with iodine; in bronchocele, scrofula, chronic rheumatism, dropsy, syphilis, glandular indurations, and various other glandular diseases. Also externally, made into a lotion or ointment.

Potassium, Nitrate of. KNO_3. *Syn.* NITRATE OF POTASH, NITRE, SALTPETRE; POTASSÆ NITRAS (B. P., Ph. L. E. & D.), NITRUM†, SAL NITRI†, SAL PETRÆ†, KALI NITRATUM†, L. This salt is produced naturally in the soil, by the action of the atmosphere, and crystallises upon its surface, in various parts of the world, especially in the East Indies. On the Continent it has long been produced artificially, by exposing a mixture of calcareous soil and animal matter to the atmosphere, when calcium nitrate is slowly formed, and is extracted by lixiviation. The liquid is then decomposed by the addition of wood ashes, or carbonate of potassium, by which carbonate of calcium is precipitated, and nitrate of potassium remains in solution. The places where these operations are performed are called 'nitriaries,' or 'nitrières artificielles.' The British market is wholly supplied from India. The salt of the first crystallisation, by either process, is called 'crude nitre' or 'rough saltpetre.' This is purified by solution in boiling water, skimming, and, after a short time allowed for defecation, straining (while still hot) into wooden crystallising vessels. The crystals thus obtained are called 'single refined nitre;' and when the process is repeated 'double refined nitre.'

1. (POTASSÆ NITRAS PURUM.—Ph. D.) Commercial nitre, 4 lbs.; boiling distilled water, 1 quart; dissolve, withdraw the heat, and stir the solution constantly as it cools; the minute crystals, thus obtained, are to be drained, and washed, in a glass or earthenware percolator, with cold distilled water, until that which trickles through ceases to give a precipitate with a solution of nitrate of silver, the contents

of the percolator are then to be withdrawn, and dried in an oven.

Prop. White, pellucid, six-sided prisms; permanent in the air; soluble in 7 parts of water at 60° and in 1 part at 212° Fahr.; insoluble in alcohol; its taste is cool, saline, and slightly bitter and pungent; at about 560° it fuses to an oily-looking mass, which concretes on cooling, forming 'sal prunella;' at a red heat it gives out oxygen, and, afterwards, nitrous fumes; sp. gr. 1·925 to 1·975.

Pur. Commercial nitre generally contains chlorides, sulphates, or calcareous salts. The first may be detected by its solution giving a cloudy white precipitate with nitrate of silver. The second by chlorides of barium or calcium giving a white precipitate, and the third by oxalate of ammonium giving a white precipitate.

Assay. Of the numerous methods prescribed for this purpose, few are sufficiently simple for mere practical men. The proportion of chlorides, sulphates, and calcareous salts, may be determined as above; and the general richness of the sample by the method of Gay-Lussac, modified as follows:—100 grs. of the sample (fairly chosen) are triturated with 50 grs. of lampblack and 400 grs. of common salt, and the mixture placed in an iron ladle, and ignited or fused therein, due care being taken to prevent loss; the residuum is exhausted with hot water, and the solution thus obtained tested by the usual methods of alkalimetry for carbonate of potassium. The quantity of carbonate found, multiplied by 2·125 or $2\frac{1}{8}$, gives the per-centage richness of the sample in nitrate.

Uses, &c. Nitre is chiefly employed in the manufacture of gunpowder, fireworks, and nitric acid. It is also used in medicine as a sedative, refrigerant, and diaphoretic, and as a cooling diuretic. It has been recommended in active hæmorrhages (especially spitting of blood), in various febrile affections, in scurvy, and in herpetic eruptions; and it has been highly extolled, by Dr. Basham, as a remedy in acute rheumatism.—*Dose.* 5 to 15 grs., every 2 hours. A small piece, dissolved slowly in the mouth, frequently stops a sore throat at the commencement. In large doses, it is poisonous. The best treatment is a powerful emetic, followed by opiates.

Potassium, Nitrite of. K_1NO_2. *Syn.* NITRITE OF POTASSA; POTASSÆ NITRIS, L. *Prep.* 1. By heating nitre to redness, dissolving the fused mass in a little water, and adding twice the volume of the solution in alcohol; after a few hours the upper stratum of liquid is decanted, and the lower one, separated from the crystals, evaporated to dryness.

2. (Corenwinder.) Nitric acid, 10 parts, are poured on starch, 1 part, and the evolved gas passed through a solution of hydrate of potassium of the sp. gr. 1·380, to saturation; the liquid is then either neutralised with a little hydrate of potassium (if necessary), and kept in the liquid form, or at once evaporated. Fused pinkish mass, or clear colourless soluble crystals, used in chemistry as a reagent, and deoxydiser.

Potassium, Oxalate of. $K_2C_2O_4$. *Syn.* NEUTRAL OXALATE OF POTASSA; POTASSÆ OXALAS, L. *Prep.* Neutralise a solution of oxalic acid, or the acid oxalates, with carbonate of potassium, evaporate, and crystallise. Transparent colourless rhombic prisms, soluble in 3 parts of water, and of the formula $K_2C_2O_4$, Aq.

Potassium, Hydrogen Oxalate of. K, H, C_2O_4. *Syn.* POTASSIUM BINOXALATE, SALT OF SORREL, ESSENTIAL SALT OF LEMONS; POTASSÆ BINOXALAS, L. *Prep.* By saturating a solution of oxalic acid, 1 part, with carbonate of potassium, adding to the mixture a similar solution of 1 part of oxalic acid, unneutralised, and evaporating for crystals. It may also be obtained from the expressed juice of wood or sheep's sorrel, by clarifying it with eggs or milk, and evaporating, &c., as before. Colourless rhombic crystals of the formula KHC_2O_4, Aq, soluble in 40 parts of cold and 6 parts of boiling water, yielding a very sour solution.

Potassium, Trihydrogen Oxalate of. $KH_3(C_2O_4)$, or KHC_2O_4, $H_2C_2O_4$. *Syn.* POTASSIUM QUADROXALATE, POTASSIUM ACID OXALATE. *Prep.* By neutralising 1 part of oxalic acid with carbonate of potassium, adding to the solution 3 parts more of oxalic acid, evaporating and crystallising. Resembles the last; has the formula $KH_3(C_2O_4)_2$, 2Aq; but is less soluble, and more intensely sour, and forms modified octahedral crystals. This salt is occasionally sold under the names of 'sal acetosellæ,' 'salt of sorrel,' and 'essential salt of lemons.' Both are used to remove ink and iron stains from linen, to bleach the straw used for making bonnets, and, occasionally, in medicine, as a refrigerant.

Potassium, Oxide of. K_2O. *Prep.* Burn pure potassium in a current of oxygen. White powder, rapidly absorbing water and forming the hydrate.

Potassium, Perchlorate of. $KClO_4$. *Syn.* POTASSÆ PERCHLORAS, L. Prepared by projecting well-dried and finely powdered chlorate of potassium, in small portions at a time, into warm nitric acid. The salt is separated from the 'nitrate' by crystallisation.

Potassium, Prussiate of. See POTASSIUM FERRICYANIDE and FERROCYANIDE.

Potassium, Salicylite of. Formed by mixing salicylous acid (artificial oil of meadow-sweet) with a strong solution of hydrate of potassium; it separates, on agitation, as a yellow crystalline mass, which, after pressure in bibulous paper, is recrystallised from alcohol. Golden-yellow crystals, soluble in both water and alcohol; damp air gradually converts them into acetate of potassium and melanic acid.

Potassium, Sulphate of. K_2SO_4. *Syn.* POTASSÆ SULPHAS (B. P., Ph. L. E. & D.). *Prep.* The sulphate of potassium of commerce is a secondary product of several chemical and

manufacturing processes. Thus, the residuum of the distillation of nitric acid from nitre is dissolved in water, the solution neutralised with carbonate of potassium, and, after defecation, evaporation until a pellicle forms; it is then strained, or decanted, and set aside to crystallise. Or, the residuum is simply ignited, to expel excess of acid, and then dissolved, and crystallised, as before.

Prop., &c. Anhydrous, heavy, quartz-like crystals; permanent in the air; soluble in 12 parts of water at 60° and in 5 parts at 212° Fahr.; insoluble in alcohol; extremely nauseous, and bitter-tasted. It crepitates on the application of heat; fuses at a red heat, but loses nothing in weight. 100 grs., dissolved in distilled water, on the addition of chloride of barium and hydrochloric acid, furnish 132 grs. of sulphate of barium, dried at a red heat.

Potassium, Bisulphate of. $KHSO_4$. *Syn.* POTASSIUM-HYDROGEN SULPHATE, ACID POTASSIUM SULPHATE; POTASSÆ BISULPHAS. *Prep.* 1. (Anhydrous.) Neutral sulphate of potassium and oil of vitriol, equal parts; hot water, q. s. (not more) to dissolve; anhydrous bisulphate crystallises out, in long delicate needles, as the solution cools. If these are left for several days in the mother-liquor, they are redissolved, and crystals of the ordinary hydrated bisulphate are deposited.

2. (Hydrated.)—*a.* (Ph. L. 1836.) Salt left in distilling nitric acid, 2 lbs.; boiling water, 3 quarts; dissolve; add of sulphuric acid, 1 lb.; concentrate by evaporation, and set the liquid aside, so that crystals may form.

b. (Ph. D.) Sulphate of potassium (in powder), 3 oz.; sulphuric acid, 1 fl. oz.; mix them in a porcelain capsule, and expose it to a heat capable of liquefying its contents, until acid vapours cease to be evolved; powder the residuum, and preserve it in a well-stopped bottle.

Prop., &c. Sour and slightly bitter-tasted rhombic prisms; soluble in about 2 parts of cold and 1 part of boiling water, the solution exhibiting a strongly acid reaction. It is much employed, in lieu of tartaric acid, for the production of carbonic acid, in 'gazogenes,' &c.; also to adulterate cream of tartar and tartaric acid. According to Dr. Paris, it forms a "grateful adjunct to rhubarb."—*Dose.* 12 grs. to 1½ dr., in solution, combined with rhubarb or bitters, as the neutral sulphate.

Potassium, Sulphocyanide of. KCNS, or KCyS. *Syn.* SULPHO-CYANURET OF POTASSIUM; POTASSII SULPHOCYANIDUM, P. SULPHO-CYANURETUM, L. *Prep.* 1. Ferrocyanide of potassium (anhydrous, or dried by a gentle heat), 46 parts; sulphur, 32 parts; pure carbonate of potassium, 17 parts; reduce them to powder, and very gradually heat the mixture to low redness in a covered iron crucible, which it will less than one half fill; remove the half-refrigerated and still soft mass, crush it, exhaust it with water, and evaporate the aqueous solution to dryness; powder the residuum, and exhaust it with hot alcohol or rectified spirit; the alcoholic solution will yield beautiful white crystals as it cools, and the residuum or mother-liquor may be evaporated for the remainder of the salt.

2. Cyanide of potassium, 3 parts; sulphur, 1 part; water, 6 parts; digest them together for some time, add 3 parts more of water, filter, evaporate, and crystallise.

Prop., &c. Long, slender, colourless prisms or plates, which are anhydrous, bitter-tasted, deliquescent, fusible, very soluble in both water and alcohol, and non-poisonous. It is chiefly used as a test for ferric oxide, for which purpose it is preferable to all other substances.

Potassium, Sulphide of. *Syn.* SULPHURET OF POTASSIUM, LIVER OF SULPHUR†; POTASSII SULPHURETUM (Ph. L. E. & U.S.), HEPAR SULPHURIS (Ph. D.), L. *Prep.* 1. (Ph. E.) Sulphur, 1 oz.; carbonate of potassium, 4 oz.; mix, heat them in a covered crucible till they form a uniform fused mass; when cold, break it into fragments, and preserve it in well-closed vessels. The formulæ of the Ph. L. 1836 and Ph. U.S. are similar.

2. (Ph. D.) Sublimed sulphur, 4 oz.; carbonate of potassium (from pearlash, first dried, and then reduced to powder), 7 oz.; mix in a warm mortar, heat them in a Hessian crucible, as before, pour the fused mass into an iron cup, over which immediately invert a second vessel, to exclude the air, and, when cold, break the mass into fragments, and preserve it in a green-glass stoppered bottle.

Prop., &c. A hard, brittle, liver or greenish-brown coloured solid; inodorous whilst dry; soluble in water, forming a highly fetid solution; and, in acids, evolving strong fumes of sulphuretted hydrogen; reaction, alkaline; exposed to the air, it is gradually converted into sulphate of potassa. As a medicine, it is reputed diaphoretic, expectorant, and stimulant.—*Dose.* 2 to 6 grs., in solution, or made into pills with soap; in gout, rheumatism, liver affections, and various chronic skin diseases. Externally, made into a lotion and ointment. It is highly acrid and corrosive, and in large doses poisonous.

Potassium, Tartrate of. $K_2C_4H_4O_6$. *Syn.* NEUTRAL TARTRATE OF POTASSIUM, TARTRATE OF POTASSA, NEUTRAL TARTAR, SOLUBLE T.; POTASSÆ TARTRAS (B. P., Ph. L. E. & D.), KALI TARTARIZATUM†, L. *Prep.* (Ph. D.) Carbonate of potassium, 8 oz.; distilled water, 2 quarts; dissolve, and to the solution, whilst boiling hot, gradually add of bitartrate of potassium, in fine powder, 1 lb., or q. s., so that the liquid, after ebullition for a couple of minutes, ceases to change the colour of either blue or reddened litmus paper; next filter the liquid through calico, evaporate it until a pellicle forms on the surface, and set it aside to

crystallise; after 12 hours, collect the crystals, dry them on bibulous paper, and preserve them from the air. The formula of the Ph. L. 1836 is nearly similar.

Prop., &c. The crystals of this salt, which are obtained with difficulty, are right rhombic prisms, and are deliquescent. The salt of commerce is usually in the form of a white granular powder, which is obtained by simply evaporating the solution to dryness, with constant stirring. In this state it requires about 4 parts of cold water for its solution. Acids convert it into the bitartrate. As a medicine, it acts as a gentle diuretic and aperient, and is valued for correcting the griping properties of senna and resinous purgatives. It is also antiscorbutic.—*Dose.* ½ dr. to ¾ oz., in powder, or dissolved in water. The solution changes the colour neither of litmus nor turmeric. The addition of almost any acid throws down crystals of bitartrate of potassium, which generally adhere to the vessel. The precipitate occasioned by either chloride of barium or acetate of lead is dissolved by dilute nitric acid.

Potassium, Bitartrate of. $KHC_4H_4O_6$. *Syn.* ACID TARTRATE OF POTASSA, SUPER-TARTRATE OF P., CREAM OF TARTAR; CREMOR TARTARI, POTASSÆ BITARTRAS (B. P., Ph. L. E. & D.), POTASSÆ SUPER-TARTRAS, TARTARI CRYSTALLI, L. This well-known salt is deposited during the fermentation of grape juice, as a crust on the sides of the casks or vats. In its unprepared or crude state, it is called white or red tartar or argol, according to the wine from which it has been obtained. It is purified by boiling it in water, crystallisation, resolution in water, and treatment with freshly burnt charcoal and aluminous clay, to remove the colour; the clear liquid is then decanted, whilst still hot, and allowed to cool slowly; the resulting crystals form the 'cream of tartar' of commerce.

Prop., &c. Small, translucent, gritty, prismatic crystals, irregularly grouped together; permanent in the air; requiring fully 100 parts of cold water, and about 15 parts of boiling water, for their perfect solution; the solution has a harsh, sour taste, and, like that of the tartrate, suffers spontaneous decomposition by keeping. Its solution reddens litmus. At a red heat, it is converted into carbonate of potassium. Entirely soluble in 40 parts of boiling water; 40 grs., in solution, are neutralised by 30 grs. of crystallised carbonate of soda.—*Dose.* As an aperient, 1 to 3 drs.; as a diuretic, ½ dr. to 1 dr.; as an antiscorbutic, 10 to 20 grs., frequently. It is much used to make a pleasant cooling drink ('Imperial'), and in tooth-powders.

POTA'TO. This well-known and valuable article of food is the tuber of the *Solanum tuberosum* or *esculentum*, a plant which was introduced to this country by either Sir Francis Drake or Sir Walter Raleigh, towards the latter part of the 16th century. It is now extensively cultivated in all the temperate climates of the world. It yields a vast quantity of food on a small space of ground, but only about 1-7th part of the weight of the tuber is nutritious, and this is chiefly farinaceous. Its farina or starch is, however, accompanied by no inconsiderable portion of saline matter, more especially of potassa, which renders it highly antiscorbutic, and a powerful corrective of the grossness of animal food. When forming part of a mixed diet, perhaps no substance is more wholesome than the potato, and, certainly, no other esculent hitherto discovered appears equally adapted for universal use.

No certain rule can be laid down for 'dressing' potatoes. "If boiled, it may be that they require to be put into boiling water, or, may be, into cold, and either boiled quickly or slowly; but this you must find out. Choose them all about the same size, with a smooth skin, and when they are boiled and begin to crack, throw off the water immediately, as it only damages the root. When dressed, let them stand near the fire, with a cloth over them, and serve them in the skins. Salt may be put into the water at the beginning. A watery potato will require quick boiling, and, sometimes, to be put into boiling water." (Soyer.)

To retain the highest amount of nourishment in potatoes, they should be 'dressed' with their skins on them. The bruised or damaged parts, worm-holes, &c., being removed with a knife, the dirt should be carefully cleaned out of the "eyes," and from the rough parts of the skins, by means of a brush and water, after which they should be well rinsed in clean water, and drained in a colander. If they are at all dry or shrivelled, they may be advantageously left to soak for 3 or 4 hours in clean cold water before cooking them. Potatoes 'dressed' in the skins have been found to be nearly twice as rich in potassa-salts as those which have been first peeled. The skins are easily removed before sending them to table.

NEW POTATOES should have their loose outer skin rubbed off with a cloth or stiff brush before being dressed or cooked.

MASHED POTATOES are prepared by crushing, with the back of a spoon, or with a rolling-pin, the hot 'dressed' tubers, placed in a bowl or dish, or on a pie-board. A little milk, butter, and salt, may be added to them at will; and they may be either at once 'served up,' or pressed into 'forms,' and first 'browned off' in the oven. Potatoes, if not soft and mealy, and well masticated, frequently escape the solvent action of the stomach, and pass off undigested, often to the serious derangement of the health. By mashing them, this inconvenience is removed. The delicate, the dyspeptic, and the aged, should take them in no other form.

Potatoes may be preserved, so as to stand the longest voyages unchanged, by thoroughly desiccating them in an oven, or by steam heat. For this purpose, the roots, either raw or

three parts dressed, are generally first cut into dice of above ¾ inch square, to facilitate the operation. Under a patent granted to Mr. Downes Edwards, Aug., 1840, the boiled potatoes are mashed and granulated, by forcing them through a perforated plate, before drying them. The granulated product, beaten up with a little hot milk or hot water, forms an excellent extemporaneous dish of mashed potatoes.

POT POURRI. [Fr.] A mixture of odorous flowers, roots, gums, &c., varied according to the taste of the operator, either mixed together dry, or in the fresh state preserved with salt. "The usual way of making it is to collect roses, lavender, and other sweet-scented flowers, as they blow; to put them into a large jar mixed (stratified) with salt, until a sufficient quantity has been collected; then to add to these such other odorous substances as may be required to form an agreeable perfume." Among the substances thus added are—ambergris, benzoin, calamus root, cascarilla, cassia, cassia buds, cinnamon, civet, cloves, musk, musk seed, orange berries and flowers, orris root, pimento, storax, vanilla, yellow sandal wood, &c.

"Instead of the fresh flowers, dried roses are sometimes used, and, with the addition of some essential oils, these answer quite as well." (Redwood.)

POTTED MEATS. See PUTREFACTION and POTTING (*below*).

POTTERY. The mechanical operations connected with the manufacture of pottery (CERAMIC ART) do not come within the province of this work. The materials employed, in this country, to produce the best kind of earthenware (STAFFORDSHIRE WARE) are the fine white clays of Devonshire and Cornwall, and powdered chert or flint. This is brought to a perfectly homogeneous plastic mass with water, and in this state is fashioned upon the potter's wheel and lathe, or by moulding, into all the varied objects of utility and ornament which are made in this material. After the newly formed vessels and other articles have been dried by exposure in heated rooms, they are enclosed in clay cases (SEGGARS) and exposed to heat in a kiln, by which they arrive at a state (BISCUIT) which renders them fit for glazing; the patterns (if any) and, afterwards, appropriate vitreous materials having been applied to their surfaces, they are again placed in the seggars, and are again exposed in a kiln to a heat sufficiently high to fuse the newly applied compound, by which they acquire a uniform enamelled surface, and become fit for the market. PORCELAIN, or CHINA, as it is commonly called, is manufactured in a nearly similar manner, but the materials are selected and the various processes conducted with corresponding skill and care.

The ornamental patterns are produced upon both Staffordshire ware and porcelain by a number of ingenious processes, among which printing, painting, and moulding, are the principal. The colours employed are those which have been already referred to under ENAMELS.

The metallic lustres now so common on stoneware, &c., are given as follows:—

1. GOLD LUSTRE. Dissolve grain-gold, 1 dr., in aqua regia, ½ oz.; to the solution add of metallic tin, 6 grs.; and when this is dissolved, pour it very gradually, with constant stirring, into a mixture of balsam of sulphur, ½ dr.; oil of turpentine, 20 grs.; when the mass begins to stiffen, ½ dr. more of oil of turpentine must be added, and well mixed in. More gold deepens and brightens the lustre; more tin turns it on the violet or purple.

2. IRON LUSTRE. From a mixture of 'muriate of iron' (ferric chloride) and spirit of tar.

3. PLATINUM LUSTRE. To a solution of platinum in aqua regia (platinic chloride) is added, drop by drop, a mixture of spirit of tar and balsam of sulphur in equal proportions, until by a trial the composition is found to give the required result. This gives the appearance of polished steel.

4. SILVER LUSTRE. The ammonio-chloride of platinum is reduced to an impalpable powder, ground up to the requisite consistence with a little spirit of tar, and at once applied with a brush.

The above lustres are applied, over an easily fusible glaze, to the outer surfaces only of the vessels, after which adhesion is produced by exposing the pieces to a slight degree of heat in the muffle. To give them their full beauty, they must be rubbed with cotton, wool, or chamois leather, after the firing. See ALUMINA, CLAY, ENAMELS, GILDING, GLAZES, KAOLIN, &c.

POTTING. A term commonly applied to the operation or practice of preserving animal substances in a state fit for immediate use, in small pots or jars. The method of proceeding is, first, to mince the substance (previously well dressed, and carefully deprived of bones, sinews, skin, &c.), and, next, to pound it in a clean polished marble or iron mortar, along with a little butter and some cayenne pepper, or other suitable spice or sauce, until it forms a perfectly smooth paste; this is pressed into the pots, so as to about 2-3rds fill them, and clarified melted butter is then poured in to the depth of about 1-8th of an inch; the pots are, lastly, closely covered over, and kept in a cool situation. In this state their contents may be preserved for a year, or longer. Potted beef, ham, veal, poultry, game, anchovies, bloaters, salmon, &c., are commonly sold in the shops. They are all intended for relishes, and are spread upon bread, in the same manner as butter.

POUDRE KOUSIQUE. [Fr.] A French nostrum, consisting of nitre and sulphur, of each, 50 parts; charcoal and antimony, of each, 1 part. It is divided into ½-dr. doses, of which

three are put into each packet. It is given to dogs in a ball of butter, to prevent the disorders to which they are liable.

POUDRE METALLIQUE. [Fr.] See TOOTH CEMENTS.

POUDRE SUBTILE. [Fr.] See DEPILATORY.

POUDRETTE. [Fr.] Dried night-soil. The manure sold under this name is a compound of night-soil with clay, charcoal, or gypsum, made into balls or cakes. Its extensive use in Belgium, France, the United States of America, and, more particularly, in China, where it was first employed, has shown it to be the most fertilising and generally applicable of all the numerous substances used as manure. Unfortunately, the prejudices of Englishmen lead them to poison the air of their cities and towns, and the water of their rivers, with a substance which, if rightly applied, would crown their fields with golden harvests, and drive pauperism from the land.

POUL'TICE. *Syn.* CATAPLASM; CATAPLASMA, L. An external application, generally extemporaneous, used to promote suppuration, allay pain and inflammation, resolve tumours, &c.

Poultices (cataplasmata) are generally prepared with substances capable of absorbing much water, and assuming a pulpy consistence, so as to admit of their application to any surface, however irregular. Their curative action principally depends upon the liquids with which they are moistened, and the heat retained by the mass. With this object they should never be heavy, or very bulky, and should be frequently repeated, and lightly, but securely, bandaged on, to prevent displacement.

The addition of a little lard, olive oil, or, still better, glycerin, to a poultice, tends greatly to promote its emollient action, and to retard its hardening.

As the continued medication of the part with warmth and moisture, or with substances applied in the moist way, is the principal object to be attained in the application of poultices, a fold or two of lint or soft linen dipped in hot water, either simple or medicated, and covered with a piece of thin sheet gutta percha or India-rubber cloth, to prevent evaporation, may be often conveniently applied in their stead. A very elegant and useful substitute of this kind is sold under the name of 'spongio piline.' Its cleanliness, lightness, and ease of application, has led to its extensive adoption by the medical profession.

The following formulæ embrace all the cataplasma of the Pharmacopœias:—

Poultice of Al'um. *Syn.* CATAPLASMA ALUMINIS, L. *Prep.* (B. P., Ph. D. 1826.) Alum (in powder), 1 dr.; whites of 2 eggs; shake them together until they form a coagulum. Applied, between the folds of fine linen, to chilblains, sore nipples, inflamed eyes, &c.

Poultice of Bread. *Syn.* CATAPLASMA PANIS, L. *Prep.* From crum of bread, soaked in hot water, slightly pressed, and then beaten up with a little lard, butter, or oil. Emollient. See LINSEED MEAL POULTICE (*below*.)

Poultice of Car'rot. *Syn.* CATAPLASMA DAUCI, L. *Prep.* 1. From the common esculent carrot, scraped fine, so as to form a pulp.

2. (Ph. D. 1826.) From the cultivated carrot boiled with a little water, until it becomes soft enough to form a poultice. Anodyne and antiseptic. *Used* in foul and painful ulcers, burns, contusions, &c. That from the first formula is the more stimulant.

Poultice of Char'coal. *Syn.* CATAPLASMA CARBONIS (B. P., Ph. L.), C. C. LIGNI, L. *Prep.* 1. (Ph. L.) Soak bread, 2 oz., in boiling water, ½ pint; to this add, by degrees, of linseed meal, 10 drs., and, afterwards, of powdered (recently burnt) charcoal, 2 drs.; lastly, sprinkle on the surface of the poultice powdered charcoal, 1 dr. As an application to fetid and gangrenous sores; frequently renewed.

2. (B. P.) Wood charcoal, ½ oz.; bread, 2 oz.; linseed meal, 1½ oz.; boiling water, 10 oz.; soak the bread in the water near the fire, add the linseed meal and half the charcoal, stirring to a soft poultice, sprinkling the remainder of the charcoal on the surface.

Poultice of Chlo"ride of So'da. *Syn.* CATAPLASMA SODÆ CHLORINATÆ (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) Boiling water, 6 fl. oz.; linseed meal, 4½ oz.; mix gradually, then add of solution of chlorinated soda, 2 fl. oz. Applied to foul ulcers, gangrenous parts, &c.

2. (B. P.) Solution of chlorinated soda, 1; linseed meal, 2; boiling water, 4; add the linseed meal gradually to the water, stirring constantly, then mix the solution of chlorinated soda.

Poultice of Hem'lock. *Syn.* CATAPLASMA CONII (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) Boiling water, ½ pint; linseed meal, 4½ oz., or q. s.; make a poultice, and on this spread of extract of hemlock (Ph. L.), 1 oz., first softened with a little hot water. Anodyne. In irritable and painful cancerous, scrofulous, and syphilitic sores, tumours, &c.

2. (B. P.) Hemlock leaf, in powder, 1 oz.; linseed meal, 3 oz.; boiling water, 10 oz.; mix the ingredients, then add them to the water gradually, constantly stirring.

Poultice of Linseed Meal. *Syn.* CATAPLASMA LINI (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) To boiling water, ½ pint, add, gradually, constantly stirring, of linseed meal, 4½ oz., or q. s. Emollient. *Used* to promote the suppuration or 'ripening' of tumours. A little oil or lard should be added, and some smeared over the surface as well, to prevent its getting hard. For small 'gatherings,' as of the fingers, a little chewed bread and butter is an efficient and convenient substitute.

2. (B. P.) Linseed meal, 4; olive oil, ½; boiling water, 10; mix the linseed meal with the oil, add the water gradually, constantly stirring.

Obs. Linseed meal prepared from the cake, from which the oil has been expressed, is less adapted for poultices than that prepared from the unpressed, whole seed. The latter is ordered in the Ph. L.

Poultice of Mus'tard. *Syn.* CATAPLASMA SINAPIS (Ph. L.), L. *Prep.* 1. (B. P., Ph. L.) Linseed meal and powdered mustard, of each, 2½ oz., or q. s.; boiling water, ½ pint; mix as before.

2. (Ph. L. 1836.) As the last, but substituting boiling vinegar for water. *Used* as a powerful counter-irritant, stimulant, and rubefacient; in low fevers, apoplexy, coma, &c., where there is a determination of blood to the head; in deep-seated inflammatory pains, neuralgic pains, &c. It should not be left on long enough to raise a blister. See PLASTERS.

Poultice of Pop'py. *Syn.* CATAPLASMA PAPAVERIS, L. *Prep.* 1. (P. Cod. 1839.) A strong decoction of poppies, thickened with crum of bread. Anodyne.

Poultice of Pota'to. *Syn.* CATAPLASMA SOLANI TUBEROSI, L. *Prep.* From the raw potato, scraped or grated fine. A popular application to fresh bruises, extravasations, burns, scalds, &c.

Pradier's Poultice. *Syn.* PRADIER'S CATAPLASMA; CATAPLASME DE PRADIER, Fr. *Prep.* Take of balsam of Mecca, 6 drs.; rectified spirit, 16 oz.; dissolve; next, separately, take red cinchona bark, sarsaparilla, and sage, of each, 1 oz.; saffron, ½ oz.; rectified spirit, 32 oz.; digest for 48 hours, and filter; mix the two liquors, add to them twice their weight of lime water. In gout; 2 fl. oz. are sprinkled on the surface of a hot linseed-meal poultice sufficiently large to surround the affected part. It is said that the Emperor Napoleon gave £2500 for this receipt.

Sim'ple Poultice. *Syn.* CATAPLASMA SIMPLEX, L. *Prep.* (Ph. D. 1826.) Powder for a cataplasma and boiling water, of each, q. s. to form a poultice, the surface of which is to be smeared over with olive oil. Emollient. Bread poultice and linseed-meal poultice are now generally called by this name. See POWDER (Poultice).

Poultice of Soap. *Syn.* CATAPLASMA SAPONIS, L. *Prep.* From white soap (scraped or sliced), 1 oz.; boiling water, ¼ pint; dissolve, and add crum of bread, q. s. As an application to scalds and burns.

Poultice of Vin'egar. *Syn.* CATAPLASMA ACETI, L. *Prep.* From crum of bread soaked in vinegar. Applied cold in bruises, extravasations, &c., especially black eyes. Verjuice is often employed in the same way.

Poultice of Yeast. *Syn.* CATAPLASMA FERMENTI (B. P., Ph. L.), C. F. CEREVISIÆ, L. *Prep.* 1. (Ph. L.) Beer yeast and water at 100° Fahr., of each, 5 fl. oz.; mix, stir in flour, 1 lb., and place it near the fire until it rises. In gangrenous or foul ulcers; to correct the fetor of the discharge, and to hasten the sloughing.

2. (B. P.) Beer yeast, 6; flour, 14; water (at 100° Fahr.), 6; mix. Place the mass near the fire till it rises.

POUL'TRY. Domestic birds, which are propagated and fed for the table, and for their eggs, feathers, &c.

The poultry of this country are the common domestic fowl, the turkey, the duck, and the goose; to which some writers add the guinea fowl and the peacock. Of these, the first is the most generally useful. Though a native of India, it accompanies man through almost every gradation of civilisation and climate, and flourishes almost everywhere, when properly secured from the inclemency of the weather, and allowed an ample supply of fresh air, with proper food. For the production of abundance of eggs, it must, however, be well fed and warmly lodged. The hen-roosts and poultry-houses should be well protected from the weather, and their temperature should be duly maintained by proximity to the stables, cow-houses, or dwelling-house, and, in cold weather, by the employment, when necessary, of artificial heat. The food should also contain an ample supply of nitrogenous matter, for without this how can it be expected that hens can produce abundance of eggs, which are peculiarly rich in nitrogen. The 'greaves' of the tallow-chandlers, and such-like substances, are hence excellent additions to the ordinary food of poultry. But it is not sufficient merely to supply poultry with abundance of food and warmth; it is equally necessary that they should have ample space for exercise and recreation. This space "should always contain living plants of various kinds, and some gravelly or sandy soil; because worms, snails, as well as, occasionally, grass and herbage, form a part of the food of poultry; and sand or gravel is swallowed by them for the purpose of promoting digestion." Hence, no healthy poultry can ever be reared in towns, however much the natural food may be imitated by the supply of animal matters, herbage, and sand." (Loudon.)

POUNCE. Powdered gum sandarac generally passes under this name. It is used to prepare parchment for writing on, and to prevent ink from spreading upon paper after erasures. Powdered cuttle-fish bone is occasionally employed in the same way. Both are applied to the surface by means of a cylindrical roll of list, called a 'rubber.' Packers rub the surface of porous and greasy woods, as the heads of boxes, cases, casks, &c., with whiting or powdered resin, to make them bear the ink. The coloured powders used by pattern drawers, for sprinkling over pricked papers, are also called 'pounce.' For liquid pounce, see MARKING INK.

POWDER. *Syn.* PULVIS, L. Powders are divided by pharmaceutical writers into two classes—simple and compound. The first are prepared by simple pulverisation; the second, by the admixture or two or more simple

powders. For use, the appropriate doses are separately weighed, and placed in separate papers. They are usually exhibited in a little honey, sugar, or milk, either taken from a spoon or made into an electuary or bolus, and swallowed in the semi-solid form. Metallic and other heavy powders are best taken in the latter state. Very active substances should be, in all cases, mixed with some inert powder, as that of starch, gum, liquorice, or marsh-mallow, at the time of 'dispensing' them.

"This form of preparing medicines is the simplest, and perhaps the least objectionable; but it is not applicable to all the articles of the Materia Medica. Those remedies which are very unpleasant to the taste; those which deliquesce rapidly when exposed to the air, or are very volatile; and those which require to be given in very large doses, or which are not diffused readily in water, cannot, with propriety, be administered in the form of powder. Some substances cannot be reduced to powder unless they be very much dried, and the heat necessary for that purpose alters their properties." Nor can we "be surprised that a great alteration should be effected in a short time by the action of the air on so great an extension of surface as takes place in the operation usually adopted for reducing drugs to a fine powder." (A. T. Thomson.)

In this country, compound powders appear to be a favourite form of medicine in the diseases of infancy and childhood.

"It is necessary that whatever we order to be reduced to powder should be rubbed through a fine sieve, so that the impurities and coarser parts may be separated; and it is needful that most powders should be recently prepared, and not too long kept." (Ph. L.)

"As nearly all powders suffer by exposure to the air and light, they should be preserved in closely corked opaque or green-glass bottles, or in tin canisters from which the external air is carefully excluded. See PULVERISATION, &c.

Powder, Algaroth's. See OXYCHLORIDE OF ANTIMONY (*page* 122).

Powder of Al'oes (Compound). *Syn.* PULVIS ALOËS COMPOSITUS (Ph. L.), P. ALOËS CUM GUAIACO, L. *Prep.* (Ph. L.) Socotrine or hepatic aloes (in powder), 1½ oz.; guaiacum (in powder), 1 oz.; compound cinnamon powder, ½ oz.; rub them together. A warm, sudorific purgative.—*Dose.* 10 to 20 grs.

Powder of Aloes with Canel'la. *Syn.* ALOETIC POWDER, HOLY BITTER†; HIERA PICRA†, PULVIS ALOES CUM CANELLÂ, L. *Prep.* From powdered Socotrine or hepatic aloes, 4 parts; powdered white canella, 1 part. *Uses* and *dose*, as the last.

Obs. Once a highly popular remedy. It was originally made into an electuary with honey, and in this form was frequently called 'HIERA LOGADII.' It is still a favourite in domestic medicine and veterinary practice. The principal objection to both this and the preceding preparation is the nauseous flavour of the aloes, which is ill concealed by the aromatics. The 'HIERA PICRA' for farriers is usually made with the cheapest Cape aloes.

Powder of Al'um (Compound). *Syn.* STYPTIC POWDER; PULVIS STYPTICUS, P. ALUMINIS COMPOSITUS (Ph. E.), L. *Prep.* (Ph. E.) Alum, 4 oz.; kino, 1 oz.; mix them, and reduce them to fine powder. Astringent and styptic.—*Dose.* 5 to 15 grs.; in diarrhœa, profuse menstruation, &c. Externally, in hæmorrhages, &c.

Powder of Ancho'vy. *Syn.* PULVIS CLUPEÆ ENCRASICOLI, L. *Prep.* Pound anchovies to a paste, them rub them through a sieve, and add enough flour to make a dough, which must be rolled out into thin slices and dried by a gentle heat in a stove; it is, lastly, powdered and bottled. Colouring is frequently added. Chiefly used to make sauces. British anchovies are frequently substituted for the genuine fish.

Powder, Antimo"nial. *Syn.* FEVER POWDER, LISLE'S P., JAMES'S P.; PULVIS JACOBI, PULVIS ANTIMONIALIS (B. P., Ph. E. & D.), PULVIS ANTIMONII COMPOSITUS (Ph. L.), L. *Prep.* 1. (Ph. L.) A mixture of tersulphide of antimony, 1 lb., and hartshorn shavings, 2 lbs., is reduced to powder, thrown into a crucible heated to whiteness, and stirred constantly until vapour no longer rises; the calcined mixture is then rubbed to powder, again put into the crucible, and the heat gradually increased to whiteness, and maintained so for 2 hours; the residuum is, lastly, reduced to a very fine powder.

2. (Ph. E.) From sulphide of antimony and hartshorn shavings, equal weights; as the last.

3. (Ph. D.) Tartarised antimony, 4 oz., is dissolved in water, ½ gall., and added to solution of phosphate of soda, 4 oz., in water, 1 quart; a solution of chloride of calcium, 2 oz., in water, 1 quart, and to which solution of ammonia (Ph. D.), 4 fl. oz., has been added, is next poured in, and the whole boiled for 20 minutes; the precipitate is then collected on a calico filter, and washed with hot distilled water, until the liquid which passes ceases to give a precipitate with a weak solution of nitrate of silver; it is, lastly, dried by a steam or water heat, and reduced to a fine powder.

4. (B. P.) Oxide of antimony, 1; precipitated phosphate of lime, 2; mix.—*Dose.* 2 to 6 grs.

Uses, &c. Febrifuge and diaphoretic. Intended as a substitute for the proprietary and more expensive JAMES'S POWDER.—*Dose.* 3 to 10 or 12 grs., or more, repeated every fourth or fifth hour until diaphoresis is set up; in fevers, rheumatic affections, chronic skin diseases, &c. It is a very uncertain and variable compound, unless it has been carefully prepared. Dr. Elliotson exhibited it in doses of 100 grs., without producing any sensible effect.

A spurious article, made by triturating 1 oz. of tartar emetic with 18 or 19 oz. of burnt hartshorn, is frequently sold for it in the shops. See ANTIMONIOUS ACID and JAMES'S POWDER.

Powder, Aromat'ic. See COMPOUND CINNAMON POWDER.

Powder, Arsen'ical. See ESCHAROTIC POWDER.

Powder of Asarabac'ca (Compound). See SNUFF (Cephalic).

Powder, Astrin'gent. *Syn.* PULVIS ASTRINGENS, P. STYPTICUS, L. *Prep.* From Aleppo galls and burnt alum, in fine powder, equal parts. *Used* in piles, soft polypi of the nose, chilblains, &c.

Powder, Ba''king. *Prep.* 1. Tartaric acid, ½ lb.; bicarbonate of soda and potato farina or British arrow-root, of each, ¾ lb. (each in powder); separately dry them perfectly by a very gentle heat, then mix them in a dry room, pass the mixture through a sieve, and at once put it into packets, observing to press it hard, and to cover it with tinfoil or close-made paper, to preserve it as much as possible from the air and moisture.

2. (Delforte's.) Powdered tartaric acid, ¼ lb.; powdered alum, ½ lb.; bicarbonate of soda, ¾ lb.; farina, 1 lb.; dry separately, as before, mix, and further add of sesquicarbonate of ammonia (in powder), 3 oz.; lastly, closely pack it in tinfoil.

3. (Green's.) Tartaric acid, 35 lbs.; sesquicarbonate of soda, 56 lbs.; potato flour, 1 cwt.; mix as before.

Uses, &c. Baking powder is chiefly employed as a substitute for yeast. 1 or 2 teaspoonfuls are mixed with the dry flour and other ingredients, which are then made into a dough, as quickly as possible, with cold water, and at once baked or boiled, as the case may be. By the addition of about ½ dr. of turmeric powder to each pound of the mixture it is converted into egg powder. When intended to be kept for any length of time it should be preserved in bottles or tins, so as to prevent the absorption of moisture. We have discovered traces of arsenic in some of the baking powders of the shops, which we refer to common washerwoman's soda being used in their composition, instead of the pure carbonate or sesquicarbonate.

Powder, Basil'ic. *Syn.* ROYAL POWDER, CORNACHINI'S P.; PULVIS BASILICUS, P. CORNACHINI, L. *Prep.* From scammony, calomel, cream of tartar, and diaphoretic antimony, equal parts. This is the formula generally adopted for this compound, which has now long been omitted from the Pharmacopœias. It is still a favourite with many practitioners, as an alterative purgative, and vermifuge for children.—*Dose.* For a child, 2 to 8 grs.; for an adult, 5 to 20 grs. Compound powder of scammony is now generally sold for it.

Powder, Blaine's Distem'per. The basis of this preparation is the 'aurum musivum,' or bisulphuret of tin. (Dr. Paris.)

Powder, Blancmange'. *Prep.* From sago meal, 1 lb.; essence of lemon, 15 drops; mace, 12 grs.; mix.

Powder, Bleach'ing. Chloride or hypochlorite of lime.

Powder Blue. See SMALT.

Powder, Bronze. See TIN (Bisulphide), BRONZING, &c.

Powder of Burnt Hartshorn. *Syn.* PULVIS CORNU CERVINI USTI, L. *Prep.* From pieces of hartshorn calcined to whiteness, and powdered. It consists principally of phosphate of lime.—*Dose.* 10 to 30 grs.; in rickets, &c.

Powder of Burnt Hartshorn with O'pium. *Syn.* PULVIS OPIATUS, PULVIS CORNU USTI CUM OPIO, L. *Prep.* From powdered calcined hartshorn, 1 oz.; powdered opium and cochineal, of each, 1 dr.—*Dose.* 5 to 20 grs.

Powder, Capuchin'. *Prep.* From powdered cevadilla, parsley seed, stavesacre, and tobacco, equal parts. *Used* to destroy pediculi.

Powder, Castillon's. *Prep.* From sago meal, salep, and gum tragacanth, of each 3 drs.; prepared oyster shells, 1 dr.; cochineal, q. s. to colour. Absorbent.—*Dose.* ½ to 1 dr., boiled in milk; in diarrhœa, &c.

Powder of Cat'echu (Compound). *Syn.* PULVIS CATECHU COMPOSITUS (B. P., Ph. D.), L. *Prep.* 1. (Ph. D.) Take catechu and kino, of each, 2 oz.; cinnamon and nutmeg, of each, ½ oz.; reduce each to a fine powder, mix, and keep the prepared powder in a well-stopped bottle. Aromatic and astringent.—*Dose.* ½ dr. to 2 drs.; in various affections.

2. (B. P.) Pale catechu; kino, 2; rhatany, 2; cinnamon, 1; nutmeg, 1; mix.—*Dose.* 25 to 30 grs.

Powder of Chalk (Compound). *Syn.* PULVIS CRETÆ AROMATICUS (B. P.), PULVIS CRETÆ COMPOSITUS (Ph. L. E. & D.), P. CARBONATIS CALCIS COMP., L. *Prep.* 1. (Ph. L.) Prepared chalk, ½ lb.; cinnamon, 4 oz.; tormentil and gum acacia, of each, 3 oz.; long pepper, ½ oz.; rub them, separately, to a very fine powder, and mix them.

2. (Ph. E.) Prepared chalk, 4 oz.; cinnamon, in fine powder, 1½ dr.; nutmeg, in fine powder, 1 dr.

3. (Ph. D.) Prepared chalk, 5 oz.; cinnamon, 2½ oz.; gum, 2 oz.; nutmeg, ½ oz.

4. (AROMATIC POWDER OF CHALK, B. P.) Chalk, 11; cinnamon, 4; nutmeg, 3; saffron, 3; cloves, 1½; cardamom seed, 1; refined sugar, 25; all in powder; mix.—*Dose.* 30 to 60 grs.

Uses, &c. Aromatic, astringent, and antacid.—*Dose.* 10 to 30 grs.; in acidity, flatulence, heartburn, diarrhœa, &c. The following form is used by many wholesale houses:—Prepared chalk, 4 lbs.; powdered cassia, 2 lbs.; powdered calamus aromaticus, ¾ lb.; powdered gum, 1½ lb.; long pepper, ½ lb.

Powder of Chalk with Opium (Compound). *Syn.* PULVIS CRETÆ AROMATICUS CUM OPIO

(B. P.); OPIATED CHALK POWDER; PULVIS CRETÆ COMPOSITUS CUM OPIO (Ph. L.), PULVIS CRETÆ OPIATUS (Ph. E. & D.), L. *Prep.* 1. (Ph. L.) Compound chalk powder, 6½ oz.; powdered opium, 80 grs.

2. (Ph. E.) Compound chalk powder, 6 oz.; powered opium, 80 grs.

3. (Ph. D.) Compound chalk powder, 4 oz. 7 drs.; opium, in fine powder, 1 dr.

4. (Wholesale.) Compound chalk powder, 21 oz.; powered opium, ½ oz. Anodyne, antacid, and carminative.—*Dose.* 10 to 30 grs.; in the same cases as the preceding, than which it is more active. It has long been a favourite remedy in all cases of simple and even choleraic diarrhœa.

5. Aromatic powder of chalk (*see* POWDER OF CHALK (Compound), 4), 39; opium, in powder, 1; mix thoroughly, and pass through a sieve.—*Dose.* 10 to 40 grs.

Powder, Chalk Mixture. *Syn.* PULVIS PRO MISTURA CRETÆ, L. *Prep.* (Beasley.) Powdered gum acacia, 5 oz.; prepared chalk, 4 oz.; white sugar, 3 oz.; oil of cinnamon, 1½ fl. dr.; mix. 40 grs. of this powder, triturated with 1 fl. oz. of water.

Powder, Chol'era (Saline). *Syn.* PULVIS SALINUS ANTICHOLERICUS, L. *Prep.* 1. (Dr. O'Shaughnessy.) Carbonate of soda, 5 grs.; chloride of sodium, phosphate of soda, and sulphate of soda, of each, 10 grs. For a dose.

Powder of Cin'namon (Compound). *Syn.* AROMATIC POWDER; PULVIS CINNAMOMI COMPOSITUS (B. P., Ph. L.), PULVIS AROMATICUS (Ph. E.), L. *Prep.* 1. (Ph. L.) Cinnamon, 2 oz.; cardamoms, 1½ oz.; ginger, 1 oz.; long pepper, ½ oz.; rub them together so that a fine powder may be made.

2. (B. P., Ph. E.) Cinnamon, cardamom seeds, and ginger, equal parts; to be kept in a well-closed glass vessel.

3. (Ph. D.) Cinnamon and ginger, of each, 2 oz.; cardamom seeds (husked), and nutmegs, of each, 1 oz. Aromatic and carminative.—*Dose.* 10 to 30 grs. In the powder of the shops cassia is generally substituted for cinnamon.

Powder, Cla'rifying. Flake albumen. See ALBUMEN.

Powder, Cock'le. From the well-known shell-fish *Cardium edule* (Linn.), as oyster powder.

Powder, Colbatche's Specific. *Prep.* From solution of sesquichloride of iron and acetate of lead, of each, 4 oz.; mix, evaporate to dryness, powder the residuum, and preserve it from the air. Astringent and hæmostatic.—*Dose.* 3 to 8 grs.

Powder of Col'ocynth. *Syn.* PULVIS COLOCYNTHIDIS, L. That of the shops is generally prepared from the whole of the peeled fruit, with the seeds, instead of merely from the pulp, by which its activity is greatly lessened. A factitious article is also met with in trade, made by grinding byrony root with about twice its weight of colocynth seeds, and a very small quantity of gamboge.

Powder of Contrayer'va (Compound). *Syn.* PULVIS CONTRAYERVÆ COMPOSITUS, L. *Prep.* (Ph. L. 1824.) Powdered contrayerva root, 5 oz.; prepared oyster shells, 1½ lb.; mix. A tonic absorbent or antacid.—*Dose.* 10 grs. to ½ dr., as required.

Powder, Corn.—See CORN SOLVENT (*page* 371), and WART POWDER (*below*).

Powder, Cosmet'ic. *Syn.* PULVIS COSMETICUS, L. *Prep.* (Ph. Hann. 1831.) Blanched sweet almonds and beans, of each, 18 oz.; orris root, 8 oz.; white Spanish soap, 6 oz.; spermaceti, 1½ oz.; dried carbonate of soda, 1 oz.; oils of lavender, bergamot, and lemon, of each, 6 drs.; mix, and beat them to a powder. See HAIR and HAND POWDER (*below*), PASTE (Almond), POWDERS (Scented), &c.

Powder of Cryst'al. From quartz, like POWDERED GLASS (page 574). *Used* to make fine glass; also for a dryer for paints, and sold under the name of 'diamond dust' for razor strops.

Powder, Cur'ry. *Syn.* INDIAN CURRY POWDER. The samples of this compound prepared by different houses vary so greatly from each other in the proportions of the ingredients, that it is difficult to regard any one as a standard. The following are therefore merely given as examples:—

Prep. 1. Corianders, 1 lb.; turmeric, ¾ lb.; black pepper, ½ lb.; scorched mustard, ¼ lb.; ginger, 2 oz.; cumin seed, 1 oz.; capsicums, ¾ oz.; mace, ¼ oz.; (all in powder;) mix well.

2. Coriander seeds and black pepper, of each, 8 lbs.; turmeric and cumin seeds, of each, 4 lbs.; allspice, ¾ lb.; mace, 1 oz.; (all in powder;) mix. This receipt is employed by an eminent wholesale house that does very largely in curry powder.

3. (See *page* 381.)

Used as a condiment and flavouring ingredient. The addition of a few heads of garlic gives it an increased zest for Indian veterans.

Powder, Cust'ard. *Prep.* From sago meal, 2 lbs.; powdered turmeric, ½ oz.; bitter-almond powder, cassia, and mace, of each, ½ dr.

Powder, Cyprus. From *Cladonia rangiferina* or reindeer moss. It has a very agreeable smell, and, being extremely retentive of odours, is much used as a basis for scent-powders, sachets, &c. The lichen known as the ragged hoary evernia also possesses nearly similar properties, and is often substituted for it. See POWDERS (Scented).

Powder, Disinfect'ing. *Syn.* PULVIS DISINFECTANS, L. *Prep.* (Keist.) Bisulphate of potassa, 41 parts; sugar of lead, 7 parts; binoxide of manganese, 3 parts; reduce them separately to a fine powder, and, when wanted for use, mix a proper quantity in any suitable

vessel. For other formulæ, see DISINFECTING COMPOUNDS. The name is generally applied to hypochlorite of lime.

Powder, Dover's. *Syn.* PULVIS DOVERI, L. *Prep.* (Original formula.) Nitre and sulphate of potassa, of each, 4 oz.; melt them together in a red-hot crucible, reduce the cold fused matter to powder, and add powdered ipecacuanha, liquorice, and opium, of each, 1 oz. This is the formula adopted in the Paris Codex. COMPOUND IPECACUANHA POWDER is now sold under this name. (See *below*.)

Powder, Egg. See BAKING POWDER.

Powder, Emmen'agogue. *Syn.* PULVIS EMMENAGOGUS, P. HÆMATINUS, P. CONTRA AMENORRHŒAM, L. *Prep.* 1. Saccharine carbonate of iron, 3 parts; powdered myrrh, ginger, and nutmeg, of each, 1 part; divide into ½-dr. papers. One for a *dose*, twice or thrice daily.

2. (Augustin.) Myrrh, 12 grs.; saffron, 3 grs.; oil of cloves, 1 drop. For a *dose*, as the last.

3. (Klein.) Calomel, 4 grs.; extract of yew, 10 grs.; powdered savine, 1 dr.; Quevenne's iron, ½ dr.; loaf sugar, 2 drs. For 6 powders; as before.

Powder, Escharot'ic (Arsenical). *Syn.* PULVIS ESCHAROTICUS ARSENICALIS, L.; POUDRE DU FRÈRES COSME, Fr. *Prep.* 1. (Original formula.) From white arsenic, 12 grs.; burnt hartshorn, ½ dr.; cinnabar, 1 dr.

2. (P. Cod.) Red sulphuret of mercury and powdered dragon's blood, of each, 2 parts; levigated arsenious acid, 1 part; carefully mixed together. See ARSENICAL CAUSTIC (*page* 304).

Powder of Extract of Col'ocyth (Compound). *Syn.* PULVIS EXTRACTI COLOCYNTHIDIS COMPOSITI, L. *Prep.* From compound extract of colocynth (Ph. L. 1836), dried by a gentle heat, and powdered.

Obs. This, like many other articles employed by lazy dispensers, does not represent the preparation for which it is used as a substitute; whilst, from its peculiar character, it is very open to sophistication, a practice, we regret to say, very general with certain druggists. Indeed, some of these parties make this article by simply throwing the ingredients of the extract into a pan along with a little water, and, when they have become soft, stirring them together with a spatula, after which they are desiccated and powdered. This is then labelled by certain houses "Pulv. Ext. Coloc. Co.—P. L.," and sold to their unfortunate customers as such, although no such an extract has been in the Ph. L. since that of 1836.

Powder, Faynard's. The charcoal of beechwood, finely powdered. (Paris.) *Used* in piles, and as a styptic.

Powder, Fe'ver. See ANTIMONIAL POWDER (*above*).

Powder of Flint. *Syn.* SILEX CONTRITUS (Ph. L.), L. *Prep.* As powdered glass. (See *page* 574.) It is ordered in the Ph. L. to be employed, instead of magnesia, for the purpose of mechanically dividing the essential oils used in the preparation of distilled water. It is also used as an escharotic.

Powder, Fly. *Prep.* From white arsenic, 5 oz.; white sugar, 6 lbs.; rose pink, 2 oz.; mix, and put 6 drs. in each paper. *Used* to kill flies. It is poisonous, and should be employed with great caution, particularly where there are children.

Powder, Ful'minating.

Powder, Fu"migating. *Syn.* PULVIS FUMALIS, L. *Prep.* (Ph. Russ.) Amber, mastic, and olibanum, of each, 3 parts; storax, 2 parts; benzoin and labdanum, of each, 1 part; reduce them to coarse powder, and mix them well. See FUMIGATION.

Powder, Galls of (Compound). *Syn.* PULVIS GALLÆ COMPOSITUS, L. See ASTRINGENT POWDER.

Powder, Goelis's Antihec'tic. *Prep.* From burnt hartshorn, powdered nutmeg, black pepper, and roasted laurel berries, of each, 1 part; liquorice powder, 3 parts.—*Dose.* ½ to 1 dr.; in the hectic fever of scrofulous subjects.

Powder, Goulard. Effloresced sugar of lead. Poisonous.

Powder, Gray. Mercurial powder.

Powder, Gregory's. See COMPOUND RHUBARB POWDER (*below*).

Powder, Hæmostat'ic. *Syn.* PULVIS HÆMOSTATICUS, L. *Prep.* 1. (Guibourt.) Charcoal and gum arabic, of each, in powder, 1 part; powdered resin, 4 parts.

2. (Mialhe.) From powdered alum, gum tragacanth, and tannin, equal parts. *Used* to check local bleeding.

Powder, Hair. *Syn.* PULVIS PRO CRINE, L. Starch reduced to a very fine powder, and then scented according to the fancy of the artist; it is, lastly, passed through a gauze sieve. In its simple form, without any addition, its constitutes 'plain hair powder.' In other cases it is distinguished by the name of the substance added to perfume it. Thus, we have 'rose hair powder,' 'violet h. p.,' &c. Potato farina, well triturated, is now commonly used for hair powder. Amongst the lower classes, the contents of the 'flour dredger' of the kitchen are frequently misappropriated to this purpose. See SCENTED POWDERS (*below*.)

Powder, Hand. *Prep.* From almond powder, 1 lb.; powdered cuttle-fish bone and white soap, of each, 4 oz.; orris powder, 1 oz.; mix. *Used* to clean the hands, and to render them soft and white. See COSMETIC POWDER.

Powder, Helvetius's. *Syn.* PULVIS HELVETII, L. A mixture of powdered alum and dragon's blood. (Dr. Paris.)

Powder, Herrenschwand's Specific. See PATENT MEDICINES.

Powder, Hiera Picra. Powder of aloes with canella (see *above*).

Powder, Hufeland's. *Syn.* HUFELAND'S

QUINQUINA FACTICE, PULVIS CINCHONÆ FACTITIUS, P. SALICIS COMPOSITUS, L. *Prep.* From bennet (the herb), calamus aromaticus, chestnut bark, gentian root, and willow bark, equal parts; reduced to powder.

Powder, Hunter's. See WART POWDER (*below*).

Powder, Hunt's Breakfast. See *page* 260.

Powder of Ipecacuan'ha (Compound). *Syn.* DOVER'S POWDER, COMPOUND POWDER OF IPECACUANHA WITH OPIUM; PULVIS DOVERI, PULVIS IPECACUANHÆ COMPOSITUS (B. P., Ph. L. E. & D.), L.; POUDRE D'IPECACUANHA ET D'OPIUM, Fr. *Prep.* 1. B. P., Ph. L.) Ipecacuanha and opium, of each, in fine powder, 1 dr.; sulphate of potassa, in fine powder, 1 oz.; mix them (thoroughly). The Edin. and Dublin Formulæ are similar.

2. (P. Cod.) Nitre and sulphate of potassa, of each, 4 oz.; ipecacuanha, liquorice root, and hard extract of opium, of each, 1 oz. This closely resembles the original formula.

3. (Wholesale.) From powdered ipecacuanha and opium, of each, 1 lb.; powdered sulphate of potassa, 8 lbs. *Uses, &c.* 'Dover's powder' is a powerful and valuable sudorific.—*Dose.* 5 to 15 or 20 grs., followed by warm diluents; in inflammatory affections, rheumatisms, colds, &c.

Powder, Itch. *Syn.* PULVIS ANTIPSORICUS, L. *Prep.* 1. Sulphur and potato farina, of each, ½ lb.; essence of bergamot, ½ oz.; mix.

2. (Poudre de Pihorel.) A mixture of finely pulverised sulphuret of calcium and farina, in nearly equal quantities. *Used* either as a dusting powder or mixed with a little oil or fat, and rubbed into the affected part.

Powder of Jal'ap (Compound). *Syn.* PULVIS JALAPÆ COMPOSITUS (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Jalap, 3 oz.; bitartrate of potassa, 6 oz.; ginger, 2 drs.; rub them separately into fine powder, then mix them.

2. (Ph. E.) As the last, omitting the ginger.

3. (Ph. D.) Jalap, 2 oz.; bitartrate of potassa, 3½ oz.; ginger, ½ oz.; (all in fine powder;) mix by careful trituration.—*Dose.* 20 to 60 grs.; as a purgative in habitual costiveness, dropsies, &c.; also in worms, the tumid bellies of children, &c.

4. (B. P.) Jalap, in powder, 5; acid tartrate of potash, 9; ginger, in powder, 1; mix.—*Dose.* 20 to 60 grs.

5. (PULVIS LENITIVUS; SACRE ORANGÉ PURGATIF.) From refined sugar, ½ lb.; jalap and cream of tartar, of each, 2 oz.; oil of orange peel, ¼ oz. A popular purgative on the Continent.—*Dose.* 1 to 3 drs.

Powder, James's. *Syn.* PULVIS JACOBI, P. FEBRIFUGUS JACOBI, L. The antimonial powder, or compound powder of antimony, of the Pharmacopœias (see *above*) is the preparation which usually passes under this name; but the true James's powder is a nostrum the pretended secret of the preparation of which is claimed to be possessed by only two parties in the kingdom. The patent specification of the once celebrated Dr. James runs as follows:—

"Take of antimony, calcine it with a continued protracted heat, in a flat, unglazed earthen vessel, adding to it, from time to time, a sufficient quantity of any animal oil and salt, well dephlegmated; then boil it in melted nitre for a considerable time, and separate the powder from the nitre by dissolving it in water." On this it has been remarked that it yields a product totally different from that which Dr. James and his successors have sold under the name, and he has hence been charged with concealing the real formula for his powder, and publishing a false one in its stead.

According to Dr. Robinson, the original formula for this nostrum, and that still adopted by the vendors of the proprietary article at the present day, is—Tartarised antimony, 1 part; prepared burnt hartshorn and calx of antimony, of each, 5 parts; carefully mixed together, and divided into 21-gr. powders. ('Phil. Journ. Pharm.,' vi, 282.)

From analyses recently made of three specimens of James's powder ('Newberry's,' 'Butler's,' and a sample of 60 years old obtained by Mr. Squire), it appears that antimonious acid was present in different proportions, from about 45% to 33%, the amount being greatest in the old specimen; teroxide of antimony was also present to the extent of from 9% to less than 1%, the greatest quantity being again in the old preparation; the remainder in each specimen consisted chiefly of phosphate of lime; no trace of tartaric acid was discoverable in any of the samples.

Perhaps no nostrum ever received such extensive patronage from the faculty as James's powder. Dr. James himself was remarkably successful in its use; but whether his success depended upon his powder or the mercurials and bark which he commonly employed at the same time, is still undetermined.

Powder of Ki'no (Compound). *Syn.* PULVIS KINO COMPOSITUS (B. P., Ph. L.), L. *Prep.* (B. P., Ph. L.) Kino, 15 drs.; cinnamon, 4 drs.; dried opium, 1 dr.; reduce them separately to fine powder, and then mix them.—*Dose.* 5 to 20 grs.; in diarrhœa, pyrosis, &c.

Powder, Lausanne. *Prep.* From nitre, 1½ dr.; carbonate of magnesia, bitartrate of potassa, precipitated sulphur, and oleo-saccharum of peppermint, of each, 4 drs.; sugar of milk, 1 oz. Lenitive and antidysenteric.

Powder, Lax'ative. See SPECIES.

Powder of Liq'uorice (Compound). *Syn.* PULVIS GLYCYRRHIZÆ COMPOSITUS, L. *Prep.* (Ph. Bor.) Liquorice root and senna leaves, of each, 6 oz.; fennel seed and milk of sulphur (pure), of each, 3 oz.; white sugar, 18 oz.; (all in fine powder;) mix. Pectoral and laxative.

Powder of Magne'sia and Rhu'barb. See COMPOUND RHUBARB POWDER (*below*).

Powder, Martin's Can'cer. An American nostrum, composed of the powdered stems of the *Orobanche Virginiana* (Linn.), combined with a very small quantity of arsenious acid. It is used as a sprinkle for open cancers and cancerous sores.

Powder, Mercu''rial. *Syn.* GREY POWDER (HYDRARGYRUM CUM CRETÂ, B. P.), MERCURY WITH CHALK. *Prep.* 1. (B. P.) Mercury, 1; prepared chalk, 2; triturate till the globules disappear.—*Dose.* 3 to 8 grs.

2. Mercury, 3 oz.; powdered resin, ¾ oz.; prepared chalk, 5 oz.; rectified spirit, q. s.; make a paste with the resin and a small quantity of the spirit; add the mercury, which may be extinguished in a short time; then the chalk and alcohol, gradually, so as to keep up the pasty consistence; lastly, add sufficient spirit to dissolve out the resin, wash the powder on a filter, and dry it. Rectified oil of turpentine may be substituted for the spirit.

Powder, Milk. (See *page* 914.)

Powder, Morison's Ape''rient. See PATENT MEDICINES.

Powder of Mush'room. *Syn.* PULVIS AGARICI, P. A. ESCULENTI, L. From edible mushrooms, dried by a gentle heat, and then powdered along with a little white pepper, cloves, and mace. Some cayenne is frequently added.

Powder of Mus'sel. From the *Mytilus edulis* (Linn.), or common mussel, in the same way as OYSTER POWDER.

Powder of Myrrh (Compound). *Syn.* PULVIS È MYRRHÂ COMPOSITUS, L. *Prep.* (Ph. L. 1788.) Myrrh, dried savine, dried rue, and Russian castor, equal parts, rubbed to powder, and then well mixed. Emmenagogue and antispasmodic.—*Dose.* 12 to 30 grs.

Powder, Nur'sery. See VIOLET POWDER (*below*).

Powder, O''piated. Powder of chalk with opium.

Powder of Oys'ter. *Syn.* PULVIS OSTREÆ, L. *Prep.* From the common oyster (*Ostrea edulis*—Linn.), pulped through a sieve, made into a paste with wheaten flour and a little salt, and then rolled out into thin pieces and dried; these are reduced to powder, sifted, and packed in well-corked bottles. *Used* to make sauce; about 1 oz., to water, 1 pint. Other shell-fish are treated in the same way.

Powder, Pea. *Syn.* PEA FLOUR; FARINA PISORUM, L. *Prep.* From peas, in the usual manner. *Used* to make extemporaneous pea-soup.

Powder, Pearl. *Prep.* From pure pearl white and French chalk (scraped fine by Dutch rushes), equal parts; triturated together. Some makers add more French chalk. *Used* as a skin cosmetic. This mixture is preferable to pearl white alone, from being more adhesive.

Powder, Pease. *Prep.* From dried mint and sage, of each, 4 oz.; celery seed and white pepper, of each, ½ oz.; turmeric powder, ¼ oz.; reduced to fine powder. *Used* as a condiment and kitchen spice.

Powder, Pec'toral. See POWDER OF LIQUORICE, &c.

Powder, Piles. *Syn.* PULVIS ANTI-HÆMORRHOIDALIS, P. HÆMORRHOIDALIS, L. *Prep.* 1. (Fr. Hosp.) Precipitated sulphur, 3 oz.; cream of tartar and black pepper, of each, 1 oz.; oil of cubebs, ½ dr.—*Dose.* A teaspoonful, in milk or honey, thrice a day.

2. (External.)—*a.* From Aleppo galls, in very fine powder, 2 oz.; opium, in fine powder, 1 dr. A pinch to be applied occasionally.

b. From sesquioxide of iron, 1 oz.; powdered acetate of lead, ½ dr. As the last.

Powder, Plate. *Syn.* PULVIS PRO ARGENTO, L. *Prep.* 1. Jeweller's rouge, ¼ lb.; prepared chalk or levigated burnt hartshorn, ¾ lb.; mix.

2. Levigated putty powder, ¼ lb.; burnt hartshorn, ½ lb.; prepared chalk, 1 lb.; rose pink, 1 oz.

3. (MERCURIAL.) From quicksilver with chalk, 1 oz.; prepared chalk, 11 oz.; mix. *Used* to clean and polish plate. See PLATE.

Powder, Plate Boiling. *Prep.* From cream of tartar, common salt and alum, equal parts. A little of this powder, added to the water in which plate is boiled, gives to it a silvery whiteness.

Powder, Plummer's Al'terative. See ANTIMONIAL ETHIOPS.

Powder, Poul'tice. *Syn.* PULVIS PRO CATAPLASMATE (Ph. D. 1826), L. *Prep.* From linseed meal, 1 part; oatmeal, 2 parts; mixed together.

Powder, Rat. See RATS.

Powder of Rhu'barb (Compound). *Syn.* GREGORY'S MIXTURE, GREGORY'S POWDER; PULVIS RHEI COMPOSITUS (B. P., Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Calcined magnesia, 1 lb.; rhubarb, 4 oz.; ginger 2 oz.; (all in fine powder;) mix, and preserve it from the air.

2. (B. P., Ph. D.) Calcined magnesia, 6 oz.; rhubarb, 2 oz.; ginger, 1 oz.

3. Calcined magnesia, 8 oz.; rhubarb, 3 oz.; chamomile, 2 oz.; ginger, 1 oz.

Obs. An excellent stomachic, antacid, and laxative.—*Dose.* 20 grs. to ½ dr. Some druggists substitute the heavy carbonate for the calcined magnesia ordered above, but this alters the nature of the preparation, and requires the dose to be increased. Heavy calcined magnesia may, however, be employed with advantage.

Powder, Sach'et. See SCENTED POWDERS.

Powder, Saline' (Compound). *Syn.* PULVIS SALINUS COMPOSITUS (Ph. E.), L. *Prep.* (Ph. E.) Pure chloride of sodium and sulphate of magnesia, of each, 4 oz.; sulphate of potash, 3 oz.; each separately dried by a gentle heat, and pulverised, then triturated together, and preserved in well-closed vessels. An excellent saline purgative.—*Dose.* 2 to 6 drs., in ½ pint of water or table-beer, in the morning, fasting.

Powder of Scam'mony (Compound). *Syn.* PULVIS SCAMMONII COMPOSITUS (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Scammony and hard extract of jalap, of each, 2 oz.; ginger, ½ oz.; rub them separately to a very fine powder, and then mix them.—*Dose.* 5 to 15 grs.

2. (Ph. E.) Scammony and bitartrate of potassa, of each, in very fine powder, equal parts.—*Dose.* 7 to 20 grs.

3. (Ph. D.) Scammony, in fine powder, 1 oz.; compound powder of jalap, 3 oz.; mix. —*Dose.* 10 to 30 grs.

4. (B. P.) Scammony, 4; jalap, 3; ginger, 1; mix, and reduce to fine powder.—*Dose.* 10 to 20 grs.

Obs. The above are favourite cathartics in worms, especially for children. They are commonly sold for basilic powder. (See *above.*)

Powder of Scammony with Cal'omel. *Syn.* PULVIS SCAMMONII CUM CALOMELANE, L. *Prep.* From scammony, ½ oz.; calomel and white sugar, of each, 2 drs. An excellent vermifuge for children.—*Dose.* For an adult, 5 to 20 grs.; for a child, 2 to 8 grs. Sold for basilic powder, to which it approaches nearer in composition than the preceding.

Powder, Schmidt's Parturifa"cient. *Syn.* SCHMIDT'S POUDRE OCYTIQUE, Fr. *Prep.* From powdered ergot of rye, borax, and oleosaccharum of camomile, of each, 8 grs.; powdered sugar, q. s. For a *dose;* to be repeated every quarter of an hour, until some effect is produced.

Powder of Sen'na (Compound). *Syn.* PULVIS SENNÆ COMPOSITUS, L. *Prep.* (Ph. L. 1824.) Senna and bitartrate of potassa, of each, 2 oz.; scammony, ½ oz.; ginger, 2 drs.; all in fine powder; mix.—*Dose.* 20 to 30 grs.; or more; as a purgative or anthelmintic.

Powder of Senna (Battley's Green). *Syn.* PULVIS SENNÆ VIRIDIS, L. *Prep.* From senna leaves, dried and heated until they turn yellow, then powdered along with a little (blue) charcoal, to give a green colour.

Powder, Sil'vering. *Prep.* 1. Silver dust (fine), 20 grs.; alum, 30 grs.; common salt, 1 dr.; cream of tartar, 3 drs.; rub them together to a fine powder.

2. As the last, but substituting 35 grs. of nitrate of silver for the silver dust.

3. Chloride of silver is dissolved in a solution of hyposulphite of soda, and the solution made into a paste with levigated burnt hartshorn or bone dust; this is next dried, and powdered.

4. Silver dust, 1 oz.; common salt and sal ammoniac, of each, 4 oz.; corrosive sublimate, ¼ oz.

Obs. The above powders, made into a paste with a little water, are *used* to silver dial-plates, statuettes, and other articles in copper, previously well cleaned, by friction. The best silver powder for the purpose is that precipitated from its nitric solution by means of a copper plate. When the product of the last formula is used, the articles should be afterwards made red hot, and polished.

Powder of Soap. *Syn.* SAPO CONTRITUS, PULVIS SAPONIS, L. Castile soap, sliced or cut small, dried by exposure to a warm atmosphere, or by a very gentle heat, and then powdered. *Used* in dispensing; also as a hand, shaving, and tooth powder. As a cosmetic, it may be scented at will.

Powder of Sponge. *Syn.* PULVIS SPONGIÆ, P. SPONGIÆ USTÆ, L. *Prep.* Let sponge, cut into small pieces, be beaten so as to free it from sand or stones; then burn it in a covered iron vessel, until it becomes black and friable; finally, reduce it to powder. Deobstruent. —*Dose.* ½ to 3 drs.; in glandular indurations and enlargements, &c. It should be of a brownish-black colour; if over burnt, its efficacy is destroyed.

Powder of Squills. *Syn.* PULVIS SCILLÆ, L. *Prep.* Remove the membranous integuments from the bulb of the squill, cut it into thin slices, and dry it at a heat between 90 and 100° Fahr.; next reduce it to powder, and keep it in well-stopped bottles.

Powder, Sternuta'tory. See SNUFFS (Medicated).

Powder, Styp'tic. See ASTRINGENT POWDER, FAYNARD'S P., &c.

Powder of Trag'acanth (Compound). *Syn.* PULVIS TRAGACANTHÆ COMPOSITUS (B. P., Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Gum tragacanth, gum acacia, and starch, of each, in fine powder, 1½ oz.; powdered white sugar, 3 oz. The Edinburgh formula is similar. Demulcent.—*Dose.* ½ dr. to 2 drs., in water or any simple liquid; in hoarseness and catarrhs, combined with squills and henbane, to allay irritation; in dysentery, combined with ipecacuanha; in gonorrhœa, strangury, &c., combined with acetate of potass or nitre.

2. (B. P.) Tragacanth, in powder, 1; gum arabic, in powder, 1; starch, in powder, 1; refined sugar, in powder, 3; rub well together. —*Dose.* 10 to 60 grs.

Powder, Violet. *Syn.* NURSERY POWDER, SKIN P. This is simply starch reduced to a very fine powder, and scented with orris powder or essence of violets. The best kinds are also perfumed with a little musk or ambergris, and are now generally made with potato farina. The commoner sort is only scented with a little essence of bergamot or essence of lemon. 'Plain violet powder' is, of course, unscented.

Prep. 1. Powdered starch, 28 lbs.; powdered orris root, 1 lb.; essence of ambergris and essence of bergamot, of each, ½ oz.; oil of rhodium, ½ dr.; mix, and pass the powder through a sieve.

2. Powdered starch, 14 lbs.; essence of bergamot, ½ oz.; oil of cloves, ¼ oz.; as last. *Used* as a dusting powder in excoriations, &c. See COSMETIC POWDERS (*below*).

Powder, Ward's Sweating. Resembles DOVER'S POWDER.

Powder, Wart. *Syn.* CORN POWDER, Cos-

METIC CAUSTIC, &c. *Prep.* 1. Ivy leaves ground to powder. A pinch is applied with a rag, the part being first moistened with strong vinegar. *Useful* for soft corns and warts.

2. (Hunter's.) From savine and verdigris, equal parts. See CORN SOLVENT.

Powder, Warwick's (Earl of). *Syn.* PULVIS COMITIS WARWICENCIS, L. *Prep.* From scammony, prepared with the fumes of sulphur, 2 oz.; diaphoretic antimony, 1 oz.; cream of tartar, ½ oz.—*Dose.* 15 to 30 grs.

Obs. This is a modification of CORNACHINI'S POWDER. It is represented in the present Pharmacopœias by COMPOUND SCAMMONY POWDER. "Cornachini wrote a whole book about his powder, the proportions of the ingredients of which he varied according to circumstances." ('Med. Lex.')

Powder, Wash'ing. The numerous compounds vended under this name have for their basis the soda-ash of commerce, blended with common Scotch soda in variable proportions. The best of them consist either wholly or chiefly of the first of these substances. The alkaline matter is reduced to coarse powder, and stirred up with liquid size, or with a decoction of linseed, Irish moss, or British gum, and is then dried, and again crushed, or powdered, and at once put into the packages, in which it is rammed tight, and covered up immediately. The object aimed at by the manufacturer is to keep his commodity from the air as much as possible, because exposure renders it less caustic, and consequently, less detergent.

POWDERS. The following preparations have been placed under this head instead of under 'POWDER,' because some are invariably spoken of in the plural number, and the others may be conveniently noticed in classes or groups.

Powders, Efferves'cing. *Prep.* 1. (PULVERES EFFERVESCENTES—Ph. E.) Take of tartaric acid, 1 oz.; bicarbonate of soda, 1 oz. 54 grs. (534 grs.), or bicarbonate of potassa, 1 oz. 2 drs. 40 grs. (640 grs.); reduce the acid and either bicarbonate separately to fine powder, divide each of these into 16 powders, and preserve the acid and alkaline powders in separate papers of different colours.

2. (PULVERES EFFERVESCENTES CITRATI—Ph. D.) Take of citric acid (crystallised), 9 drs.; bicarbonate of soda, 11 drs., or bicarbonate of potassa, 13 drs.; proceed as last, dividing each into 18 parts.

3. (PULVERES EFFERVESCENTES TARTARIZATI—Ph. D.) Take of tartaric acid (in crystals), 10 drs.; bicarbonate of soda, 11 drs., or bicarbonate of potassa, 13 drs.; reduce them to powder, and divide them into 18 parts, as before. (See *below*.)

Powders, Gin'ger Beer. *Syn.* PULVERES EFFERVESCENTES CUM ZINGIBERE, L. *Prep.* 1. Powdered white sugar, 1 to 2 drs.; bicarbonate of soda, 26 grs.; finest powdered Jamaica ginger, 6 grs.; essence of lemon, 1 drop; mix, and wrap it in blue paper. In the white paper put of powdered tartaric acid, 35 grs., or of powdered citric acid, 30 grs.

2. Finest Jamaica ginger, 1 dr.; bicarbonate of soda, 5 drs.; white sugar, 16 drs.; essence of lemon, 6 or 8 drops; mix, and divide it between 12 papers (blue). For the white papers, divide tartaric acid, 6 drs., in the same way. By taking the drachms as ounces, the quantity will be sufficient for 8 dozen. For *use*, dissolve one of each colour separately in somewhat less than half a glass of water, mix the two, and drink the mixture whilst effervescing.

3. (In one bottle.)—*a.* The sugar and the saline ingredients are separately dried by a very gentle heat, then mixed in a dry room with the ginger and essence of lemon, and at once put into bottles.

b. By adding to the 'acidulated kali,' noticed at page 667, about 1-16th of its weight of the finest powdered Jamaica ginger (*i. e.* ½ dr. to each oz.; 1 oz. to each lb.) at the time of mixing the ingredients together. A dessert-spoonful, thrown into a tumbler two thirds filled with cold water, produces an excellent glass of ginger beer.

Powders, Ink. The article usually sold under this name is noticed under INK. Another formula, which we have adopted with considerable success, is as follows:—Good black ink, 3 pints, lump sugar, 1½ oz., and gum arabic, ½ oz., are put into a clean iron pan, and evaporated by the heat of boiling water, with occasional stirring, to dryness; the dried mass is reduced to powder, and divided into 12 parts, which are enveloped in either tinfoil or glazed paper, and kept dry. One of these papers dissolved in ½ pint of hot water forms that quantity of excellent black ink, without sediment, and which answers well with the copying press.

Powders, Lem'onade. *Syn.* LEMON SHERBET; LIMONADUM SICCUM, PULVIS PRO LIMONADO, L. *Prep.* 1. Powdered citric or tartaric acid, 12 grs.; powdered white sugar, ½ oz.; essence of lemon, 1 drop (or a little of the yellow peel of a lemon rubbed off on a piece of sugar); mix. For one glass.

2. White sugar, 4 lbs.; citric or tartaric acid, 1½ oz.; essence of lemon, ½ oz.; mix well, and preserve it in a bottle for use. 1 to 2 dessert-spoonfuls make a glass of lemonade. It is also put up in papers, containing about 2½ drs. each.

3. (EFFERVESCING.)—*a.* For the blue papers, take of powdered white sugar, 1 lb.; bicarbonate of soda, ¼ lb.; essence of lemon, 1½ dr.; mix, and divide it between 6 dozen papers. Next divide tartaric or citric acid, 5 oz., between 6 dozen white papers. Or the two may be kept in bulk, in separate bottles.

b. (In one bottle.) As 'ACIDULATED KALI.' Some makers slightly increase the quantities of acid and essence of lemon there ordered.

Powders, Pol'ishing. *Prep.* 1. (For brass

and copper.)—*a*. From rotten stone, 3 oz.; powdered soap, 1 oz.

b. From rotten stone, 7 oz.; powdered oxalic acid, 1 oz. Both are used with a little water. See BRASS PASTE.

2. (For gold.) Jeweller's rouge. See SESQUIOXIDE OF IRON.

3. (For ivory.) Pumice stone and putty powder.

4. (For plate.) See PLATE and PLATE POWDER.

5. (For silver.) As the last.

Powders, Scented. *Prep*. 1. COSMETIC POWDERS.—*a*. (POUDRE DE CHIPRE.) Macerate oak moss in running water for 2 or 3 days, then dry, and powder it. *Used* as a basis for other powders, on account of its being highly retentive of odours. Reindeer moss and ragged hoary evernia are also used for the same purpose. See CYPRUS POWDER (*above*).

b. (POUDRE DE CHIPRE DE MONTPELIER.) From poudre de chipre, 2 lbs.; musk, 30 grs.; civet, 20 grs.; (the last two powdered by means of a little sugar;) cloves, ¼ oz.

c. (POUDRE DE FLEURS D'ORANGES.) From starch or cyprus powder, 25 lbs.; orange flowers, 1 lb.; mixed in a covered chest, and stirred twice or thrice daily; the process being repeated, with fresh flowers, a second and a third time. Or, the plain powder is scented by the addition of a little neroli or essence of petit grain.

d. (POUDRE DE FRANGIPANNI.) From poudre de fleurs d'oranges and poudre de chipre, of each, 6 lbs.; essence of ambergris, 1 oz.; civet (powdered with sugar), ½ dr. Ash-gray colour.

e. (POUDRE DE JASMINE.) As POUDRE DE FLEURS D'ORANGES, but using jasmin flowers.

f. (POUDRE À LA MARÉCHALE.) From poudre de chipre, 2 lbs.; starch powder, 1 lb.; calamus aromaticus, cloves, and cyperus perennis or rotundus, of each, 2 oz. Or, starch powder, 28 lbs.; powdered cloves, ¾ lb.; powdered orris root, ½ lb.; essence of ambergris, 2 drs.

g. (POUDRE À LA MOUSSELINE.) From orris root, 1 lb.; coriander seed, 6 oz.; mace and violet ebony, of each, 2 oz.; musk seed, cassia, cloves, and sandal wood, of each, 1 oz.

h. (POUDRE DE JONQUILLE.) From jonquils, as POUDRE DE JASMINE.

i. (POUDRE À L'ŒILLET.) From plain powder, 2 lbs.; orris root and dried red rose leaves, of each, 1 lb.; cloves and musk seed, of each, 4 oz.; essence of bergamot and essence de petit grain, of each, ½ dr.

k. (POUDRE DE ROSES COMMUNES.) From pale roses, as POUDRE DE FLEURS D'ORANGES.

l. (POUDRE DE ROSES MUSQUÉES.) From musk roses, as the last.

m. (POUDRE À LA VANILLE.) From poudre de chipre or cyprus, 3 lbs.; vanilla, powdered by means of sugar, 2 drs.; oil of cloves and essance of ambergris, of each, 20 drops.

n. (POUDRE À LA VIOLETTE.) See VIOLET POWDER (*above*).

The above are used as cosmetic powders for the skin and hair; also, but less frequently, for sachets, drawers, &c.

2. SACHET POWDER.—*a*. From orris root, 2 oz.; cassia, 1½ oz.; cloves, 1 oz.; yellow sandal wood, ¼ oz.; oils of lavender and bergamot, of each, 1 dr.; otto of roses, 20 drops; musk and ambergris, of each, rubbed with a little sugar, 6 grs.; reduce the dry ingredients to coarse powder, mix them, and add the oils.

b. From corianders, orris root, rose leaves, and calamus aromaticus, of each, 4 oz.; lavender flowers, 8 oz.; rhodium wood, 1 dr.; musk, 20 grs.

c. From corianders, orris, calamus aromaticus, and red roses (dried), of each, 1 oz.; lavender flowers, 2 oz.; mace and cloves, of each, 1 dr.; essential oil of almonds, 10 drops.

d. As last, but substituting musk, 5 grs., for the oil of almonds.

e. From patchouli, 8 oz.; lavender flowers, (lightly dried), 3 oz.; orris root, 2 oz.; cloves, 1 oz.; essence of bergamot, 1 dr.; essences of ambergris and musk, of each, ½ dr.

These are used, along with cotton wool, to fill scent bags, cassolettes, &c.; and as scent powders for boxes, drawers, and the like. The scent is added to the dry ingredients, separately reduced to powder, and the whole is then passed through a fine sieve, to ensure perfect admixture.

3. PARFUM POUR LES AUTRES POUDRES. From poudre d'ambrette, 12 lbs.; civette, 1½ oz.; musk, 1 dr.; reduce the last two to powder by grinding them with some dry lump sugar, then mix the whole together and pass it through a sieve. *Used* to perfume hair powder, sachets, &c.

Powders, Seidlitz. *Syn*. PULVERES EFFERVESCENTES APERIENTES, L. *Prep*. 1. Potassio-tartrate of soda (Rochelle salt) 2 drs.; bicarbonate of soda, 40 grs.; mix, and put it in a blue paper; tartaric acid, 35 grs., to be put in a white paper. For about ½ pint of water. Laxative.

2. (In one bottle.) From potassio-tartrate of soda, 12 oz.; bicarbonate of do., 4 oz.; tartaric acid, 3½ oz.; white sugar, 1 lb.; (all in fine powder;) dry each separately by a gentle heat, add of essence of lemon, ½ dr., mix well, pass the mixture through a sieve, and put it at once into clean dry bottles.—*Dose*. A dessert-spoonful, or more, to a tumblerful of water.

Obs. The above mixtures, though now universally sold as Seidlitz powder, do not, when dissolved, exactly resemble the natural water, which contains carbonates, sulphates, and chlorides of calcium and magnesium. However, the factitious article is equally effective, and much more agreeable.

Powders, Sherbet. These are made of the same materials as lemonade powders, the flavouring ingredient being varied to suit the particular case.

Powders, So'da-water. *Syn.* EFFERVESCING POWDERS, E. SALINE P., SODAIC P., AËRATED SODA P.; PULVERES EFFERVESCENTES, L. *Prep.* 1. From bicarbonate of soda, 30 grs., in each blue paper; tartaric acid, 25 grs. (or citric acid, 24 grs.), in each white paper. One of each is dissolved separately in about ½ a glassful of water, and the two solutions mixed, and drank immediately. A cooling, wholesome summer beverage, but it should not be indulged in to excess.

2. (Chalybeated.) By adding 1 gr. of dried protosulphate of iron to each paper of acid. Tonic.

3. (Midgeley's.) Made by adding ½ gr. of tartarised antimony to each paper of acid. Refrigerant and diaphoretic. For the Ph. formulæ see EFFERVESCING POWDERS (*above*).

Powders, Soup. See CURRY POWDER, PEASE P., SPICE, &c.

Powders, Spruce Beer. *Syn.* PULVERES EFFERVESCENTES CUM ABIETE, L. *Prep.* As ginger-beer powders, but substituting essence of spruce, 3 to 6 drops, for the powdered ginger.

Powders, Tooth. *Syn.* PULVIS DENTIFRICII, L. The general principles which should be kept in view in the selection of the materials, and in the preparation of dentifrices, have been already fully noticed (see page 399), and need not, therefore, be repeated here. Care must be taken that all the dry ingredients be finely pulverised, and that the harder and gritty ones be reduced to the state of an impalpable powder, either by levigation or elutriation. The mixture of the ingredients must also be complete. This is the most readily effected by stirring them well together until they form an apparently homogeneous powder, and then passing this powder through a very fine sieve. Those which contain volatile substances should be preserved in closely corked wide-mouth bottles, and those which contain acidulous or gritty matter should not be frequently employed. The selection of the tooth brush likewise deserves attention. It should be sufficiently stiff to effect its purpose completely; but, at the same time, it should be so formed as not to cause irritation or injury to the gums during its use.

Prep. 1. Cuttle-fish bone and prepared chalk, of each, 2 oz.; oil of cloves, 20 drops. This may be perfumed at will, and medicated by any of the substances referred to under DENTIFRICES.

2. To the last add of powdered Castile soap, 2 oz.

3. Prepared chalk, 12 oz.; cuttle-fish bone, 8 oz.; orris root, 4 oz.; dragon's blood, 1½ oz.; oils of cloves and cassia, of each, ½ dr.

4. Prepared chalk, 1 lb.; pumice-stone, in impalpable powder, ¼ lb.; orris root, 2 oz.; pure rouge, ¼ oz.; neroli, ½ dr.

5. Yellow cinchona bark and myrrh, of each, ½ oz.; recently burnt charcoal, 3 oz.; cloves, 1 dr.

6. Pumice-stone, red coral, and powdered rhatany root, of each, 2 oz.; orris root, ½ oz.; essence of vanilla, ½ dr.

7. (AROMATIC TOOTH POWDER.) From cuttle-fish bone, 4 oz.; calamus aromaticus, 2 oz.; powdered Castile soap, 1 oz.; oil of cloves, ½ dr.

8. (ASIATIC DENTIFRICE.) From prepared red coral, 8½ lbs.; Venetian red, ¾ lb.; prepared chalk and pumice-stone, of each, 1¼ lb.; China musk, 30 grs.

9. (Cadet's.) From lump sugar and charcoal, of each, 1 oz.; Peruvian bark, ½ oz.; cream of tartar, ½ oz.; cinnamon, ½ dr.

10. (Camphorated.) See CAMPHORATED CHALK (page 317).

11. (CHARCOAL DENTIFRICE.) From charcoal, preferably that from the willow or the areka nut, either alone or combined with twice its weight of prepared chalk. Scent or medicinals injure it. (See 9, 19, and 26.)

12. (CORAL DENTIFRICE.) See 16, 23, and 25 (*below*).

13. (Deschamp's ALKALINE DENTIFRICE.) From powdered talc, 4 oz.; bicarbonate of soda, 1 oz.; carmine, 6 grs.; oil of mint, 12 or 15 drops.

14. (FLORENTINE DENTIFRICE.) From prepared shells, 4 oz.; orris root, 1½ oz.; bitartrate of potassa, ¾ oz.; Florentine lake, q. s. to colour.

15. (GALVANIC DENTIFRICE.) From gold, 3 leaves; silver, 4 leaves; triturate them with alum and sulphate of potassa, of each, 1½ dr.; then add, of dry common salt, pellitory of Spain, and Peruvian bark, of each, 1 dr.; prepared hartshorn, 1 oz.; mix, and either colour it blue with smalts or red with lake. A useless compound.

16. (Grosvenor's.) From red coral, 3 lbs.; prepared oyster-shells, 2½ lbs.; orris powder, ½ lb.; oil of rhodium, 25 drops. Rose-pink is now commonly substituted for the coral.

17. (Hemet's.) From cuttle-fish bone, 6 oz.; cream of tartar, 1 oz.; orris root, ½ oz.

18. ('Lancet.') Red bark and Armenian bole, of each, 1 oz.; powdered cinnamon and bicarbonate of soda, of each, ½ oz.; oil of cinnamon, 2 or 3 drops.

19. (Lardner's.) From charcoal, in very fine powder, 1 oz.; prepared chalk, 3 oz.; mix.

20. (Miahle's RATIONAL DENTIFRICE.) From sugar of milk, 3 oz.; pure tannin, 3 drs.; rose lake, 1 dr.; oils of mint and aniseed, of each, 7 or 8 drops; neroli, 4 or 5 drops.

21. (MYRRH DENTIFRICE.) From cuttle-fish bone, 6 oz.; myrrh and orris root, of each, 2 oz.

22. (PEARL DENTIFRICE.) From heavy carbonate of magnesia or precipitated chalk, 1 lb.; finest smalts, 3 drs.; essence de petit grain, ½ dr.

23. (Pelletier's QUININE DENTIFRICE.) From prepared red coral, 3 oz.; myrrh, 1 dr.; disulphate of quinine, 12 to 15 grs.

24. (Ph. Russ.) Cinchona bark, 4 oz.; orris root, 2 oz.; catechu and myrrh, of each, 1½ oz.; sal ammoniac, 1 oz.; oil of cloves, 20 drops.

25. (POUDRE DENTIFRICE—P. Cod.) Red coral, red bole, and cuttle-fish bone, of each, 3 oz.; dragon's blood, 1½ oz.; cinnamon, ¾ oz.; cochineal, 3 drs.; cloves, 1 dr.; bitartrate of potassa, 4½ oz.; reduce them separately to very fine powder before mixing them. This is the 'coral dentifrice' of the French.

26. (Rignini's.) From charcoal, 1 oz.; yellow bark, ½ oz.

27. (ROSE DENTIFRICE.) From precipitated chalk, 6 oz.; cuttle-fish bone, 3 oz.; bicarbonate of soda, 2 oz.; red lake, ¼ oz.; otto of roses, 20 drops.

28. (Ruspini's.) From cuttle-fish bone, 8 oz.; Roman alum and orris root, of each, 1 oz.; cream of tartar, 2 oz.; oil of rhodium, 6 or 8 drops.

29. (VIOLET TOOTH POWDER.) From orris root, 3 oz.; cuttle-fish bone and rose pink, of each, 5 oz.; precipitated chalk, 12 oz.; pure indigo, q. s. to give it a pale violet tinge.

30. (Zieter's.) From finely powdered calcined hartshorn and cuttle-fish bone, of each, 6 oz.; calamus aromaticus, cassia, and pellitory of Spain, of each, 1 oz.; essence of vanilla, 1 dr.; essence of ambergris, 10 or 12 drops.

Powders, Worm. *Syn.* PULVERES ANTHELMINTICI, P. VERMIFUGI, L. *Prep.* 1. (Bouchardat.) Powdered Corsican moss and worm-seed, of each, 5 drs.; calomel, 40 grs.; rub them together.

2. (Collier.) From powdered jalap and scammony, of each, 1 dr.; cream of tartar, 2 drs.; Ethiop's mineral, 3 drs.

3. (Guibourt.) Sulphate of iron, 1 dr.; tansy, 2 drs.; worm-seed, 3 drs.

4. (P. Cod.) Corsican moss and worm-seed, of each, 2 oz.; rhubarb, 1 oz.; rubbed to a fine powder, and carefully mixed.

POX. A corruption of a Saxon word, originally applied to pustules or eruptions of any kind, but now restricted to varicella, variola, vaccinia, and, in its unqualified form, to syphilis. (See *below*.)

Chick'en-pox. *Syn.* WATER-POX; VARICELLA, L. An eruptive disease, consisting of smooth, semi-transparent vesicles, of various sizes, which afterwards become white and straw-coloured, and about the fourth day break and scale off, without leaving any permanent mark behind them. In hot weather the discharge sometimes become purulent, and at others the eruption is attended with considerable fever. Sometimes the vesicles assume a pointed form, and the fluid remains clear throughout the disease; it is then frequently called the 'swine-pox.' When the vescicles are large and globular, and their contents, at first whey-coloured, afterwards turn yellow, it is popularly known as 'hives.'

The treatment of chicken-pox consists in the adoption of a light, vegetable diet, and in the administration of mild saline aperients and cooling drinks.

The chicken-pox, except in children of a very bad habit of body, is an extremely mild disease. Like the smallpox, it rarely attacks the same person more than once during life.

Cow-pox. *Syn.* VACCINIA, VARIOLA VACCINA, L. This disease was proposed as a substitute and a preventive of smallpox, by Dr. Jenner, in 1798, and its artificial production (vaccination) has rendered smallpox a comparatively rare disease in Britain. There appears no reason to doubt that the pretensions of the advocates of vaccination have been fully justified by the experience of more than half a century; or, that this disease, when actively developed, evinced by the completeness and maturation of the pustules, acts as a prophylactic of smallpox.

The process of vaccination is similar to that of inoculation for smallpox. The point of a lance is wetted with the matter taken from one of the pustules, and is then gently inserted under the cuticle, and the scratch afterwards rubbed over with the same. Hæmorrhage should be avoided, as the blood is apt to wash away the virus, or to form a cake which shields the living tissue from its action.

Smallpox. *Syn.* VARIOLA, L. This disease comes on with the usual symptoms of inflammatory fever. About the third day, red spots, resembling flea-bites, make their appearance on the face and head, and gradually extend over the whole body. About the fifth day, small circular vesicles, depressed in the centre, surrounded by an areola, and containing a colourless fluid, begin to form, when the feverish symptoms abate; about the sixth day, the throat becomes sore; about the eighth day, the face is swollen; and about the eleventh day, the pustules acquire the size of a pea, and cease to enlarge, the matter which they contain becomes opaque and yellow, a dark central spot forms on each, the swelling of the face subsides, and secondary symptoms of fever come on; the pustules become rough, break, and scab over, and a dark spot remains for some days, often followed by permanent indentations, popularly known as 'pock-marks.' At the end of the sixteenth or eighteenth day, the symptoms usually disappear. In the confluent smallpox, a severer form of the disease, the pustules coalesce, the eruption is irregular in its progress, and the inflammatory symptoms are more severe.

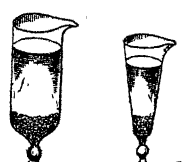
The treatment of ordinary cases of smallpox resembles, for the most part, that mentioned above for chicken-pox. As soon as the febrile symptoms become marked, the patient should not be suffered to lie in a hot bed, but on a mattress, in a cool and well-ventilated apartment, and antiseptic cooling drinks should be freely administered. When convulsions occur, or great irritability exists, small doses of morphine, opium, or camphor, may be ad-

ministered, and obstinate vomiting arrested by effervescing saline draughts. When the skin is pale and cold, the pulse weak, and the eruption languidly developed, the warm or tepid bath is often serviceable. An infusion of the root of *Sarracenia purpurea*, an American plant, has been strongly recommended as a preventive and cure of smallpox, but many of our most eminent physicians regard it as valueless. The application on the third day of a mask formed of thin muslin, covered with mercurial ointment, and having holes cut in it for the nostrils, eyes, and mouth, will effectually prevent 'pitting.' (Dr. Stewardson.) With the same intention, some persons recommend the puncture of the pustules as soon as they are mature. A solution of India rubber in chloroform is now often painted over the face when the eruption has become fully developed. The chloroform quickly evaporates, leaving an elastic film of india-rubber, which almost entirely removes the itchiness of the pustules and prevents 'pitting.' To remove the pock-marks, whether recent or old, nothing appears to be better than warm sea-bathing, or the use of tepid ioduretted lotions.

The smallpox is eminently contagious, but only attacks the same person once during life. Formerly, a milder form of the disease was propagated by inoculation, a practice introduced into England from Turkey, by Lady Mary Wortley Montague, about the year 1721. At the present day, in England, inoculation, as well as the exposure of a patient labouring under smallpox, is penal, the punishment being either by fine or imprisonment. See COW-POX (*above*).

PRECIP'ITATE. Any substance which has separated from its solution in a solid and, usually, a pulverulent or flocculent form. The substance by which such a change is produced is called the 'precipitant'; and the act or operation by which it is effected is called 'precipitation.' The old chemists gave this name to several compounds. Red precipitate, or precipitate *per se*, is the red oxide of mercury prepared by heat. White precipitate is the AMMONIATED MERCURY of the B. P.

PRECIPITA'TION. The formation or subsidence of a precipitate. (See *above*.) When the precipitate is the chief object of the process, it is necessary to wash it, after it is separated, by filtration. This operation requires little attention when the substance thrown down is insoluble in water; but when it is in some degree soluble in that liquid, great attention is required to prevent the loss which might result from the use of too much water. Precipitates soluble in water, but insoluble in alcohol, are frequently, on the small scale, washed with spirit more or less concentrated.



The best precipitating vessel is a very tall glass jar, furnished with a lip and spout, and narrower at the bottom than at the mouth, so that the precipitate may readily collect by subsidence, and the supernatant liquor be decanted off with more ease.

PREG'NANCY. For the preservation of the health, and the prevention of the numerous discomforts and dangers which so frequently attend this condition, nothing is so effective as exercise. It is this that is so favourable to the humble peasant, and it is its absence that inflicts such calamities on the wealthier classes. Exercise, moderate and unfatiguing, when assisted by regular habits, and a diet nutritious, but not too liberal, is, indeed, capable of not only affording pleasure and increasing the comforts of existence, but is also generally sufficient to greatly lessen the severity of the sufferings, and to ward off the not unfrequently fatal results which terminate this interesting condition.

The sickness of pregnancy may be greatly ameliorated, if not removed, by the occasional use of a saline aperient, and by effervescing draughts formed with the bicarbonate of potassa and citric acid. The oxalate of cerium is strongly recommended by Professor Simpson, of Edinburgh, as a remedy for obstinate vomiting in pregnancy.—*Dose.* 1 gr. to 2 grs. three times a day in pills.

PRESCRI"BING (Art of). Besides a knowledge of diseases and their treatment, much of the success of the physician depends on circumstances connected with the form in which the remedies are exhibited. In writing a prescription, it is necessary to consider the age, sex, temperament, habits, and idiosyncrasy of the patient, as well as the conditions of climate and season, before the selection of the leading medicament, and the apportioning of the dose. The most convenient form of exhibiting it, whether it should be given alone or in some simple form, or combined with other ingredients, the compatibility of the latter, and how far these are likely to assist, impede, or modify its operation, must also receive the consideration of the practitioner. Without a careful attention to all these circumstances, the most valuable remedies may be rendered worthless, and the highest medical skill and the best intentions frustrated.

A prescription generally contains several medicinal substances, which are distinguished by medical writers by names indicative of the office which each of them performs. These are—1. The BASIS, which is the principle or most active ingredient;—2. The ADJUVANT, or that which is intended to promote the action of the base;—3. The CORRECTIVE, intended to correct, modify, or control its action, or to cover its odour or taste, as when we add carminatives or diaphoretics to cathartics, or aromatics or liquorice to nauseous substances;

—4. The EXCIPIENT, or that which gives the whole a commodious or agreeable form, and which, consequently, gives the prescription its peculiar character, as that of draught, mixture, pills, &c. To these, certain Continental writers add a 5th,—The INTERMEDIUM, which is the substance employed to unite remedies which are not, by themselves, miscible with each other, or with the excipient. Of this character are the yolk of egg and mucilage, employed in the preparation of emulsions.

The medicinal substances, with the quantities to be taken, generally arranged as above, are said to form the 'inscription,'—the directions as to their combination or dispensing, which usually come next, the 'subscription,' and—the orders for the exhibition of the compound medicine, which follow these, the 'instructions.' These distinctions are, however, in many cases more technical than useful.

In choosing the form of a prescription, it should be recollected that solutions and emulsions generally act with more certainty and rapidity than powders diffused through water; and these, again, than the semi-solid and solid forms of medicine, represented by electuaries, boluses, and pills. On these matters, however, the taste and wishes of the patient should not be disregarded. For this purpose, the taste of nauseous medicines should be disguised, as much as possible, by the judicious selection of an appropriate corrective or excipient. Thus, the disagreeable flavour of Epsom salt may be in a great measure covered by dissolving it in peppermint water; that of aloes, by liquorice; that of castor oil and copaiba by orange peel; and that of powdered bark, by mixing it with milk immediately before taking it; whilst the bitterness of all bitter substances is concealed by strong coffee.

In order that a prescription may be well made, it is not necessary to unite all the elements above referred to. The basis and the excipient are the only two which are absolutely necessary, since there are many medicines which have no need of an adjuvant. The agreeable flavour and odour of some, and the mild and harmless nature of others, often render the intervention of a corrigent unnecessary when they are employed. A single substance may also "be capable of answering two or more purposes. Thus the adjuvant may also act as a corrigent, as when the addition of soap to aloes, or to extract of jalap, lessens their griping properties, and at the same time promotes their action. In the same way neutral salts correct the colic which follows the use of resinous purgatives, and accelerate their action." According to Gaubius, the number of ingredients in a prescription should scarcely ever exceed three or four. See DOSE, MEDICINES, INCOMPATIBLES, PILLS, &c.

PRESCRIPTIONS. Recipes or formulæ for the preparation and exhibition of medicines intended, generally, for immediate use. See PRESCRIBING (*above*).

PRESERVES'. A general term, under which are included the various fruits and vegetables which are seasoned and kept in sugar or syrup, more especially those which are so preserved whole or in slices. See CANDYING, JAM, MARMALADE, &c.

PRESS (Correcting for the). See PROOFS.

PRINCE'S METAL. One of the names for Dutch gold. (See page 580.)

PRINT'ING (Anastatic). A method of zincography, patented in 1845, having for its object the reproduction of drawings, engravings, and letter-press, from copies however old. To describe briefly the preparation of a plate or cylinder, let us suppose a newspaper about to be reprinted by this means. The sheet is first moistened with dilute acid and placed between sheets of blotting paper, in order that the superfluous moisture may be absorbed. The ink resists the acid, which attacks the blanks only. In all cases where the letter-press is of recent date, or not perhaps older than half a year, a few minutes suffice for this purpose. The paper is then carefully placed upon the plate with which the letter-press to be transferred is in immediate contact, and the whole passed under a press, on removal from which, and on carefully disengaging the paper, the letters are found in reverse on the plate. A preparation of gum is then applied to the plate by means of a roller, after which the letters receive an addition of ink, which is immediately incorporated with that by which they are already formed. These operations are effected in a few minutes. The surface of the plate round the letters is next bitten in a very slight degree by dilute acid, and on the fresh application of the ink it is rejected by the zinc, and received only by the letters, which are charged with the ink by the common roller used in hand-printing. Each letter comes from the press as clear as if it had been imprinted by type metal; and the copies are fac-similes, which cannot easily be distinguished from the original sheet.

When pen-and-ink drawings are to be reproduced, they are made on any paper free from hairs or filaments, and well-sized. The ink used is a preparation made for the purpose, closely resembling lithographic ink, and may be mixed to any degree of thickness in pure distilled water. It should be used fresh, and slightly warm when a fine effect is to be given. In making or copying a design a pencil may be used; but the marks must be left on the paper, and by no means rubbed with India rubber or bread. It is necessary to add, that the paper should be kept quite clean and free from friction, and should not be touched by the fingers, inasmuch as it will retain marks of very slight touches.

Before closing this notice of anastatic printing, it may be proper to remark, that the great pretensions originally set up by the patentees

have not been fulfilled by its extensive adoption in trade.

PRINTING INK. *Prep.*—*a.* The VARNISH. Linseed or nut oil, 10 or 20 galls., is set over the fire in an iron pot capable of containing fully as much more; when it boils, it is kept stirred with an iron ladle, and, if it does not take fire of itself soon after the smoke begins to rise, it is kindled by means of a piece of burning paper, stuck in the cleft end of a long stick; the pot is shortly afterwards removed from the fire, and the oil is suffered to burn for about half an hour, or until a sample of the varnish cooled upon a pallet knife may be drawn into strings of about ½ inch long, between the fingers; the flame is now extinguished by the application of a closely fitting tin cover, and, as soon as the froth of the ebullition has subsided, black resin is added, in the proportion of ¾ lb. to 1 lb. for every quart of oil thus treated; the mixture is next stirred until the resin is dissolved, when dry brown soap, cut into slices, 1¾ lb., is further added (cautiously), and the ingredients are again stirred with the spatula until the whole is united, the pot being once more placed over the fire to promote the combination; when this is effected, the varnish is removed from the heat, and, after a good stirring, is covered over and set aside.

b. The INK. Indigo and Prussian blue, of each, in fine powder, 2½ oz.; mineral lampblack (finest), 4 lbs.; vegetable lampblack, 3½ lbs.; stir them gradually into the warm varnish (*a*), and submit the mixture to careful grinding, either in a mill or by means of a slab and muller. On the large scale, steam power is now generally employed for this purpose.

An extemporaneous superfine black ink may be made by the following formula:—Take of balsam of copaiba (pure), 9 oz.; lampblack, 3 oz.; indigo and Prussian blue, of each, ½ oz.; Indian red, ¾ oz.; yellow soap (dry), 3 oz.; grind the mixture to an impalpable smoothness by means of a stone and muller. Canada balsam may be substituted for balsam of copaiba where the smell of the latter is objectionable, but the ink then dries very quickly.

COLOURED PRINTING INKS are made in a similar way from the following pigments:—Carmine, lakes, vermilion, chrome yellow, red lead, orange red, Indian red, Venetian red, for red; orange chrome, chrome yellow, burnt terra di sienna, gall-stone, Roman ochre, yellow ochre, for orange and yellow; verdigris, Scheele's green, Schweinfurt green, blues and yellows mixed, for greens; indigo, Prussian blue, Antwerp b., cobalt b., charcoal b., for blue; lustre, bronze powders, &c., for metallic colours; and umbia, sepia, &c., for brown.

Obs. It is necessary to prepare two kinds of varnish, varying in consistence, from more or less boiling, to be occasionally mixed together as circumstances may require; that which answers well in hot weather being too thick in cold, and *vice versâ*. Large characters also require a thinner ink than small ones. Old linseed oil is preferable to new. Yellow resin soap is preferred for black and dark-coloured inks, and white curd soap for light ones.

A good varnish may be drawn into threads like glue, and is very thick and tenacious. The oil loses from 10% to 14% by the boiling. Mr. Savage obtained the large medal of the Society of Arts for his black ink made as above.

PRINTS (Ackerman's Liquor for). *Prep.* Take of the finest pale glue and white curd soap, of each, 4 oz.; boiling water, 3 pints; dissolve, then add of powdered alum, 2 oz. *Used* to size prints and pictures before colouring them.

PROOF. See ACETIMETRY, ALCOHOLOMETRY, &c.

PROOFS (Correct'ing). The specimen on the next page, with the notes, will, if carefully perused, put the reader into possession of all the secrets of this useful art.

PROPYL'IC ALCOHOL. C_3H_7O. *Syn.* HYDRATED OXIDE OF PROPYL, TRITYL ALCOHOL. A liquid boiling at 204·8° Fahr., obtained by repeatedly rectifying the first products of the distillation of the fusel-oil of marc-brandy. It stands to ethylic alcohol (ordinary alcohol) in the same relation in which the latter stands to methylic alcohol (pyroxylic spirit).

PRO'TEIN. The name given by Mülder to a substance which he regarded as the original matter from which animal albumen, casein, and fibrin, were derived; but which is now considered as a product of the decomposition of those important principles by moderately strong caustic alkali.

Prep. (Liebig.) Albumen, casein, or fibrin is dissolved in moderately strong potassa, the solution heated for some time to 120° Fahr., and acetic acid added; a gelatinous precipitate subsides, which, after being washed and dried, is protein.

Obs. The names binoxide and teroxide of protein have been given by Mülder to products of the long-continued action of boiling water upon fibrin in contact with the air.

PRO'TIDE. A soluble, straw-yellow substance, formed, along with other products, by the action of strong solution of potassa on albumen, fibrin, or casein. See ERYTHROPROTIDE.

PROTO-. See NOMENCLATURE.

PROVI'SIONS (Preservation of). See PUTREFACTION.

PRUNES. [Fr.] The fruit of cultivated varieties of *Prunus domestica* (Linn.). The dried fruit (FRENCH PRUNES or PLUMS; PRUNUM—B. P., Ph. L., PRUNA—Ph. E. & D.) is cooling and gently laxative, and, as such, is usful in habitual costiveness and fevers.

Pulp of Prunes. *Syn.* PREPARED PRUNES; PULPA PRUNORUM; PRUNUM PRÆPARATUM

[*Proof.*

1 *Ital.* As the vine, which has long
2 twined its graceful foliage
3 about the oak; and been
lifted by it into sunshine, will,
4 when the hardy plant is rift
5 ed by the thunderbolt,
6 cling round it with its
7 *caressing* tendrils, and bind
8 its shattered boughs up,
9 so is it ordered beautifully
10 by providence, that woman
12 who is the mere dependant
13 and ornament of man in the
14 happier hours, should his
15 stay and solace.
When smitten by
16 sudden calamity, winding
17 herself into the rugged
18 recesses of his nature, ten-
derly supporting the droop-
19 ing head, and binding up
20 the broken heart. [It also
21 is interesting to notice how
22 *some* MINDS seem almost to
23 create themselves, springing
24 up under, and working their
25 solitary, but irresistible way,
26 through a thousand obsta-
27 cles; Nature seems, &c.
28 IRVING.
29 every disadvantage

[*The same corrected.*]

As the *vine*, which has long twined its graceful foliage about the oak, and been lifted by it into sunshine, will, when the hardy plant is rifted by the thunderbolt, cling round it with its caressing tendrils, and bind up its shattered boughs, so is it beautifully ordered by Providence, that WOMAN, who is the mere dependant and ornament of man in his happier hours, should be his stay and solace when smitten by sudden calamity; winding herself into the rugged recesses of his nature, tenderly supporting the drooping head, and binding up the broken heart.

It also is interesting to notice how *some* minds seem almost to create THEMSELVES, springing up under every disadvantage, and working their "solitary, but irresistible way," through a thousand obstacles. Nature seems, &c.

IRVING.

Explanation of the marks:

1. When a letter or word is to be in *italics*.
2. When a letter is turned upside down.
3. The substitution of a comma for another point or letter.
4. The insertion of a hyphen; also marked (-).
5. When letters should be close together.
6. When a letter or word is to be omitted.
7. When a word is to be changed to roman.
8, 9. Two methods of marking a transposition: when there are *several* words to be transposed, and they are much intermixed, it is a common plan to number them, and to put the usual mark in the margin.
10. Substitution of a capital for a small letter.
11. When a word is to be changed from small letters to capitals.
12. The transposition of letters in a word.
13. The substitution of one word for another.
14. When a word or letter is to be inserted.
15. When a paragraph occurs improperly.
16. The insertion of a semicolon.
17. When a space or quadrat stands up, and is seen along with the type.
18. When letters of a wrong fount are used.
19. When words crossed off are to remain.
20. The mark for a paragraph, when its commencement has been neglected. Sometimes the sign [, or ¶, or the word '*break*,' is used instead of the syllables '*New Par.*'
21. For the insertion of a space when omitted or insufficient.
22. To change capitals to small letters.
23. To change small letters to small capitals.
24. When lines or words are not straight.
25, 26 The insertion of inverted commas. The apostrophe is similarly marked.
27. The insertion of a period when omitted, or in place of another point or letter.
28. Substitution of one letter for another.
29. The method of marking an omission or insertion when too long for the side margin.

(Ph. L.), L. *Prep.* The imported dried fruit is boiled gently for four hours with water, q. s. to cover them, and then pressed, first through a fine cane sieve, and afterwards through a fine hair sieve; the pulp is, lastly, evaporated by the heat of a water bath to the consistence of a confection. A better plan is to use as little water as possible, by which the necessity of subsequent evaporation is avoided. *Used* in the preparation of confection of senna.

PRU″NING varies according to the kind of plant or tree operated on, and the particular object in view, and its skilful performance must, therefore, greatly depend on the experience and knowledge of the gardener. "In the operation of pruning, the shoots are cut off close to the buds, or at a distance not greater than the diameter of the branch to be cut off; because without the near proximity of a bud, the wounds will not heal over. In shoots which produce their buds alternately the cut is made at the back of the bud, sloping from it, so that it may be readily covered by the bark in the same or in the following year; but in the case of branches where the buds are produced opposite each other, either one bud must be sacrificed or the branch must be cut off at right angles to its line of direction, which is most conveniently done with the pruning shears." (Loudon.)

PRUS'SIAN AL'KALI. Ferrocyanide of potassium.

PRUS'SIAN BLUE. *Syn.* BERLIN BLUE, PARIS B., FERROCYANIDE OF IRON, PRUSSIATE OF IRON, CYANURET OF I. This is the well-known blue pigment of the shops.

Prep. 1. The crude but clear solution of ferrocyanide of potassium (blood lye) is precipitated by a mixed solution of alum, 2 parts, and green sulphate of iron, 1 part; the dingy greenish precipitate that falls gradually becomes blue by absorption of atmospheric oxygen, which is promoted by exposure and agitation of the liquor; as soon as it has acquired its full colour, the sediment is repeatedly washed with water, and is then drained, and dried, at first in a stove, but afterwards on chalk stones. *Product* large, but inferior in quality.

2. Repeatedly digest and wash the precipitate obtained by the above process, in very dilute hydrochloric acid, and then in pure water; drain and dry it, as before. Superior.

3. (Paris blue.)—*a.* Neutralise the solution of ferrocyanide of potassium (blood lye) with dilute sulphuric acid, precipitate the liquid with a solution of any persalt or sesquisalt of iron (as the persulphate, nitrate, sesquichloride, or peracetate); well wash the precipitate with water, and dry it, as before. A very rich and intense colour.

b. (Hochstätter.) Crystallised ferrocyanide of potassium and green sulphate of iron, of each, 6 parts, are each separately dissolved in water, 15 parts; after the admixture of the solutions, and frequent agitation, oil of vitriol, 1 part, and fuming hydrochloric acid, 24 parts, are stirred in; after some hours have elapsed, a strained solution of chloride of lime, 1 part, dissolved in water, 80 parts, is gradually added, the addition being stopped as soon as an effervescence from the escape of chlorine is perceived; the whole is now left for 5 or 6 hours, when the precipitate is thoroughly washed in pure soft water, drained, and dried. Or, instead of the above, the precipitate is at once washed in dilute nitric acid, until its colour ceases to be improved by the process. The *product* is of the finest quality.

Prop. Insoluble in water and in dilute acids, except the oxalic, in solutions of which it dissolves freely, when pure; oil of vitriol dissolves it to a white pasty mass, which is again precipitated of the usual blue colour by water; alkalies instantly decompose it, and so do red oxide of mercury and some other oxides when boiled with it; it burns in the air like tinder, leaving an ash of oxide of iron. It is not poisonous.

Pur., &c. The quality of Prussian blue may be estimated by the richness of its colour, and by the quantity of potassa or soda required to destroy this. If it effervesces with acids, it contains chalk; and if it forms a paste with boiling water, it is adulterated with starch. It is pure if, "after being boiled with dilute hydrochloric acid, ammonia throws down nothing from the filtered liquid." (Ph. L. 1836.) It is distinguished from indigo by exhibiting a coppery tint when broken, but which is removed by rubbing with the nail.

Concluding remarks. The commercial Prussian blue is not pure ferrocyanide of iron, but a mixture of this salt with varying proportions of the ferricyanide of iron and potassium, which also has a fine deep blue colour. The object in employing alum is to prevent or lessen the precipitation of oxide of iron by the free alkali in the blood lye, but a portion of alumina is in consequence thrown down with the blue, and tends to render it paler and increase the product. The quantity of alum employed may be varied according to the shades of the intended blue. Samples containing this contamination must not be employed medicinally. (See *page* 240.)

Prussian Blue, Sol'uble. *Prep.* 1. (BASIC PRUSSIAN BLUE.) By adding a solution of protosulphate of iron to a solution of ferrocyanide of potassium; a bluish-white precipitate, turning dark blue by free exposure, is formed, which, after it has acquired this colour, is washed until it begins to dissolve in the water, and colour it blue; it is then either collected and dried, or is at once dissolved in pure water. This variety is not precipitated from its solution by alcohol.

2. (FERROCYANIDE OF POTASSIUM AND IRON.) By precipitating a solution of a sesquisalt or persalt of iron (as the persulphate, pernitrate, peracetate, or sesquichloride) with a stronger solution of ferrocyanide of potassium,

so that the latter may be in considerable excess. A blue precipitate is formed, which is treated as before. This variety is precipitated by alcohol. Both are freely soluble in pure water, but not in water which has the slightest saline contamination. Hence it is that lengthened exposure to the atmosphere, and the use of the common steel pen, causes the gradual precipitation of this substance from its solution when used as ink. See WRITING FLUIDS.

PRU'SSIC ACID. See HYDROCYANIC ACID.

PSEU'DO-MOR'PHIA. A substance of little importance, occasionally found in opium. It differs from morphine chiefly in not decomposing iodic acid. It is said to contain nitrogen.

PTIS'AN. *Syn.* PTISANA, L. A decoction made of pearl barley, liquorice, raisins, and other like vegetable matters, either alone or so slightly medicated as to be taken as a common drink in fevers, catarrhs, &c. Those retained in English pharmacy have been already noticed. The French physicians often employ this form of medicine. The 'tisanes' of the P. Cod. are numerous. See DECOCTION, INFUSION, JULEP, TISANE, &c.

PTY'ALIN. A peculiar animal matter, analogous to diastasse, obtained from the saliva. It is soluble in water, but insoluble in alcohol.

PUCHA PAT. *Syn.* PATCHOULI. Puchá pât is the dried foliaceous tops of *Pogostemon Patchouli*, an Indian species of *Labiatæ*. It is much used in perfumery, particularly for making sachets; but its odour, although very durable, is not so agreeable as that of many other substances, unless it is combined with lavender, bergamot, ambergris, musk, or some other like perfume.

PUD'DINGS. The instructions given under CAKES, PIES, &c., will be found, with some slight modifications, also to apply to puddings, and, therefore, need not be repeated here. Soyer tell us that every sort of pudding, if sweet or savory, is preferably dressed in a basin, instead of in a cloth. If boiled in a basin, the paste receives all the nutriment of the materials, which, if boiled in a cloth, are dissolved out by the water, when by neglect it ceases boiling. To cause them to turn well out, the inside of the basin should be thoroughly 'larded' or rubbed with butter.

In the preparation of meat puddings the "first and most important point is never to use any meat that is tainted; for in pudding, above all other dishes, it is least possible to disguise it by the confined progress which the ingredients undergo. The gradual heating of the meat, which alone would accelerate decomposition, will cause the smallest piece of tainted meat to contaminate all the rest. Be particular, also, that the suet and fat are not rancid, ever remembering the grand principle that everything which gratifies the palate nourishes."

"A pudding-cloth, however coarse, ought never to be washed with soap; it should be simply dried as quickly as possible, and kept dry and free from dust, and in a drawer or cupboard free from smell." (Soyer.)

PUD'DLING. See IRON.

PULMONI'TIS. Inflammation of the lungs.

PULP. *Syn.* PULPA, L. The softer parts of plants, more particularly of fruits, separated from the fibrous and harder portions.

"Pulpy fruits, if they be unripe, or ripe and dried, are to be placed in a damp situation until they become soft; then the pulp is to be pressed out through a hair sieve; afterwards, it is to be boiled with a gentle heat, frequently stirring; and, finally, the (excess of) water is to be evaporated in a water bath, until the pulp acquire proper consistence.

"Press the pulpy fruits which are ripe and fresh through a hair sieve, without boiling them." (Ph. L. 1836.)

PULVERISA'TION. The reduction of any substance to dust or powder.

On the small scale, pulverisation is usually performed by means of a pestle and mortar; on the large scale, by stamping, grinding or cutting the substance in a mill. A few soft substances, as carbonate of magnesia, carbonate of lead, &c., may be pulverised by simply rubbing them through a fine sieve, placed over a sheet of paper; whilst many hard, gritty substances can only be reduced to fine powder by porphyrisation or levigation. Elutriation, or 'washing over,' is adopted for several substances, as chalk, antimony, &c., which are required to be reduced to fine powder on the large scale. For some articles which are very tough, fibrous, or resisting, a rasp or file is employed. Whichever of these methods is adopted, the body to be powdered must be very dry, and where spontaneous drying is insufficient, artifical desiccation in a stove or oven, gently heated, is employed. To facilitate this, the substance should be first cut into pieces or crushed small. On the other hand, a few substances, as rice, sago, nux vomica, and St. Ignatius's bean, are often soaked in water, or steamed, before being further operated on. Whenever a substance cannot be dried completely, without an alteration of its properties, an intermedium is had recourse to, by which the moisture may be absorbed, or its state of aggregation modified. Thus, sugar is employed in pulverising civet, musk, nutmeg, and vanilla. When camphor is to be pulverised, the addition of a very small quantity of alcohol renders the operation easy. In other cases, the intermedium is of so hard a nature as to assist in breaking down the substance to be powdered; thus, gold leaf is reduced to powder by rubbing it with sulphate of potassa, and afterwards removing this last by means of water. Fusible metals, as zinc and tin, are powdered by pouring them into a mortar, and stirring them rapidly whilst cooling; or, by briskly agitating them, in the melted state, in a wooden box covered with chalk or whiting. Phosphorus is

powdered by melting it in urine or lime water, and then shaking the bottle until its contents have become quite cold. Glass, quartz, and silicated stones, require to be heated red hot, and in this state to be thrown into cold water, by which they become sufficiently friable to admit of pulverisation. Many salts which are reduced to fine powder with very great difficulty, and do not dissolve in spirit of wine, are easily obtained in a pulverulent form, by agitating their concentrated aqueous solution with a considerable quantity of rectified spirit; the disengaged fine crystallised powder may then be dried, and further divided by trituration. Potassio-tartrate of antimony may be advantageously thus treated. A large number of salts, including nitre, sal ammoniac, and carbonate of potash, may also be reduced to powder by keeping their solutions in a state of constant and violent agitation during their rapid evaporation.

The following rules should be observed in the preparation of powders:—

1. If possible, perfectly dry articles should alone be operated on, and only in dry weather.

2. The nature of the mortar, and the mode of operating, should be adapted to the nature of the substance. Thus, woods and barks should be pulverised in an iron mortar; sugar, alum, and nitre, in one of marble or wedgwood-ware; and corrosive sublimate, only in one of glass.

3. The mortar should be provided with a cover, to prevent loss and annoyance to the operator. If much powder escapes, or if it is dangerous or disagreeable when breathed, or if the substance is rare or costly, the mortar should be covered with a skin of leather, to which the pestle is attached, so that the latter may be freely moved without causing the slightest opening for the escape of the dust occasioned by the process. When aloes or gamboge is powdered, a few drops of olive oil are commonly added, with the same intention.

4. The pulverised portions should be separated from time to time, by aid of a sieve, the coarser particles being returned to the mortar to be again beaten and triturated; and this alternate pulverisation and sifting is to be repeated until the process is complete.

PUM'ICE STONE. *Syn.* PUMEX, LAPIS PUMICEUS, L. RUMICIS, L. Found in the neighbourhood of volcanoes. *Used*, in the solid form, to polish wood, paint, &c.; also, when pulverised, as a polishing powder for glass, bone, ivory, marble, metals, &c.

PUNCH. An acidulous, intoxicating beverage, composed of water sweetened with sugar, with a mixture of lemon juice and spirit, to which some aromatic, as nutmeg, mace, or cinnamon, is occasionally added. Wine is sometimes substituted for spirit. It is much less drunk than formerly. Rum punch is the most popular amongst sailors, who are now the principal consumers of this beverage.

Prep. 1. Juice of 3 or 4 lemons; yellow peel of 1 lemon; lump sugar, ¾ lb.; boiling water, 3½ pints; infuse ½ an hour, strain, and add, of bitter ale, ½ pint; rum and brandy, of each, ¾ to 1 pint (or rum alone, 1½ to 2 pints). More hot water and sugar may be added if the punch is desired either weaker or sweeter.

2. (COLD PUNCH.) From arrack, port wine, and water, of each, 1 pint; juice of 4 lemons; white sugar, 1 lb.

3. (GIN PUNCH.) From the yellow peel of ½ a lemon; juice of 1 lemon; strongest gin, ¾ pint; water, 1¾ pint; sherry, 1 glassful.

4. (ICED PUNCH.) From champagne or Rhenish wine, 1 quart; arrack, 1 pint; juice of 6 lemons; yellow peel of 3 lemons; white sugar, 1 lb.; soda water, 1 or 2 bottles; to be iced as cream.

5. (MILK PUNCH; VERDER.) Steep the yellow rinds of 18 lemons and 6 oranges, for 2 days, in rum or brandy, 2 quarts; then add, 3 quarts more of either spirit; hot water, 3 quarts; lemon juice, 1 quart; loaf sugar, 4 lbs.; 2 nutmegs, grated; and boiling milk, 2 quarts; mix well, and in 2 hours strain the liquor through a jelly-bag.

6. (NORFOLK PUNCH.) Take of French brandy, 20 quarts; yellow peels of 18 oranges and 30 lemons; infuse for 12 hours; add, of cold water, 30 quarts; lump sugar, 20 lbs.; and the juice of the oranges and lemons; mix well, strain through a hair sieve, add of new milk, 2 quarts, and in 6 weeks bottle it. Keeps well.

7. (ORANGE PUNCH.) As No. 1, using oranges, and adding some orange wine, if at hand. A little curaçoa, noyau, or mareschino, improves it.

8. (RASPBERRY PUNCH.) As the last, but using raspberry juice, or raspberry vinegar, for the oranges or lemons.

9. (REGENT'S PUNCH.) From strong hot green tea, lemon juice, and capillaire, of each, 1½ pint; rum, brandy, arrack, and curaçoa, of each, 1 pint; champagne, 1 bottle; mix, and slice a pineapple into it.

10. (TEA PUNCH.) From strong hot tea, 1 quart; arrack, ½ bottle; white sugar, 6 oz.; juice of 8 lemons; and the yellow rinds of 4 lemons; mixed together.

11. (WINE PUNCH.) From white sugar, 1 lb.; yellow peel of 3 lemons; juice of 9 lemons; arrack, 1 pint; port or sherry (hot), 1 gal.; cinnamon, ¼ oz.; nutmeg, 1 dr.; mix.

12. (YANKEE PUNCH.) Macerate sliced pineapple, 3 oz.; vanilla, 6 grs.; and ambergris (rubbed with a little sugar), 1 gr., in the strongest pale brandy, 1 pint, for a few hours, with frequent agitation; then strain with expression; add, of lemon juice, 1 pint; lemon syrup, and either claret or port wine, of each, 1 bottle; with sugar, ½ lb., dissolved in boiling water, 1½ pint. See SHRUB.

PURG'ATIVES. *Syn.* DEJECTORIA, PURGANTIA, PURGATIVA, L. These have been divided into five orders or classes, according to

their particular actions. The following are the principal of each class:—

1. (LAXATIVES, LENITIVES, or MILD CATHARTICS.) Manna, cassia pulp, tamarinds, prunes, honey, phosphate of soda; castor, almond, and olive oils; ripe fruit.

2. (SALINE or COOLING LAXATIVES.) Epsom salt, Glauber's salt, phosphate of soda (tasteless salt), seidlitz powders, &c.

3. (ACTIVE CATHARTICS, occasionally acrid, frequently tonic and stomachic.) Rhubarb, senna, aloes, &c.

4. (DRASTIC or VIOLENT CATHARTICS.) Jalap, scammony, gamboge, croton oil, colocynth, elaterium, &c.

5. (MERCURIAL PURGATIVES.) Calomel, blue-pill, quicksilver with chalk, &c.

In prescribing purgatives, regard should be had to the particular portion of the alimentary canal on which we desire more immediately to act, as well as to the manner in which the medicine effects its purpose. Thus, Epsom salt, sulphate of potassa, and rhubarb, act chiefly on the duodenum; aloes, on the rectum; blue pill, calomel, and jalap, on the larger intestines generally; and tartrate and bitartrate of potassa, and sulphur, on the whole length of the intestinal canal. Again, others are stimulant, as aloes, croton oil, jalap, scammony, &c.; others are refrigerant, as most of the saline aperients; magnesia and its carbonate are both aperient and antacid; whilst another class, including rhubarb, damask roses, &c., are astringent. Further, some produce only serous or watery dejections, without greatly increasing the peristaltic action of the bowels; whilst a few occasion a copious discharge of the fæces in an apparently natural form. See DRAUGHT, MIXTURE, PILLS, PRESCRIBING, &c.

PURL. *Prep.* To ale or beer, ½ pint, gently warmed, add of bitters, 1 wine-glassful, or q. s. Some add a little spirit. A favourite beverage with hard drinkers early in the morning.

PURPLE. A rich compound colour, produced by the admixture of pure blue and pure red. This colour has always been the distinguishing badge of royalty and distinction. The celebrated Tyrian purple was produced from a shell-fish called murex.

Purple, Aniline. *Syn.* PERKIN'S PURPLE, MAUVE. This valuable dye-stuff is prepared under W. H. Perkin's patent, by mixing solutions of sulphate of aniline and bichromate of potassa in equivalent proportions, and, after some hours, washing the black precipitate with water, drying it, digesting it repeatedly in coal-tar naphtha, and, finally, dissolving it in boiling alcohol. It may be further purified by evaporating the alcoholic solution to dryness, dissolving the residue in a large quantity of boiling water, reprecipitating by caustic soda, washing with water, dissolving in alcohol, filtering, and evaporating to dryness. Thus purified, mauve forms a brittle substance, having a bronze-coloured surface. It imparts a deep purple colour to cold water, though dissolving sparingly in that liquid; it is more soluble in hot water, and very soluble in alcohol. See PURPLE DYE (*below*), and TAR COLOURS.

Purple of Cassius. *Syn.* PURPLE PRECIPITATE OF CASSIUS, GOLD PURPLE, GOLD PREPARED WITH TIN; AURUM STANNO PARATUM, PURPURA MINERALIS CASSII, L. *Prep.* 1. Crystallised protochloride of tin, 1 part; crystallised perchloride of tin, 2 parts; dissolve each separately, mix the solutions, and add of crystallised terchloride of gold (in solution), 1 part; carefully wash, and dry the precipitate. Very fine.

2. (Frick.) Dissolve pure grain tin in cold dilute aqua regia, until the fluid becomes faintly opalescent, then take the metal out and weigh it; next, dilute the solution largely with water, and add, simultaneously, a dilute solution of gold and dilute sulphuric acid in such proportion that the tin in the one shall be to the gold in the other in the ratio of 10 to 36.

3. (P. Cod.) Terchloride of gold, 1 part, is dissolved in distilled water, 200 parts; another solution is made by dissolving, in the cold, pure tin, 1 part, in a mixture of nitric acid, 1 part, and hydrochloric acid, 2 parts; this last solution is diluted with distilled water, 100 parts, and is then added to the solution of terchloride of gold until precipitation ceases to take place; the powder is, lastly, washed by decantation, and dried by a very gentle heat.

4. Silver, 150 parts; gold, 20 parts; pure grain tin, 35 parts; fuse them together under charcoal and borax, cool, laminate, and dissolve out the silver with nitric acid.

Obs. Purple of Cassius is generally supposed to be a combination of oxide of gold and sesquioxide of tin, in which the latter acts as an acid. Heat resolves it into a mixture of metallic gold and binoxide of tin. It is used as a purple in porcelain painting, and to communicate a ruby red colour to glass, when melted in open vessels.

PURPLE DYE. The purples now in vogue are the numerous shades of 'mauve' and 'magenta' obtained by the 'aniline colours.' (See *above*, also RED.) For silk and woollen goods, no mordant is required. The proper proportion of the clear alcoholic solution is mixed with water slightly warm, any scum that may form is cleared off, and the goods are entered and worked until the required shade is obtained; a small quantity of acetic or tartaric acid is recommended to be added in some cases. For dyeing on cotton with the aniline colours, the cloth or yarn is steeped in sumac or tannic acid, dyed in the colour, and then fixed by tin; or it may be steeped in sumac and mordanted with tin, and then dyed. Purples were formerly, and are still occasionally, produced, by first dyeing a blue in the 'indigo

vat,' and then dyeing a cochineal or lac scarlet upon the top. See VIOLET DYE.

PUR'PURATE OF AMMO'NIA. See MUREXIDE.

PURPU'RIC ACID. See MUREXAN.

PUR'PURIN. $C_9H_6O_3$. *Syn.* MADDER PURPLE. The name given by Robiquet and Colin to a beautiful colouring principle obtained from madder.

Prep. Coarsely powdered madder is allowed to ferment with water, after which it is boiled in a strong solution of alum; the decoction is next mixed with sulphuric acid, and the resulting red precipitate is purified by one or more crystallisations from alcohol.

Prop., &c. Crystalline red needles, insoluble in cold water, but soluble in hot water, and in alcohol, ether, and solutions of alum and the alkalies. It differs from alizarin or madder red in containing 2 atoms less of carbon.

PUR'REE. *Syn.* INDIAN YELLOW. A yellow substance, of doubtful origin, imported from China and India, and now extensively used in both oil and water-colour painting. According to the researches of Stenhouse and Erdmann, it consists of purreic acid, a strongly tinctorial vegetable substance, united to magnesia.

PURRE'IC ACID. *Syn.* EUXANTHIC ACID. This substance is obtained from purree. It crystallises in nearly colourless needles, which are only sparingly soluble in cold water, and forms rich yellow-coloured compounds with the alkalies and earths. Heat converts it into a neutral, crystallisable substance, called purrenone.

PUS. The cream-like, white or yellowish liquid secreted by wounded surfaces, abscesses, sores, &c.

PUTREFAC'TION. *Syn.* PUTREFACTIO, L. The spontaneous decomposition of animal and nitrogenised vegetable substances, under the joint influence of warmth, air, and moisture. The solid and fluid matters are resolved into gaseous compounds and vapours, which escape, and into earthy matters, which remain. The most striking characteristic of this species of decomposition is the ammoniacal or fetid exhalations that constantly accompany it.

The nature of putrefaction, and the conditions essential to its occurrence, have been briefly alluded to under FERMENTATION, to which we must refer the reader. It may here, however, be useful to reiterate that this change can only be prevented by the abstraction or exclusion of the conditions essential to its occurrence. This may be effected by—reduction of temperature,—exclusion of atmospheric air, or—the abstraction of moisture. The antiseptic processes in common use are effective in precisely the same degree as these preventive means are carried out. Frozen meat may be preserved for an unlimited period, while the same substance will scarcely keep for more than a few days at the ordinary heat of summer. Animal substances will also remain uninjured for a long period if kept in vessels from which the air is entirely excluded, as in the process now so extensively adopted for the preservation of fresh meat for the use of our army and marine. The third condition is fulfilled when nitrogenised matter is preserved in alcohol, brine, or any similar fluid, and when it is dried. In either case water is abstracted from the surface, which then loses its propensity to putrefy, and forms an impervious layer, which excludes atmospheric oxygen from the interior and softer portion of the substance. Creasote, and most of the antiseptic salts, also act in this way.

Among special antiseptic processes are the following:—

APPLICATION OF COLD. The accession of putrefaction is prevented, and its progress arrested, by a temperature below that at which water freezes. In the colder climates of the world, butcher's meat, poultry, and even vegetables, are preserved from one season to the other in the frozen state. In North America millions are thus supplied with animal food, which, we can state, from personal experience, is often superior in flavour, tenderness, and apparent freshness, to that from the recently killed animal. In temperate climates, and in cold ones during their short summer, ice-houses and ice-safes afford a temperature sufficiently low for keeping meat fresh and sweet for an indefinite period. Substances preserved in this manner should be allowed to gradually assume their natural condition before cooking them; and on no account should they be plunged into hot water, or put before the fire, whilst in the frozen state.

BUCANING. A rude kind of drying and smoking meat, cut into thin slices, practised by hunters in the prairies and forests.

DESICCATION OR DRYING. In this way every article of food, both animal and vegetable, may be preserved, without the application of salt or other foreign matter. The proper method is to expose the substances, cut into slices or small fragments, in the sun, or in a current of warm dry air, the temperature of which should be under 140° Fahr. Articles so treated, when immersed for a short time in cold water, to allow the albumen and organic fibres to swell, and then boiled in the same water, are nearly as nutritious as fresh meat cooked in the same manner. If a higher degree of heat than 140° be employed for animal substances, they become hard and insipid. Owing to the practical difficulties in the way of applying the above process to fresh meats, it is usually employed in conjunction with either salting or smoking, and, frequently, with both of them.

EXCLUSION OF ATMOSPHERIC AIR. This is effected by the method of preserving in sugar, potting in oil, and, more particularly, by some of the patented methods noticed below. Fresh meat may be preserved for some months in that state, by keeping it in water perfectly

deprived of air. In practice, some iron filings and sulphur may be placed at the bottom of the vessel, over which must be set the meat; over the whole is gently poured recently boiled water, and the vessel is at once closed, so as to exclude the external air.

IMMERSION IN ANTISEPTIC LIQUIDS. One of the commonest and most effective liquids employed for this purpose is alcohol of 60 to 70%, to which a little camphor, ammonia, sal ammoniac, or common salt, is occasionally added. A cheaper and equally efficient plan is to employ a weak spirit holding a little creasote in solution. A weak solution of sulphurous acid may be substituted for alcohol. Weak solutions of alum, or carbolic acid, with or without the addition of a few grains of corrosive sublimate, or of arsenious acid, are also highly antiseptic. These are chiefly employed for anatomical specimens, &c. A solution containing only $\frac{1}{600}$th part of nitrate of silver is likewise very effective; but, from this salt being poisonous, it cannot be employed for preserving articles of food. Butcher's meat is occasionally pickled in vinegar. By immersing it for 1 hour in water holding $\frac{1}{400}$th part of creasote in solution, it may be preserved unchanged for some time, even during summer.

INJECTION OF ANTISEPTIC LIQUIDS into the veins or arteries of the recently killed animal. It is found that the sooner this is done after the slaughter of the animal the more effective it becomes, as the absorbent power of the vessels rapidly decrease by age. See GANNAL'S PROCESS (*below.*)

JERKING is a method of preserving flesh sometimes adopted in hot climates. It consists in cutting the lean parts of the meat into thin slices, and exposing these to the sunshine until quite dry and brittle, when they are bruised in a mortar, and pressed into pots.

PICKLING IN VINEGAR. In this method the substances, rendered as dry as possible by exposure to the air, are placed in glass or stoneware jars (not salt-glazed), or wooden vessels, when strong vinegar, either cold or boiling hot, is poured over them, and the vessel at once closely corked, or otherwise covered up, and preserved in a cool situation. Meat is occasionally thus treated; vegetables frequently so. See PICKLE.

POTTING IN OIL. In this case salad or olive oil is substituted for vinegar (see *above*), and is always used cold.

SALTING acts chiefly by abstracting water from the albuminous portions of the meat, by which its disposition to change is lessened.

SMOKING. This process, which, as well as the last, is referred to further on, acts both by the abstraction of moisture and the antiseptic properties of certain substances (creasote, &c.) contained in wood smoke. Fresh meat and fish are occasionally smoked; but, in general, substances intended to be thus treated are first salted.

In Donkin and Gamble's patent process, the substances, previously parboiled, are placed in small tin cylinders, which are then filled up with rich soup; the lids are next soldered on quite air-tight, and a small hole is afterwards made in the centre; the cylinders are then placed in a bath of strong brine, or a strong solution of chloride of calcium, which is at once heated to the boiling-point, to nearly complete the cooking process; after which the small hole in the lid is hermetically sealed, by covering it with solder while the vessel still remains boiling hot; the tins are, lastly, again submitted to heat in the heated bath, the duration of which is proportioned to the quantity and character of their contents, the 'dressing' of which is to be perfected by this operation. The ends of the tins, on cooling, assume a concave form, from the pressure of the atmosphere, without which they cannot be air-tight, and the process has been unsuccessful. To determine this, the patentees expose the canisters, prepared as before, for at least a month, in an apartment heated to about 100° Fahr.; when, if the process has failed, putrefaction commences, and the ends of the cases, instead of remaining concave, bulge, or become convex. This is called the 'test.' By this process, which was invented by M. Appert in France, about the year 1808, fish, flesh, poultry, and vegetables, may be preserved for years, in any climate.

Goldner's process differs somewhat from the preceding, in the employment of a higher degree of heat, more hastily applied, and not prolonged or repeated after the tins are soldered up.

Gannal's process, having for its object the preservation of butcher's meat in the fresh state, depends on the peculiar absorbent property of the flesh of recently killed animals, above referred to. This process consists in injecting a solution of sulphate of alumina, or, better, of chloride of aluminium, of the sp. gr. 1·070 to 1·085 (10° to 12° Baumé), into the carotid artery, by means of a syphon, as soon as the blood ceases to flow from the slaughtered animal; both extremities of the jugular vein being previously tied. 9 to 12 quarts of the solution are sufficient for an ox, and a proportionate quantity for smaller animals. A less quantity is also required in winter than summer. When the animal has been well bled, and the injection skilfully performed, it is scarcely perceptible that the animal has undergone any preparation. The injected animal is cut up in the usual way; and when intended to be eaten within 2 or 3 weeks merely requires to be hung up in a dry, airy situation, free from flies; but if it is to be kept for a longer period, it is directed to be washed with a mixed solution of common salt and chloride of aluminium at 10° Baumé, and then simply dried and packed in clean air-tight barrels, and kept in a cool, dry place. If the air cannot be perfectly excluded, it should be

packed in dry salt, not for the purpose of preserving it, but to prevent the vegetation of bissus, as, without this precaution, the meat becomes musty from exposure and the action of moisture. Meat preserved by this process may be kept for several years, and merely requires soaking for 24 hours in water, for the purpose of swelling its pores, to give it the appearance and taste of fresh meat, fit for either roasting or boiling. For hot climates a somewhat stronger solution, or a larger quantity of the usual one, may be injected. The use of the strong solutions ordered in some recent works, however, deprives the flesh of a portion of its apparent freshness, and makes it more nearly approach in flavour to that which has been slightly salted in the ordinary manner.

In addition to the above, it may be added that both flesh and fish may be preserved by dipping them into, or brushing them over with, pyroligneous acid, and then drying them. This gives them a smoky flavour; but if pure acetic acid (Ph. L.) be used, no taste will be imparted. These fluids may be applied by means of a clean painter's brush, or even a stiff feather. A table-spoonful is sufficient to brush over a large surface. Fish and flesh so prepared will bear a voyage to the East Indies, and back, uninjured.

Fish may also be preserved in a dry state, and perfectly fresh, by means of sugar alone. Fresh fish may be thus kept for some days, so as to be as good when boiled as if just caught. If dried and kept free from mouldiness, there seems no limit to their preservation; and they are much more nutritious in this way than when salted. This process is particularly valuable in making what is called 'kippered salmon;' and the fish preserved in this manner are far superior in quality and flavour to those which are salted or smoked. A few table-spoonfuls of brown sugar are sufficient for a salmon of five or six pounds' weight; and if salt be desired, a teaspoonful or two may be added. Saltpetre may be used, instead of salt, if it be wished to make the kipper hard.

The well-known property possessed by ether, alcohol, pyroxylic spirit, chloroform, and certain other hydrocarbons, of averting putrefaction, has been thus applied by M. Robin:—He encloses the meat or other substances to be preserved in a glass case, along with a sponge or a capsule containing the preservative liquid, which latter is continually evolved in a vaporous condition, and exercises the preservative agency. In this way the vapours of hydrocyanic acid are found to be very efficacious. Camphor is thus employed in the MUMMY CASES in the British Museum.

It has been asserted by Mr. George Hamilton, that in an atmosphere of binoxide of nitrogen, in the dark, flesh preserves its natural colour and freshness for about 5 months; and eats well, provided it be boiled in open vessels, to expel nitrous fumes. See ANIMAL SUBSTANCES, CANDYING, EGG, FISH, FRUIT, MILK, PICKLES, POTTING, PRESERVES, SALTING, SMOKING, STUFFING, VEGETABLE SUBSTANCES, &c.

PUTTY. This name is given to the following preparations (when used alone, 'Glazier's putty' is generally indicated):—

Glazier's Putty. From whiting made into a stiff paste with drying oil. It is used to fix panes of glass in sashes, to fill holes and cracks in wood before painting it, &c.

Plasterer's Putty. A fine cement used by plasterers, made of lime only. It differs from 'FINE STUFF' in the absence of hair.

Polisher's Putty. *Syn.* PUTTY POWDER, CALCINE; CINERES STANNI, STANNI OXYDUM CRUDUM, L. A crude peroxide of tin, obtained by exposing metallic tin in a reverberatory furnace, and raking off the dross, as it forms; this is afterwards calcined until it becomes whitish, and is then reduced to powder. Another method is to melt tin with rather more than an equal weight of lead, and then to rapidly raise the heat so as to render the mixed metal red hot, when the tin will be immediately flung out in the state of 'putty' or 'peroxide.' The products of both these processes are very hard, and are used for polishing glass and japan work, and to colour opaque white enamel. See TIN.

PUZZOLA'NA, PUOZZOLANA, or, more correctly, PUZZUOLANA, is a volcanic ash, found at Puzzuoli, near Naples. When mixed with lime, it forms an excellent hydraulic cement. A good FACTITIOUS PUZZOLANA may be made by heating a mixture of 3 bushels of clay and 1 bushel of fresh-slaked lime, for some hours, to redness. (M. Bruyere.) See CEMENT and MORTAR.

PYRI'TES. A term applied to several native metallic sulphides. IRON PYRITES is the best known of these.

PY'RO-. The term is applied to several acids that are obtained by the action of heat on other substances; as, PYROGALLIC ACID, PYROLIGNEOUS A., &c.

PYROACE'TIC SPIRIT. See SPIRIT (Pyroacetic).

PYROGAL'LIC ACID. $HC_6H_5O_3$. *Syn.* ACIDUM PYROGALLICUM, L. *Prep.* 1. From either gallic or tannic acid, heated in a retort, by means of an oil bath, and steadily maintained at a temperature of about 420° Fahr. as long as crystals are formed in the neck of the retort, or in the receiver, both of which should be kept well cooled. Pure. If a much higher heat is employed, the product consists chiefly of metagallic acid.

2. From Aleppo galls, in very coarse powder, heated in a dish covered with thin filtering paper pasted to its edge, and connected with a well-cooled receiver. Dr. Ure says that the so-called Chinese galls furnish, by dry distillation, a "very concentrated solution of pyrogallic acid, which, evaporated on the water bath, yields of brown crystalline

pyrogallic acid nearly 15% of the weight of the galls."

3. (Dr. Stenhouse.) By sublimation from the dry aqueous extract of nut-galls, in a Mohr's apparatus, in the same way that benzoic acid is obtained from benzoin resin (see *page* 208), observing the precautions referred to in No. 1 (*above*). Nearly pure. The product is fully 10% of the weight of extract operated on.

Prop. Light crystals, which, when perfectly pure, are quite white; freely soluble in water, but the solution cannot be evaporated without turning black and suffering decomposition; it strikes a rich blackish-blue colour with the protosalts of iron, and reduces those of the sesquioxide to the state of protoxide; when heated to 480° Fahr., it is converted into METAGALLIC ACID and water.

Uses, &c. Pure pyrogallic acid is now very extensively employed in photography. A solution of the crude acid mixed with a little spirit is used to dye the hair, to which it imparts a fine brown colour, but has the disadvantage of also staining the skin when applied to it.

PY'ROGEN ACIDS. Those generated by heat.

PYRO'LA. See WINTER GREEN.

PYROLIG'NEOUS ACID. *Syn.* VINEGAR OF WOOD†, SPIRIT OF W.†, SMOKING LIQUOR†, ESSENCE OF SMOKE†; ACIDUM PYROLIGNOSUM, L. Impure acetic acid, obtained by the destructive distillation of wood in close vessels. It comes over along with tar, creasote, and other liquid and gaseous matters. In this state it contains much empyreumatic matter in solution; but by separation from the tar, saturation with slaked lime or chalk, defecation, and evaporation, an impure acetate of pyrolignate of lime is obtained, which, after being gently heated, to destroy part of its empyreumatic matter, without injuring its acetic acid, is again dissolved and defecated, and then precipitated by a solution of sulphate of soda, when a solution of acetate of soda and a precipitate of sulphate of lime are formed by double decomposition. The solution is next evaporated to dryness, the dry mass (pyrolignite of soda) dissolved in water, and the new solution filtered and recrystallised. The crystals of acetate of soda, obtained by the last process, yield nearly pure acetic acid by distillation along with sulphuric acid. See ACETIC ACID and VINEGAR.

PYROLIG'NEOUS SPIRIT. See SPIRIT (Pyroxilic).

PYROM'ETER. An instrument to measure high degrees of heat. WEDGWOOD'S PYROMETER, the one best known, depends on the property which clay possesses of contracting when strongly heated. PROF. DANIEL'S PYROMETER consists, essentially, of a small rod or bar of platinum, which acts in a precisely opposite manner to the preceding, viz., by its expansion.

PYROPH'ORUS. *Syn.* LUFT-ZUNDER, Ger. Any substance that inflames spontaneously when exposed to the air.

Prep. 1. Neutral chromate of lead, 6 parts; sulphur, 1 part; triturate them with water, q. s. to form a paste, and make this into pellets; dry these perfectly by a gentle heat, then heat them in a closed tube until the sulphur is all driven off; lastly, transfer them to a stoppered phial.

2. (HOMBERG'S PYROPHORUS.) From alum and brown sugar, equal parts; stir the mixture in an iron ladle over the fire until dry, then put it into an earthen or coated glass phial, and keep it at a red heat so long as flame is emitted; it must then be carefully stopped up and cooled.

3. (Dr. Hare.) Lampblack, 3 parts; burnt alum, 4 parts; carbonate of potassa, 8 parts; as the last.

4. (Gay Lussac.) From sulphate of potassa, 9 parts; calcined lampblack, 5 parts; as No. 2.

5. Alum, 3 parts; wheat flour, 1 part; as No. 2.

6. (LEAD PYROPHORUS—Göbel.) Heat tartrate of lead to redness in a glass tube, and then hermetically seal it. See TARTRATE OF LEAD.

Obs. When the above are properly prepared, a little of the powder rapidly becomes very hot, and inflames on exposure to the air. The accession of the combustion is promoted by moisture, as a damp atmosphere or the breath. With the exception of the first and sixth, "they owe their combustibility to the presence of sulphide of potassium." (Gay Lussac.)

PYROPHOSPHOR'IC ACID. See DIBASIC PHOSPHORIC ACID.

PYRO'SIS. *Syn.* BLACK WATER, WATER BRASH, WATER QUALM. An affection of the stomach, attended by a sensation of heat and the eructation of a thin, sour liquid, often in considerable quantity, especially in the morning. It is a variety of HEARTBURN (which *see*).

PYROTARTAR'IC ACID. $H_2C_5H_6O_4$. Obtained by the destructive distillation of tartaric acid. See TARTARIC ACID.

PYROTECH'NY. The art of making fireworks. The three principal materials employed in this art are charcoal, nitre, and sulphur, along with filings of iron, steel, copper, or zinc, or with resin, camphor, lycopodium, or other substances, to impart colour, or to modify the effect or the duration of the combustion. Gunpowder is used "either in grain, half crushed, or finely ground, for different purposes. The longer the iron filings are, the brighter red and white spots they give; those being preferred which are made with a coarse file, and quite free from rust. Steel filings and cast-iron borings contain carbon, and afford a more brilliant fire, with wavy radiations. Copper filings give a greenish tint to flame; those of zinc, a fine blue colour; the

sulphide of antimony gives a less greenish blue than zinc, but with much smoke; amber affords a yellow fire, as well as colophony (resin) and common salt; but the last must be very dry. Lampblack produces a very red colour with gunpowder, and a pink one with nitre in excess; it serves for making golden showers." When this substance is lightly mixed with gunpowder and put into cases, it throws out small stars resembling the rowel of a spur; this composition has hence been called 'spur fire.' "The yellow sand, or glistening mica, communicates to fire-works golden radiations. Verdigris imparts a pale green; sulphate of copper and sal ammoniac gives a palm-tree green. Camphor yields a very white flame and aromatic fumes, which masks the bad smell of other substances. Benzoin and storax are also used, on account of their agreeable odour. Lycopodium burns with a rose colour and a magnificent flame; but it is principally employed in theatres to represent lightning, or to charge the torch of a Fury." (Ure.) See FIRES (Coloured), FLAME COLOURS, GUNPOWDER, STARS, ROCKETS, &c.

PYROXYL'IC SPIRIT. See SPIRIT (Pyroxylic).

PYROX'YLIN. *Syn.* FULMINATING COTTON, GUN-COTTON. A highly inflammable and explosive compound, discovered by Schönbein. It is obtained by the action of nitric acid on cotton (cellulin, $C_6H_{10}O_5$), in the presence of sulphuric acid.

By varying the strength of the nitric acid three kinds of gun-cotton may be obtained, called respectively mononitro-cellulin [$C_6H_9(NO_2)O_5$], dinitro-cellulin [$C_6H_8(NO_2)_2O_5$], and trinitro-cellulin [$C_6H_7(NO_2)_3O_5$]. The first is but slightly explosive; the second is not sufficiently explosive to be used as a substitute for gunpowder, but is best adapted for the preparation of collodion; the third is highly explosive, and is the variety employed in mining and military operations, &c.

Prep. 1. (B. P., DINITRO-CELLULIN.) Cotton-wool, 1; sulphuric acid, 5; nitric acid, 5; mix the acids, immerse the cotton, and stir with a glass rod for three minutes, or until it is thoroughly wetted, then remove it, and thoroughly wash out the acid, so that the washings cease to produce a precipitate with chloride of barium. Drain on filtering paper, and dry in a water bath. *Used* in the preparation of COLLODION.

2. Concentrated nitric acid (sp. gr. 1·500) and concentrated sulphuric acid (sp. gr. 1·845) are mixed together in about equal measures; when the mixture has become cold, it is poured into a glass or wedgwood-ware mortar or basin, and clean, dry carded cotton, in as loose a state as practicable, is immersed in it for 4 or 5 minutes, the action of the liquid being promoted by incessant stirring with a glass rod; the acid is next poured off, and the cotton, after being squeezed as dry as possible, by means of the glass stirrer, or between two plates of glass, is thrown into a large quantity of clean soft water, and again squeezed to free it from superfluous moisture; it is then washed in a stream of pure water until it becomes perfectly free from acid, and is, lastly, carefully dried by the heat of hot water or steam, at a temperature not higher than about 180° Fahr.

3. (Schönbein.) Nitric acid (1·45 to 1·50), 1 part; sulphuric acid (1·85), 3 parts; (both by volume;) proceed as above, but, after the cotton has been squeezed from the acid, allow it to remain in a covered vessel for an hour before washing it; and after washing it, dip it into a solution of carbonate of potassa, 1 oz., in pure water, 1 gal., then squeeze, and partially dry it; next dip it into a weak solution of nitre, and dry it in a room heated by hot air or steam to about 150° Fahr. (See Patent Specif.)

4. (Von Lenk.) The cotton, having been thoroughly cleansed and dried, is steeped, as above, in a mixture of nitric and sulphuric acids (the strongest obtainable in commerce), squeezed as dry as possible, and immersed in a fresh mixture of strong acids, being allowed to remain in this second mixture 48 hours. It is then washed in a stream of water for several weeks, and finally treated with a solution of silicate of potassa (soluble glass). This is the celebrated Austrian gun-cotton which was reported on so favourably by a committee of the British Association in 1863. The treatment with silicate of potassa is adopted merely for the purpose of retarding the combustion.

5. ('Bulletin de St. Pétersbourg.')—*a.* Take of powdered nitre, 20 parts; sulphuric acid (1·830 to 1·835), 31 parts; dissolve in a glass vessel, and, whilst the solution is still warm (122° Fahr.), add of dry carded cotton, 1 part, and employ agitation until this last is well saturated; then cover over the vessel with a plate of glass, and let it stand, for 24 hours, at a temperature of about 86° Fahr.; next well wash the cotton, as above, first with cold and afterwards with boiling water, and dry it carefully at a very low temperature.

b. From sulphuric acid (containing 3 equiv. of water), 13 parts; nitric acid (monohydrated), 12 parts; carded cotton, 1 part; the immersion being limited to one hour at a temperature of from 104° to 122° Fahr. (See 'Pharm. Journ.,' vol. xiii, No. 2.)

Prop., &c. Pyroxylin explodes, with a very sudden flash, and the development of very little heat, without either smoke or residue, at a temperature of about 300° Fahr. (No. 3 at 277° Fahr.). Several modifications of pyroxylin are known, varying considerably in composition, though they all contain the elements of hyponitric acid, and are all explosive. Some are insoluble in a mixture of ether and alcohol, whilst others are readily dissolved, forming the glutinous solution which is used in surgery under the name of 'collodion,' and which is also extensively used in photography. The

best gun-cotton (Von Lenk's) is of no use whatever for making collodion. The pyroxylin prepared by the formula 5, *a* (*above*), is soluble in a mixture of 7 parts of ether and 1 part of alcohol; whilst the product of 5, *b*, if prepared by 2 hours' digestion instead of 1, is said to be even soluble in absolute alcohol.

Obs. General von Lenk has overcome all the difficulties which have hitherto prevented gun-cotton being used in place of gunpowder. By spinning the gun-cotton into thread or yarn, and weaving this into webs, he has succeeded in making cartridges which will produce the exact amount of force required. The time needed for the complete ignition of the cartridge can be diminished or increased at pleasure by varying the mechanical arrangement of the spun threads. Each gun and each kind of projectile requires a certain density of cartridge. In general, it is found that the proportion of 11 lbs. of gun-cotton occupying 1 cubic foot of space produces a greater force than gunpowder of which from 50 to 60 lbs. occupies the same space, and a force of the nature required for ordinary artillery. See COLLODION and XYLOIDIN; consult also Abel's researches in the 'Transactions of the Royal Society.'

QUACK MED'ICINES. See PATENT MEDICINES, OINTMENT, PILLS, &c.

QUAIL. The *Coturnix vulgaris*, a gallinaceous bird, allied to the partridge, but of smaller size. Its flesh is highly esteemed by epicures. It is imported from Turkey, preserved in oil; and from Italy, potted with clarified butter.

QUAR'TAN. Occurring every fourth day.

QUARTA'TION. The practice, among assayers, of alloying 1 part of gold with 3 parts of silver, before submitting it to the operation of 'parting;' in order that its particles may be too far separated to protect the copper, lead, palladium, silver, or other metals, with which it is contaminated, from the solvent action of the nitric or sulphuric acid, as the case may be. See ASSAYING.

QUARTZ. Pure native silica. It is an essential constituent of granite and many other rocks. Its crystalline, transparent varieties are known as rock crystal. See GLASS, POWDER, &c.

QUASS. *Syn.* POSCA VENALIS, L. *Prep.* Mix rye-flour and warm water together, and keep the mixture by the fireside until it has turned sour. *Used* as vinegar in Russia.

QUAS'SIA. *Syn.* QUASSIA (Ph. L. E. & D.; QUASSIA LIGNUM, QUASSIA WOOD, B. P.) The "wood of *Picræna* (*Picrasma*) *excelsa*, Lindl." (B. P., Ph. L.), or *Jamaica quassia*; and also of the "*Quassia amara*, Linn." (Ph. E.), or *Surinam quassia*. The latter is the original quassia, but it is no longer imported. Quassia is characterised by its intense bitterness. It is reputed tonic and stomachic, assisting digestion, and giving tone and vigour to the system. Its name was given to it by Linnæus, in honour of a negro slave who had long employed it as a remedy for the malignant endemic fevers of Surinam. When sliced, it forms the 'quassia chips' of the shops. It is generally taken in the form of infusion. This last, sweetened with sugar, forms a safe and effective poison for flies.—*Dose.* (In powder) 10 to 20 grs.

ROASTED QUASSIA, reduced to powder, is largely employed, instead of hops, to embitter porter; and the unroasted powder is used for the same purpose in the adulteration of the bitter varieties of ale.

QUAS'SIN. *Syn.* QUASSITE, QUASSINA. A peculiar bitter principle, obtained by precipitating decoction of quassia with milk of lime, evaporating the filtrate, dissolving the residue in alcohol, treating with animal charcoal, again evaporating, dissolving in water, and crystallising. 8 lbs. of quassia chips yield 1 drachm.

QUEEN'S BLUE. Thumb blue. See BLUE.

QUEEN'S MET'AL. A species of pewter used for teapots, &c., made by fusing under charcoal a mixture of tin, 9 parts, and antimony, bismuth, and lead, of each, 1 part; or, tin, 100 parts; antimony, 8 parts; copper, 4 parts; bismuth, 1 part. See BRITANNIA METAL and PEWTER.

QUEEN'S YEL'LOW. Subsulphate of mercury.

QUER'CITRON. The bark of *Quercus nigra* or *tinctoria*, a species of oak indigenous in North America. With alum mordants it yields a very permanent yellow dye.

QUICK'SILVER. See MERCURY.

QUILLS. *Prep.* 1. The quills or wing-feathers of the goose (goose quills) are separately plunged, for a few seconds, into hot ashes, cinders, or sand, of a temperature about equal to that of boiling water, after which they are scraped with a blunt knife, strongly rubbed with a piece of flannel or woollen cloth, and gently 'stoved;' they are, lastly, tied up in bundles by women or children. A yellow tinge is often given to them by dipping them for a short time into dilute hydrochloric or nitric acid, or into an infusion of turmeric.

2. Suspend the quills in a copper over water sufficiently high to nearly touch the nibs; then close it steam tight, and apply three or four hours' hard boiling; next, withdraw the quills, and dry them, and in 24 hours cut the nibs and draw out the pith; lastly, rub them with a piece of cloth, and expose them to a moderate heat in an oven or stove. Quills prepared in this way are as hard as bone, without being brittle, and nearly as transparent as glass. Crow quills and swan quills may be cured in the same manner.

QUI'NA. See QUININE.

QUINCE. *Syn.* CYDONIA, L. The fruit of *Cydonia vulgaris*, or common quince tree. Its flavour in the raw state is austere, but it forms an excellent marmalade (quince marma-

lade), and its juice yields an agreeable and wholesome wine. The seed or pips (cydoniæ seminæ; cydonium—Ph. L.) abound in gummy matter, which forms a mucilage with water, and possesses the advantage of not being affected by the salts of iron or alcohol. See DECOCTION, FIXATURE, and JELLY.

QUINICINE. An alkaloid obtained in 1853 by Pasteur, by exposing quinine or quinidine, under favourable circumstances, to a temperature varying from 248° to 266° Fahr., for several hours. It is very probable that this alkaloid is either identical, or in very close connection, with the amorphous alkaloid soluble in ether which occurs in all barks, and particularly in the young barks of the plantations in India.

QUINIDINE. $C_{20}H_{24}O_2N_2.2Aq$. *Syn.* QUINIDIA, CONCHININE, &c. An alkaloid contained in many species of cinchona, together with quinine and cinchonine, and therefore often found in the mother-liquors of quinine manufacturers. It is identical with the β quinine of Van Heyningen, and was discovered, in 1833, by Henry and Delondre. As the cinchonidine discovered by Winckler, in 1848, has been unhappily denominated quinidine by this chemist, there is still a confusion about these alkaloids, and, therefore, the quinidine of commerce was very often a mixture of both, till Pasteur made, in 1853, a classical investigation of this matter. He maintained the name of quinidine for the alkaloid discovered by Henry and Delondre, because it is isomeric with quinine, and gives the same green colour when treated with chlorine followed by ammonia, and gave the name of cinchonidine to the alkaloid discovered by Winckler, because it is isomeric with cinchonine. He determined also the action of the solutions of these alkaloids on the plane of polarization, and found that the quinidine turned this plane to the right, its molecular rotation in alcoholic solution being $[\alpha] = 250{\cdot}75° \gg\gg\gg\rightarrow$, whilst he found that the cinchonidine turned this plane to the left, its molecular rotation in alcoholic solution being $[\alpha] = 144{\cdot}61° \leftarrow\ll\ll$.

Prop. &c. Many of the salts of quinidine are very similar to those of quinine, but the normal salt with hydriodic acid is not only very different from that of quinine, but also from those of all the other cinchona-alkaloids. The normal hydriodate of quinidine is so very sparingly soluble in water that 1 part requires, at 60° Fahr., not less than 1200 parts of water to be dissolved. Therefore the presence of sulphate of quinidine in the sulphate of quinine, which often occurs, either from that article being carelessly made or from wilful adulteration, can be easily detected by adding a few minims of solution of iodide of potassium to the saturated solution of sulphate of quinine in water of 60° Fahr., whereby, if quinidine is present, its hydriodate will be separated either in the shape of a sandy precipitate or, if only traces are present, in the shape of striæ on the sides of the glass where this has been rubbed by a glass rod.

For an account of its medicinal properties, the reader should consult the recent report from India upon the experiments made there by order of Government with all the four cinchona-alkaloids, which experiments are very favourable to the therapeutical action of quinidine compared with that of quinine.

QUININE. $C_{10}H_{12}ON$. *Syn.* QUINA, QUINIA. Till recently it was found in the greatest quantity in good Calisaya bark, particularly in that from Bolivia, but since it has been found in great quantity in some other barks, especially in the bark of *Cinchona officinalis*, for instance in the bark of that species grown in Ceylon. Red bark contains not only quinine and cinchonine, but also cinchonidine.

Prep. 1. By precipitating a solution of sulphate of quinine with a *slight* excess of ammonia, potassa, or soda, and washing and drying the precipitate. By solution in alcohol, sp. gr. ·815, and spontaneous evaporation, it may be procured in crystals. Crystals may also be obtained from "its solution in hot water with a little ammonia." (Liebig.)

2. (Direct.) By adding hydrate of lime, in slight excess, to a strong decoction of the ground bark made with water acidulated with sulphuric acid, washing the precipitate which ensues, and boiling it in alcohol; the solution, filtered while hot, deposits the alkaloid on cooling.

Prop., &c. Quinine, when prepared by precipitation, is an amorphous white powder, but when this precipitate is left in the liquor it assumes, after some time, the appearance of aggregated crystalline needles; when slowly crystallised from its solution, these needles are remarkably fine, and of a pearly or silky lustre. It is freely soluble in rectified spirit and in ether, and of all the cinchona-alkaloids it is the most soluble in ammonia. It is upon this fact that Kerner's method for testing the purity of sulphate of quinine is founded. Its normal salts, if dissolved in water, have a slightly alkaline reaction upon red litmus paper. It is only sparingly soluble in water, even when boiling; both the fixed and volatile oils dissolve it with the aid of heat, more especially when it has been rendered anhydrous, or is presented to them under the form of an ethereal solution. It fuses by a gentle heat, without decomposition; forms crystallisable salts, which are only slightly soluble in water, unless it be acidulated, and, like the pure alkaloid, are extremely bitter, and possess much of the characteristic flavour of cinchona bark. It is precipitated by the alkalies and their carbonates, by tannic acid, and by most astringent substances.

Pur. See SULPHATE OF QUININE, and QUINOMETRY (*below*).

Tests. Quinine is recognised by—1. Its appearance under the microscope.—2. Its solubility in ether, and in pure ammonia water.—3. Its solubility in concentrated nitric acid, forming a colourless liquid, which does not become yellowish until it is heated.—4. The solubility of itself and salts, when pure, in concentrated sulphuric acid, forming colourless fluids, "which do not acquire any coloration upon being heated to the point of incipient evaporation of the sulphuric acid, but which afterwards become yellow, and finally brown." (Fresenius.)—5. It solubility in concentrated sulphuric acid to which some nitric acid has been added, forming a colourless, or, at the most, only a faintly yellowish liquid.—6. It is wholly destroyed by heat.

A solution of quinine in acidulated water, and solutions of its salts, exhibit the following reactions:—1. Ammonia, potassa, and the alkaline carbonates, give white, pulverulent precipitates, becoming crystalline after some time (see *above*), and which are soluble in ammonia in excess, and which, when ether is added after the ammonia, and the whole is agitated, redissolve in the ether, whilst the clear liquid, on repose, presents two distinct layers.—2. Bicarbonate of soda (avoiding excess) gives a similar precipitate, both in acid and neutral solutions of quinine, either at once or after a short time. This precipitate is soluble in excess of the precipitant, and is again precipitated from the new solution upon protracted ebullition. "Vigorous stirring of the liquid promotes the separation of this precipitate." (Fresenius.)—3. If recently prepared chlorine be added to it, and then ammonia, a beautiful emerald-green colour is developed. (Ph. L.)—4. A concentrated solution of ferrocyanide of potassium being added, in excess, after the chlorine, instead of the ammonia, a dark red colour is instantly produced, which, after some time, passes into green, especially when freely exposed to the light. This reaction is not characteristic of quinine, for with quinidine one gets the same reaction.—5. If caustic potassa be used instead of ammonia (see *above*), the solution acquires a sulphur-yellow colour. "These reactions are restricted to this alkaloid." (Dr. Garrod.)

The best test, however, for quinine is the formation of its iodosulphate, the so-called herapathite. For this purpose the quinine is dissolved in 10 parts of proof spirit, acidulated with $\frac{1}{10}$th part of sulphuric acid, and to this solution an alcoholic solution of iodine is carefully added, and the liquid in the meanwhile stirred with a glass rod. There appears, either immediately or after some minutes, a black precipitate of iodosulphate of quinine, which, if redissolved in boiling proof spirit, forms in cooling the beautiful crystals of herapathite. 100 parts of this herapathite, if dried on a water bath, represent 56·5 parts of pure quinine.

Quinine is distinguished from both cinchonine and quinidine by its comparatively free solubility in ether; the last of these being very sparingly soluble, and the other wholly insoluble, in that menstruum. The presence of cinchonine may also be positively determined by reference to the behaviour of that alkaloid. Quinidine is also distingished from quinine by the different crystallisation, greater specific gravity, and freer solubility of its salts in cold water.[1]

Estim. See QUINOMETRY.

Uses, &c. Pure quinine is but rarely used in medicine, but several of its salts are employed as remedies, on account of their great stimulant, tonic, and febrifuge powers. As a tonic in dyspeptic affections, and for restoring strength and vigour to morbidly weakened habits, and as an antiperiodic or agent to counteract febrile action, it appears to be superior to all other remedies, provided no abnormal irritability of the mucous membranes, or of the circulatory organs, exists. The dose of the salts of quinine, as a tonic, is ½ to 1 gr., twice or thrice daily; as an antiperiodic, 2 to 5 grs., or even more, every second or third hour, during the intervals of the paroxysms of ague, and of other intermittent or periodic affections; also in acute rheumatism. The sulphate (disulphate) is the salt generally used; this and other salts are most effective when taken in solution.

The salts of quinine may be made by simply saturating the dilute acids with the base, so that part of the latter remains undissolved, and gently evaporating the solutions for crystals, or to dryness. Prince Lucien Bonaparte recommends all these salts to be prepared by the addition of a strong alcoholic solution of quinine to a cold solution of the acid. We have tried this method with success.

Quinine, Ac'etate of. *Syn.* QUINÆ ACETAS, L. *Prep.* 1. (P. Cod.) Mix quinine, 2 parts, with water, 3 parts; heat the mixture, and add of acetic acid, q. s. to dissolve the alkaloid, and to render the solution slightly acid; lastly, decant or filter the solution whilst boiling hot, and set it aside to crystallise. The mother-water, on evaporation, will yield a second crop of the acetate.

2. Effloresced sulphate of quinine, 17 parts, is dissolved in boiling water, and mixed with crystallised acetate of soda, 6 parts. The acetate of quinine crystallises.

Prop., &c. Satiny, acicular crystals, which are rather more soluble in water than those of the sulphate.—*Dose.* ½ to 5 grs.

Quinine, Arse"niate of. *Syn.* QUINÆ ARSENIAS, L. *Prep.* (Bourières.) Arsenic acid, 1½ dr.; quinine, 5 drs.; distilled water, 6 fl. oz.; boil them together in a covered glass vessel until the alkaloid is dissolved, then set the solution aside to crystallise.

Uses, &c. Recommended by Dr. Neligan,

[1] An extremely elegant and highly sensitive method of testing for quinine and quinidine by means of the microscope, &c., is described at considerable length, by Dr. Herapath, in the 'Pharm. Journ.' for November, 1853.

and others, as being more powerfully antiperiodic than the other preparations of quinine. —*Dose.* $\frac{1}{16}$ to $\frac{1}{4}$ gr., made into pills; in agues, neuralgia, &c.; also in cancer.

Quinine, Ar'senite of. *Syn.* QUINÆ ARSENIS, L. *Prep.* Sulphate of quinine, 100 parts, is dissolved in alcohol, 600 parts, and boiled with arsenious acid, 14 parts. The liquid is then filtered. The poisonous salt is deposited in the crystalline form as the liquid cools.

Uses, &c. As the last.

Quinine, Chlo''ride of. Hydrochlorate of quinine (see *below*).

Quinine, Cit'rate of. *Syn.* QUINÆ CITRAS, L. *Prep.* 1. By mixing a hot solution of sulphate of quinine with a like solution of citrate of soda.

2. From quinine and citric acid, as the acetate. Needle-shaped prisms.—*Dose, &c.* As the sulphate or disulphate.

Quinine, Disul'phate of. Sulphate of quinine (see *below*).

Quinine, Ferrocy'anide of. *Syn.* CYANIDE OF IRON AND QUININE; QUINÆ HYDROFERROCYANAS, QUINÆ FERRO-PRUSSIAS, L. *Prep.* (P. Cod.) Sulphate of quinine, 100 parts; ferrocyanide of potassium, 31 parts; distilled water, 2500 parts; boil for a few minutes, and, when cold, separate the impure salt which floats as an oily mass on the surface, wash it with a little cold water, and dissolve it in boiling alcohol; the solution will deposit crystals as it cools.

Obs. This compound is by some said to be the most efficacious of all the salts of quinia. Pelouze asserts that it is simply quinine mixed with some Prussian blue.—*Dose.* 1 to 6 grs.

Quinine, Ferrosul'phate of. See SULPHATE OF QUININE AND IRON (*below*).

Quinine, Hydri'odate of. *Syn.* IODIDE OF QUININE; QUINÆ HYDRIODAS, Q. IODIDUM, L. *Prep.* 1. By adding, drop by drop, a concentrated solution of iodide of potassium to a like solution of acid sulphate of quinine, and drying the precipitate in the shade; or, heat the liquid nearly to the boiling-point, and allow it to crystallise.

2. (Parrish.) Effloresced sulphate of quinine, 5 parts, dissolved in alcohol, and decomposed by an alcoholic solution of 3 parts of iodide of potassium, precipitates sulphate of potassa, and yields, on cooling and evaporation, hydriodate of quinine in fine crystalline needles.[1]

3. (IODUERETTED — Bouchardat.) From an acid solution of quinia and a solution of iodide of iron containing a slight excess of iron, as No. 1.

Obs. The above are reputed alterative, tonic, and antiperiodic.—*Dose.* 1 to 4 grs.; in obstinate intermittents, and in the scrofulous affections of debilitated subjects.

[1] "1 and 2 are not identical, 1 is an acid salt which readily crystallises, but 2 is a normal salt which I never saw crystallise, but always like a fluid resin, quite amorphous."—De Vrij.

Quinine, Hydrochlo''rate of. *Syn.* CHLORIDE OF QUININE, MURIATE OF QUININE †; QUINÆ HYDROCHLORAS, QUINIÆ MURIAS, L. *Prep.* 1. By neutralising dilute hydrochloric acid with the base, as above.

2. (Ph. Bor.) Chloride of barium, 5 drs.; boiling water, 1 lb.; dissolve, add, gradually, of sulphate of quinine, 2 oz.; boil gently for a few minutes, filter the solution whilst hot, and set it aside that crystals may form.

3. (QUINÆ MURIAS—Ph. D.) Dissolve chloride of barium, 123 grs., in distilled water, 2 fl. oz.; add of sulphate of quinine, 1 oz., dissolved in boiling water, 1½ pint; mix, evaporate the solution to one half, filter, and again evaporate until spiculæ begin to appear; next allow the liquid to cool, collect the crystals, and dry them on bibulous paper. The mother-liquor, by further concentration and cooling, will yield an additional product.

Obs. Hydrochlorate of quinine occurs in snow-white groups of feathery crystals, of a mother-of-pearl lustre, which are more freely soluble than those of the disulphate.

Quinine, Ki'nate of. *Syn.* QUINÆ KINAS, L. *Prep.* By saturating a solution of kinic acid with quinine, and purifying by crystallisation out of alcohol. The kinate of quinine is obtained in crystalline warts, soluble in 4 parts of water and 8 parts of alcohol.

Quinine, Lac'tate of. *Syn.* QUINÆ LACTAS, L. *Prep.* As the ACETATE or CITRATE. By spontaneous evaporation fine crystals may be obtained. Said to agree better with dyspeptic patients than the other salts of quinine.

Quinine, Mu''riate of. Hydrochlorate of quinine (see *above*).

Quinine, Ni'trate of. *Syn.* QUINÆ NITRAS, L. *Prep.* As the HYDROCHLORATE, substituting dilute nitric acid, or nitrate of baryta (P. Cod.), for hydrochloric acid or chloride of barium.

Quinine, Phos'phate of. *Syn.* QUINÆ PHOSPHAS, L. As the ACETATE. Silky, needle-shaped crystals, with a pearly lustre. It has been highly recommended in intermittents, &c., associated with rickets and stomach affections.

Quinine, Sul'phates of. The salt often called 'disulphate of quinine' is now generally regarded as the normal sulphate, while the soluble salt, often called the 'neutral sulphate,' is considered to be an acid salt. This change in nomenclature results from doubling the atomic weight of the alkaloid quinine:—

1. **Quinine, Acid Sulphate of.** ($C_{20}H_{24}N_2O_2 . H_2SO_4 . 7Aq$). *Syn.* SULPHATE OF QUININE †, NEUTRAL SULPHATE OF QUININE †, SOLUBLE S. OF Q.; QUINÆ SULPHAS SOLUBILIS, L. *Prep.* From sulphate of quinine, 1 oz., dissolved, by the aid of heat, in water, ½ pint, previously acidulated with dilute sulphuric acid, 5 fl. drs.; the solution affords crystals on cooling, and more on evaporation.

Obs. This salt possesses the advantage of being soluble in about 10 parts of water at

60° Fahr.; but it is seldom used in the crystalline form; still, as the officinal sulphate ('disulphate') is generally prescribed along with a small quantity of dilute sulphuric acid to render it soluble, this acid sulphate is, in fact, the compound which is commonly given. It is the 'bisulphate,' 'supersulphate,' or 'acid sulphate of quina' of Soubeiran and other Continental chemists.

2. Quinine, Sulphate of. $(C_{20}H_{24}N_2O_2)_2$. $2H_2SO_4 \cdot 7Aq$). *Syn.* NORMAL SULPHATE OF QUININE, DISULPHALE OF Q., QUININE; QUINÆ DISULPHAS (Ph. L.), QUINÆ SULPHAS (Ph. E., D., & U. S., & P. Cod.), QUINIÆ SULPHAS (B. P.), L.; SULPHATE DE QUININE, Fr. *Prep.* 1. (Ph. L. 1836.) Take of yellow cinchona bark, bruised, 7 lbs.; sulphuric acid, 4½ oz.; (diluted with) water, 6 galls.; boil them for 1 hour, and strain; repeat this a second time for 1 hour, with a like quantity of acid and water, and again strain; next boil the bark for 3 hours, in water, 8 galls., and strain; wash the residue with fresh quantities of boiling distilled water; to the mixed decoctions and washings, add moist hydrated oxide of lead to saturation, decant the supernatant fluid, and wash the sediment with distilled water; boil down the liquor for 15 minutes, and strain, then precipitate the quina with liquor of ammonia, and wash the precipitate (with very cold water) until nothing alkaline is perceptible; saturate what remains with sulphuric acid, ½ oz., diluted with water, q. s., digest with animal charcoal, 2 oz., and strain; lastly, the charcoal being well washed, evaporate the mixed liquors, that crystals may form.

2. (Ph. E.) This process varies from the last one, in the bark (1 lb.) being first boiled in water (4 pints) along with carbonate of soda (4 oz.); the residuum, being pressed, is moistened with water, and again pressed, and this operation is repeated a second and a third time, the object being to remove, as much as possible, the acids, colouring matter, gum, and extractive, before proceeding to extract the alkaloid. Carbonate of soda is also used as the precipitant, instead of ammonia, and the precipitate is formed into a sulphate (disulphate) by being stirred with boiling water, 1 pint, to which sulphuric acid, 1 fl. scruple, or q. s., is subsequently added. The crystals, after digestion with prepared animal charcoal, 2 drs., are ordered to be dried at a heat not higher than 140° Fahr.

3. (Ph. D.) Yellow bark, 1 lb., is macerated for 24 hours in water, 2 quarts, acidulated with oil of vitriol, 2 fl. drs., and then boiled for half an hour, after which the fluid is decanted; this is repeated a second and a third time with water, 2 quarts, and oil of vitriol, 1 fl. dr.; the decanted (or strained) liquors are evaporated to a quart, and filtered, and slaked lime, 1 oz., or q. s., added to the solution until it exhibits a decidedly alkaline reaction; the precipitate is next collected on a calico filter, and, after having been washed with cold water, partially dried on porous bricks, and subjected to powerful pressure enveloped in blotting paper, is boiled for 20 minutes in rectified spirit, 1 pint, and the liquid, after subsidence, decanted; this is repeated a second and a third time with a fresh pint of spirit, and the residuum being well pressed, the mixed liquors are filtered, and the spirit removed by distillation; the brown viscid residuum is dissolved in boiling water, 16 fl. oz., boiled, and dilute sulphuric acid, ½ fl. oz., or q. s., added to render the solution neutral or only slightly acid; animal charcoal, ½ oz., is next stirred in, the mixture boiled for about 5 minutes, filtered, and set aside to crystallise; the crystals are dried on blotting paper, by mere exposure to a dry atmosphere.

4. (B. P.) Yellow cinchona bark, in coarse powder, 16; hydrochloric acid, 3; distilled water, a sufficiency; solution of soda, 80; dilute sulphuric acid, a sufficiency. Dilute the hydrochloric acid with ten pints of the water. Place the bark in a porcelain basin, and add to it as much of the diluted hydrochloric acid as will render it thoroughly moist. After maceration, with occasional stirring, for twenty-four hours, place the bark in a displacement apparatus, and percolate with the diluted hydrochloric acid until the solution which drops through is nearly destitute of bitter taste. Into this liquid (hydrochlorate of quinine) pour the solution of soda, agitate well, let the precipitate (quinine) completely subside, decant the supernatant fluid, collect the precipitate on a filter, and wash it with cold distilled water until the washings cease to have colour. Transfer the precipitate to a porcelain dish containing a pint of distilled water, and, applying to this the heat of a water bath, gradually add diluted sulphuric acid until *very nearly* the whole of the precipitate has been dissolved, and a neutral liquid has been obtained. (Or add about half the precipitated quinine to some water in an evaporating basin, warm the mixture and pour in diluted sulphuric acid until the precipitate has dissolved and the liquid is neutral or only faintly acid, then add the other half, stir well, and again heat liquid.) Filter the solution (sulphate of quinine), while hot, through paper, wash the filter with boiling distilled water, concentrate till a film forms on the surface of the solution, and set it aside to crystallise. The crystals should be dried on filtering paper without the application of heat.

5. "Those who are well acquainted with the chemistry of the cinchona-alkaloids all agree with me in condemning the boiling of bark with dilute acids. I prefer the following method, which can also be used on a small scale for quinometry.

"Yellow bark, or any other bark in which quinine prevails, like, for instance, that of *Cinchona officinalis*, 1 lb., is mixed with milk of lime, made from 4 oz. of lime and 40 oz. of water. After drying this mixture it is ex-

hausted with strong methylated spirit (the strongest possible) and the slightly coloured solution neutralised with sulphuric acid, so that the liquor has a slight acid reaction upon blue litmus paper. After filtering or subsiding, the clear liquid is distilled and the residue in the still dissolved in water, carefully neutralised, so that the solution has a slight alkaline reaction upon red litmus paper, treated with charcoal and crystallised, &c."—De Vrij.

6. ('HOSPITAL SULPHATE'—Mr. E. Herring.) The crushed bark is boiled in a solution of caustic soda or potassa, to extract colouring matter and gum; it is then pressed, washed with cold water, a second time boiled with a solution of caustic alkali, and again pressed, washed, and pressed; the decoloured and purified bark is next exhausted by coction with acidulated water, in the usual way, and the filtered mixed decoctions are precipitated with carbonate of soda; the precipitated quina is then dissolved in hot dilute sulphuric acid, to saturation, when the 'HOSPITAL SULPHATE' crystallises out, as the solution cools; this is, lastly, washed with a little cold water, drained, and dried.—The advantage of this process is the non-use of animal charcoal as a bleacher, and the consequent less cost of the product. In the preparation of his 'WHITE SULPHATE,' Mr. Herring uses benzol as a solvent, instead of alcohol. *Patent* dated July 28th, 1853.

Prop. When pure, sulphate of quinine forms very light, delicate, flexible, white needles, which are efflorescent, inodorous, and intensely bitter; it is soluble in 740 parts of water at 60°, and in 30 parts at 212° Fahr.; it takes about 80 parts of cold rectified spirit for its solution, but is freely soluble in boiling alcohol, and in acidulated water; it melts at 240° Fahr., and is charred and destroyed at a heat below that of redness. The crystals contain 76·1% of quinine, 8·7% of sulphuric acid, and 15·2% of water; of the last, they lose about 3-4ths by exposure to dry air, and nearly the whole when kept in a state of fusion for some time.

Pur. This may not be inferred from the form of its crystallisation, for the sulphates of quinidine and of cinchonidine may be obtained in the same form of crystallisation. As mentioned already, the reaction with chlorine and ammonia does not distinguish quinine from quinidine, as both give the same green colour. "It is entirely soluble in water (hot), and more readily so when an acid is present. Precipitated by ammonia, the residuary liquid, after evaporation, should not taste of sugar. By a gentle heat it loses 8 or 10% of water. It is wholly consumed by heat. If chlorine be first added, and then ammonia, it becomes green." (Ph. L. 1836.) "On adding chloride of barium to 100 grs. of this salt, dissolved in water mixed with hydrochloric acid, 26·6 grs. of sulphate of baryta, dried at a red heat, are prepared." (Ph. L. 1851.) "A solution of 10 grs., in 1 fl. oz. of distilled water, and 2 or 3 drops of sulphuric acid, if decomposed by a solution of ½ oz. of carbonate of soda, in two waters, and heated until the precipitate shrinks and fuses, yields, on cooling, a solid mass, which, when dry, weighs 7·4 grs., and when reduced to powder, dissolves entirely in a solution of oxalic acid." (Ph. E.)

Adult. Sulphate of quinine is said to be often adulterated with starch, magnesia, gum, sugar, cinchonine, quinidine, &c.; but according to De Vrij, those with starch, magnesia, gum, and sugar, are very rare, if ever they were really observed. Very frequent are those with the sulphates of the other cinchona-alkaloids, and these become even still more frequent, as very different kinds of bark are used for the manufacture of quinine. Salicine is, if ever, but very seldom used for adulteration of quinine. The best practical test for the purity of sulphate of quinine is the following:—A saturated solution of the salt is made at 60° Fahr., and one part of this solution is mixed with 2 or 3 minims of a concentrated solution of iodide of potassium, whilst another part is mixed with 2 or 3 minims of a concentrated solution of tartrate of potash and soda. If the sulphate of quinine is pure its solution will remain unaltered by both reagents, even after rubbing the sides of the test tube with a glass rod and standing many hours. But if it contains one or more of the other cinchona-alkaloids there will appear either precipitates or striæ on the glass where it has been rubbed by the glass rod. Iodide of potassium indicates particularly the presence of even traces of quinidine, but also of cinchonidine and cinchonine, provided their quantity be not too small. Tartrate of potash and soda indicate, under these circumstances, only the presence of cinchonidine. The first three remain undissolved when the salt is digested in spirit; the fourth is dissolved out by cold water; the fifth may be detected by its total insolubility in ether; or, by precipitating the quinine by solution of potassa, and dissolving the precipitate in boiling alcohol; cinchonine crystallises out as the solution cools, but the quinine remains in the mother-liquor; and the last, by the greater solubility and sp. gr. of the salt, &c. If the sample disengages ammoniacal fumes when treated with liquor of potassa, it contains sal ammoniac. The presence of most foreign organic substances is also shown by the sample being turned brown, and being soon charred when treated with a drop of concentrated sulphuric acid. If it turn red it contains salicin, a substance which is now frequently used to adulterate sulphate of quinine. The pure sulphate is not discoloured by this reagent.

Uses, &c. The sulphate is more extensively employed than any of the other salts of quinine, and, indeed, to almost the exclusion of them. It is the article intended to be used whenever 'sulphate' or 'disulphate' of quinine, or even 'quinine,' is ordered for medicinal purposes,

unless the name is qualified by some other term. It is a most valuable stomachic, in doses of ½ to 1 gr.; as a tonic, 1 to 3 grs.; and as a febrifuge, 2 to 20 grs.

Quinine, Sulpho-tar'trate of. *Syn.* QUINÆ SULPHO-TARTRAS, L. *Prep.* From sulphate of quinine, 4 parts; tartaric acid, 5 parts; distilled water, 20 parts; mix, gently evaporate to dryness, and powder the residuum.

Quinine, Tan'nate of. *Syn.* QUINÆ TANNAS, L. *Prep.* Dissolve sulphate of quinine in slightly acidulated water, and add a solution of tannic acid as long as a precipitate forms; wash this with a little cold water, and dry it. The Ph. Græca orders infusion of galls to be used as the precipitant. In intermittent neuralgia.

Quinine, Tar'trate of. *Syn.* QUINÆ TARTRAS, L. *Prep.* (P. Cod.) From tartaric acid and quinine, as the acetate.

Quinine, Vale'rianate of. *Syn.* QUINÆ VALERIANAS (Ph. D.), L. *Prep.* 1. As the acetate or citrate.

2. (Ph. D.) Valerianate of soda, 124 grs.; distilled water, 2 fl. oz.; dissolve; also dissolve hydrochlorate of quinine, 7 drs., in distilled water, 14 fl. oz.; next heat each solution to 120° (not higher), mix them, and set the vessel aside for 24 hours; lastly, press the mass of crystals thus obtained, and dry them, without the application of artificial heat.

Prop., &c. Silky needles and prisms; its solution suffers decomposition when heated much above 120° Fahr. It is powerfully antispasmodic, antiperiodic, and nervine.—*Dose.* ½ gr., every two hours, or 1 to 3 grs., twice or thrice daily; in epilepsy, hemicrania, hysteria, neuralgia, and other nervous affections.

QUININE AND COD-LIVER OIL. *Syn.* COD-LIVER OIL WITH QUININE, QUINIARETTED COD-LIVER OIL; OLEUM MORRHUÆ CUM QUINÂ, OLEUM JECORIS ASELLI CUM QUINÂ, L. This medicine is a solution of pure anhydrous quinine in pure cod-liver oil.

Prep. 1. Pure quinine (preferably recently precipitated) is fused in a glass or porcelain capsule by the heat of an oil or sand bath, carefully applied, by which it assumes a brown colour and the appearance of a resin; it is then allowed to cool out of contact with the air, after which it is reduced to powder in a dry mortar, and added to pure pale Newfoundland cod-liver oil, gently heated in a closed glass vessel over a water bath; the solution of the alkaloid is promoted by constant agitation, and, when complete, the vessel, still corked, is set aside in a dark situation to cool; when the 'quiniaretted oil' is quite cold, it is put into bottles, in the usual manner, and preserved as much as possible, from the light and air.

2. The anhydrous quinine is dissolved in a little anhydrous ether before adding it to the oil, which in this case need not be heated, as the union is effected by simple agitation; should this not take place, it may be gently warmed for a few minutes.

3. The anhydrous quinine is dissolved in anhydrous alcohol, and after being added to the oil, the whole is gently heated, in an open vessel, by the heat of a water bath, until the alcohol is expelled; agitation, &c., being had recourse to, as in No. 1.

Prop., &c. The above preparation resembles ordinary cod-liver oil, except in having a pale yellowish colour, and a slightly bitter taste, similar to that of cinchona bark. It is said to possess all the properties of cod-liver oil combined with those peculiar to quinine, by which the tonic, stomachic, and antiperiodic qualities of the latter are associated, in one remedy, with the genial, supporting, and alterative action of the other. The common strength is 2 grs. of quinine per oz.

QUININE AND IRON. These two important medicinal agents are combined together in various ways. The following compound salts are often prescribed.

Quinine and Iron, Cit'rate of. *Syn.* CITRATE OF IRON AND QUININE; FERRI ET QUINÆ CITRAS, B. P. *Prep.* 1. (B. P.) Solution of persulphate of iron, 4½; sulphate of quinia, 1; dilute sulphuric acid, 1½; citric acid, 3; solution of ammonia and distilled water, of each, a sufficiency: mix 8 of the solution of ammonia with 40 of the water, and to this add the solution of persulphate of iron, previously diluted with 40 of the water, stirring them constantly and briskly. Let the mixture stand for two hours, stirring it occasionally, then put it on a calico filter, and when the liquid has drained away, wash the precipitate with distilled water until that which passes through the filter ceases to give a precipitate with chloride of barium. Mix the sulphate of quinia with 8 of the water, add the sulphuric acid, and when the salt is dissolved, precipitate the quinia with a slight excess of solution of ammonia. Collect the precipitate on a filter, and wash it with 30 of the water. Dissolve the citric acid in 5 of the water, and having applied the heat of a water bath, add the oxide of iron, previously well drained; stir them together, and when the oxalic acid has dissolved, add the precipitated quinia, continuing the agitation until this also has dissolved. Let the solution cool, then add, in small quantities at a time, 1½ solution of ammonia, dilute with 2 of the water, stirring the solution briskly, and allowing the quinia, which separates with each addition of ammonia, to dissolve before the next addition is made. Filter the solution, evaporate it to the consistence of a thin syrup, then dry it in layers on flat porcelain or glass plates, at the temperature of 100° Fahr., remove the dry salt in flakes, and keep it in a stoppered bottle. Solubility, 2 in 1.—*Test.* Taste bitter as well as chalybeate. When burned with exposure to air, it leaves a residue (oxide of iron) which yields nothing to water. 50 grs., dissolved in an ounce of water, and treated with a slight excess of ammonia, gives a white precipitate (quinia) which, when collected on

a filter and dried, weighs 8 grs. The precipitate is entirely soluble in pure ether, indicating absence of quinidia and cinchonia. When burned it leaves no residue. When dissolved by the aid of an acid it forms a solution which, after decolorisation by a little purified animal charcoal, turns the plane of polarisation strongly to the left (cinchona turns it to the right).—*Dose.* 5 to 10 grs. as a tonic, three times a day, in solution or in pill.

2. (Ph. U. S.) Triturate sulphate of quinine, 1 oz., with distilled water, 6 fl. oz., and having added sufficient diluted sulphuric acid to dissolve it, cautiously pour into the solution water of ammonia with constant stirring, until in slight excess. Wash the precipitated quinine on a filter, and having added solution of citrate of iron, 10 fl. oz., keep the whole at a temperature of 120° by means of a water bath, and stir constantly until the alkaloid is dissolved. Lastly, evaporate the solution to the consistence of a syrup, and spread it on plates of glass, so that, on drying, the salt may be obtained in scales.—*Dose.* 2 grs. to 5 grs.

Quinine and Iron, I'odide of. *Syn.* QUINÆ ET FERRI IODIDUM, L. *Prep.* From protiodide of iron, 2 parts; hydriodate of quinine, 1 part; rectified spirit, 12 parts; heat them together, and either evaporate to dryness or crystallise by refrigeration. A powder, or crystalline scales.

Quinine and Iron, Sul'phate of. *Syn.* FERRO-SULPHATE OF QUININE; QUINÆ FERRO-SULPHAS, QUINÆ ET FERRI SULPHAS, L. *Prep.* From solutions of the sulphates of iron and quinine, in atomic proportions, mixed whilst hot, and the crystals which form as the liquid cools carefully dried and preserved from the air.

QUININE AND MER'CURY. See CHLORIDE OF MERCURY AND QUININE.

QUINOID'INE. *Syn.* AMORPHOUS QUININE, CHINOIDINE; QUINA AMORPHA, QUINA INFORMIS, QUINOIDIA, QUINOIDINA, QUINOIDINUM, CHINOIDEUM, L. A few years after the discovery of the quinine by Pelletier and Caventou, Sertuerner, a German physician, and known as the discoverer of morphia, obtained, by a peculiar method, from yellow bark, an amorphous alkaloid which was called by him Chinioidin,[1] and also fever-killer (Fiebertödter). He found that not only this alkaloid itself, but also all its compounds with acids, were equally amorphous. As recent investigations have proved that this amorphous alkaloid occurs in all cinchona barks, and is found particularly in many young Indian barks in great quantity, it is quite natural that in the manufacture of quinine the uncrystallisable sulphate of this alkaloid should accumulate in the mother-liquors of the sulphate of quinine. From such liquors it is precipitated in an impure state by an alkali, and brought into commerce under the name of quinoidine. As this amorphous alkaloid has the property of preventing the crystallisation of the salts of the other alkaloids, particularly those of quinidine, it is clear that the quinoidine of commerce very often contains quinidine and also cinchonidine. Dr. de Vrij, for instance, found sometimes more than 20% of quinidine in some samples of quinoidine of commerce. Although commercial quinoidine contains many impurities which may have their origin partly in the adulteration of the cinchona-alkaloids, unadulterated quinoidine, no doubt, chiefly consists of the amorphous alkaloid discovered by Sertuerner.

The quinoidine of commerce ought never to be used in medicine, unless purified. For this purification there are two methods. 1. That of Mr. Bullock, which gives the purer but the more expensive product. Crude quinoidine is exhausted with ether, which, after defecation, is distilled off, leaving the purified quinoidine behind. This process has been patented in England by Mr. Bullock. 2. That of Dr. de Vrij, which consists in boiling 9 parts of crude quinoidine with a solution of 2 parts of oxalate of ammonium in water. By this process the alkaloids contained in the quinoidine are dissolved, whilst the impurities, and amongst them the lime which is often contained in the crude quinoidine, remain undissolved. The solution is mixed with a large bulk of water, then filtered and the purified quinoidine precipitated by a slight excess of liquor of soda.

Prop., &c. In its crude form quinoidine somewhat resembles aloes; in its purest state it is a yellowish-brown resin-like mass, freely soluble in alcohol and ether, but nearly insoluble in water; with the acids it forms dark-coloured, uncrystallisable salts. It is powerfully febrifuge, but less so than either quinidine or quinine, although it is identical in chemical composition with both of them.—*Dose.* 2 to 4 grs. for adults, ½ to 1 gr. for children, given in wine, lemonade, or acidulated honey.

QUINOM'ETRY. *Syn.* CINCHONOMETRY. The art of estimating the quantity of quinine in cinchona bark, and in the commercial salts of this alkaloid.

Proc. 1. FOR BARK.—*a.* (Ph. E.) A filtered decoction of 100 grs. of bark, in distilled water, 2 fl. oz., is precipitated with 1 fl. dr., or q. s., of a concentrated solution of carbonate of soda; the precipitate, after being heated in the fluid so as to become a fused mass, and having again become cold, is dried and weighed. "It should be 2 grs., or more, and entirely dissolve in a solution of oxalic acid." To render the result strictly accurate, the product should be dissolved in 10 parts of proof spirit, containing $\frac{1}{20}$th of sulphuric acid, and to this solution carefully added an alcoholic solution of iodine as long as there appears a brown precipitate, which immediately turns black by stirring with a glass rod. This precipitate, collected upon a filter, washed with strong alcohol and dried on a water bath, is Herapath's

[1] Sertuerner, 'Die neuesten Entdeckungen in der Physik, Heilkunde, und Chemie,' 3ter Band, 2tes Heft, Seite 269 (1830).

iodosulphate of quinine, of which 100 parts represent 56·5 parts of pure quinine.

b. (Rebourdain.) 100 grs. of the bark (coarsely powdered) are exhausted with acidulated water, and the filtered solution rendered alkaline with solution of potassa; it is next shaken with about 1-3rd of its volume of chloroform, and then allowed to repose for a short time; the chloroform holding the alkaloid in solution sinks to the bottom of the vessel in a distinct stratum, from which the supernatant liquid is separated by decantation; the chloroformic solution, either at once or after being washed with a little cold water, is allowed to evaporate; the residuum, when weighed, gives the per-centage richness of the sample.

Obs. A like result may be obtained with ether, instead of chloroform; in which case the solution of quinine will form the upper stratum.

c. Instead of Rebourdain's process, Dr. de Vrij prefers that of Charles,[1] so far as regards the separation of the total mixed alkaloids from the bark. To this mixture is applied the process mentioned above (*a*), viz. solution in acidulated proof spirit, &c.

2. For the SALTS. The above methods, as well as several others which have been devised for the purpose, may also be applied to the salts of quinine; but, unfortunately, they are inapplicable when great accuracy is required, owing to the non-recognition of the presence of quinidine, as such, and which, consequently, goes to swell the apparent richness of the sample in quinine. The following ingenious method, invented by Dr. Ure, not merely enables us to detect the presence of cinchonine and quinidine in commercial samples of the salts of quinine, but, with some trifling modifications, it also enables us to determine the quantity of each of these alkaloids present in any sample:—"10 grs. of the salts to be examined" (the sulphate is here more especially referred to) "is put into a strong test-tube, furnished with a tight-fitting cork; to this are to be added 10 drops of dilute sulphuric acid (1 acid and 5 water), with 15 drops of water, and a gentle heat applied to accelerate solution. This having been effected, and the solution entirely cooled, 60 drops of officinal sulphuric ether, with 20 drops of liquor of ammonia, must be added, and the whole well shaken while the top is closed by the thumb. The tube is then to be closely stopped, and shaken gently from time to time, so that the bubbles of air may readily enter the layer of ether. If the salt be free from cinchonine and quinidine, or contain the latter in no greater proportion than 10%, it will be completely dissolved; while on the surface, where contact of the two layers of clear fluid takes place, the mechanical impurities only will be separated. After some time the layer of ether becomes hard and gelatinous, and no further observation is possible."

[1] 'Journal de Pharmacie et de Chimie,' 4e série, t. 12, p. 81 (Août, 1870).

"From the above statement respecting the solubility of quinidine in ether, it appears that the 10 grs. of the salt examined may contain 1 gr. of quinidine, and still a complete solution with ether and ammonia may follow; but in this case the quinidine will shortly begin to crystallise in a layer of ether. The least trace of quinidine may be yet more definitely detected by employing, instead of the ordinary ether, some ether previously saturated with quinidine, by which means all of the quinidine contained in the quinine examined must remain undissolved. It is particularly requisite, in performing this last experiment, to observe, (immediately) after the shaking, whether all has dissolved; for, owing to the great tendency of quinidine to crystallisation, it may become again separated in a crystalline form, and be a source of error."

"If more than 1-10th of quinidine or (any) cinchonine be present, there will be found an insoluble precipitate at the limits of the two layers of fluids. If this be quinidine, it will be dissolved on the addition of proportionately more ether, while cinchonine will remain unaffected."

Note. To Dr. Ure's test Dr. de Vrij prefers, for several reasons, Dr. Kerner's test, 'Zeitschrift fur Analytische Chemie,' von Fresenius, 1st Jahrg, 1862; 'Ueber Die Prufung des Käuflichen Schwefelsauren Chinins auf fremde Alkaloides, von Dr. G. Kerner.'

QUINOVIN. $C_{30}H_{48}O_8$. *Syn.* CINCHOVIN, QUINOVIA.

QUINOVIN. A very bitter amorphous glucoside contained in the genus Cinchona, Nauslea, and probably in many other allied genera. It is insoluble in water, very soluble in rectified spirit and in chloroform, with which last liquid it forms, in concentrated solutions, a jelly. If a current of hydrochloric gas is passed into its alcoholic solution the liquid becomes hot and the quinovin is split up into a peculiar kind of sugar.

QUINOVIC ACID. $C_{24}H_{38}O_4$. This is insoluble in water, also in chloroform, and difficultly soluble in alcohol. It can be obtained from the boiling alcoholic solution, by cooling, in small crystals. In the leaves, bark, and wood, of the cinchona tree this acid is contained, together with quinovin, and it is this mixture which has been recently applied in therapeutics, as a powerful tonic in cases of dysentery, &c. The mixture can easily be obtained from the leaves, bark, or wood, of cinchona, and even from bark which has been exhausted by ebullition with water or diluted acids, by cold maceration with weak milk of lime, by which it is dissolved, as it combines easily with bases. It is only the quinovate of lime which has till now been used in medicine.—*Dose.* 2 to 8 grs. every two hours.

QUIN'QUINA. See CINCHONA.

QUIN'SY. See THROAT AFFECTIONS.

QUINTES'SENCE. *Syn.* QUINTA ESSENTIA, L. A term invented by the alchemists to represent a concentrated alcoholic solution of

the active principles of organic bodies. It is still occasionally employed in perfumery and the culinary art. See ESSENCE, TINCTURE, &c.

QUOTID'IAN. Occurring or returning daily. See AGUE.

RAB'BIT. The *Lepus cuniculus* (Linn.) of the Cuvian order *Rodentia.* The domestic rabbit, when young, is a light and wholesome article of food, approaching in delicacy to the common barn-door fowl; but has less flavour than the wild animal. The fat is among the 'simples' of the Ph. L. 1618. Its hair and skin are made into cheap furs, gloves, hats, &c.

RAC'AHOUT. *Syn.* RACAHOUT DES ARABES. This is said to be farina prepared from the acorns of *Quercus Ballota,* or Barbary oak, disguised with a little flavouring. The following is recommended as an imitation:—Roasted cacao or chocolate nuts, 4 oz.; tapioca and potato farina, of each, 6 oz.; white sugar, slightly flavoured with vanilla, ½ lb. Very nutritious. *Used* as arrow-root.

RACE'MIC ACID. *Syn.* PARATARTARIC ACID. This compound was discovered by Kestner, in 1820, replacing tartaric acid in grape-juice of the Department of the Vosges. Racemic acid and tartaric acid have exactly the same composition, and yield, when exposed to heat, the same products; the racemates also correspond in the closest manner with the tartrates. Racemic acid is rather less soluble than tartaric, and separates first from a solution containing the two acids. A solution of racemic acid precipitates a neutral salt of calcium, which is not the case with tartaric acid. A solution of racemic acid does not affect a ray of polarised light, while a solution of tartaric acid rotates the ray to the right.

RACK'ING. See CIDER and WINES.

RAD'ICAL. *Syn.* RADICLE. According to the binary theory of the constitution of saline compounds, every salt is composed, like chloride of sodium (NaCl), of two sides or parts, which are termed its radicals. That part of a salt which consists of a metal, or of a body exercising the chemical functions of one, is called the metallic, basic, or basylous radical; while the other part, which, like chlorine, by combining with hydrogen would produce an acid, is designated the chlorous or acidulous radical. Every salt, therefore, consists of a basic and of an acid radical. Sometimes radicals are elementary in their nature, when they are called *simple;* and sometimes they are made up of a group of elements, when they are termed *compound.* Some radicals, both simple and compound, have been isolated, while many have but a hypothetical existence. In the following formulæ the vertical line separates the basic from the acid radicals, the former being on the left, the latter on the right:

H	F	Hydrofluoric acid (*Fluoride of hydrogen*).
Na	Cl	Chloride of sodium.
K	CN	Cyanide of potassium.
Ca	CO_3	Carbonate of calcium.
NH_4	Cl	Chloride of ammonium.
C_2H_5	NO_2	Nitrite of ethyl.

RAD'ISH. The common garden radish (RAPHANUS, L.) is the root of *Raphanus sativus* (Linn.), one of the *Cruciferæ.* There are several varieties. They are all slightly diuretic and laxative, and possess considerable power in exciting the appetite. The seed is pressed for oil. The horseradish (ARMORACIA, L.) belongs to a distinct genus.

RAIN-GAUGE. *Syn.* OMBOMETER, PLUVIAMETER, UDOMETER. An instrument for determining the quantity of water, which falls as rain, at any given place. A simple and convenient rain-gauge for agricultural purposes is formed of a wide-mouthed funnel, or open receiver, connected with a glass tube furnished with a stop-cock. The diameter of the tube may be exactly 1-100th that of the receiver, and if the tube be graduated into inches and tenths, the quantity of rain that falls may be easily read off to the 1-1000th of an inch. The instrument should be set in some perfectly open situation; and, for agricultural purposes, with its edge as nearly level with the ground as possible. The quantity of water should be duly measured and registered at 9 a.m., daily.

RAI'SINS. *Syn.* DRIED GRAPES; UVÆ (B. P.), UVÆ SICCATÆ, UVA (Ph. L.), UVÆ PASSÆ (Ph. E. & D.), L. "The prepared fruit of *Vitis vinifera*" (Linn.)—Ph. L. The grapes are allowed to ripen and dry on the vine. After being plucked and cleaned, they are dipped, for a few seconds, into a boiling lye of wood ashes and quicklime at 12° or 15° Baumé, to every 4 galls. of which a handful of culinary salt and a pint of salad oil has been added; they are then exposed for 12 or 14 days in the sun to dry; they are, lastly, carefully garbled, and packed for exportation. The sweet, fleshy kinds of grapes are those selected for the above treatment; and, in general, their stalks are cut about one half through, or a ring of bark is removed, to hasten their maturation.

Raisins are nutritious, cooling, antiseptic, and, in general, laxative; the latter to a greater extent than the fresh fruit. There are many varieties found in commerce. Their uses as a dessert and culinary fruit, and in the manufacture of wine, &c., are well known, and are referred to elsewhere. See GRAPES, WINES, &c.

RANCID'ITY. The strong, sour flavour and odour which oleaginous bodies acquire by age and exposure to the air. For its prevention, see FATS, OILS (Fixed), &c.

RAPE OIL. See OILS (Fixed).

RASH. Erasmus Wilson notices four different affections, as included under this head:—

1. ST. ANTHONY'S FIRE, or ERYSIPELAS, the severest of them all, already referred to.

2. NETTLE-RASH, or URTICARIA, characterised by its tingling and pricking pain, and its little white elevations on a reddish ground, like the wheals caused by the sting of a nettle. This efflorescence seldom stays many hours, and, sometimes, not even many minutes, in the same place, and is multiplied or reproduced whenever any part of the skin is scratched or even touched. No part of the body is exempt from it, and when many of them occur together, and continue for an hour or two, the parts are often considerably swelled, and the features temporarily disfigured. In many cases these eruptions continue to infest the skin, sometimes in one place, and sometimes in another, for one or two hours together, two or three times a day, or, perhaps, for the greatest part of the twenty-four hours. In some constitutions this lasts only a few days; in others several months.

There are several varieties of nettle-rash or urticaria noticed by medical writers, among which URTICARIA FEBRILIS, PERSISTANS, and EVANIDA, are the principal.

The common cause of nettle-rash is some derangement of the digestive functions, arising either from the use of improper food or a disordered state of the nervous or other systems of the body. Lobsters, crabs, mussels, shrimps, dried fish, pork, cucumbers, mushrooms, and adulterated beer or porter, bear the character of frequently causing this affection. In childhood it commonly arises from teething. Occasionally, in persons of peculiar idiosyncrasy, the most simple article of food, as almonds, nuts, and even milk, rice, and eggs, will produce this affection.

The treatment may consist of the administration of gentle saline aperients, and in severer cases a gentle emetic, followed by the copious use of acidulated diluent drinks, as weak lemon-juice-and-water, effervescing potassa-draughts, &c., and, when required, diaphoretics. The clothing should be light, but warm, and the itching, when severe, may be allayed by the application of a lotion of water to which a little vinegar or camphorated spirit has been added; the latter must, however, be employed with caution. A hot knee-bath is useful in drawing the affection from the face and upper part of the body. A 'compress,' wrung out of cold water until it ceases to drip, and kept in contact with the stomach by means of a dry bandage, has been recommended to relieve excessive irritation of the stomach and bowels. It has been stated that decoction of Virginian snake-root is particularly useful in relieving chronic urticaria.

3. RED-RASH, RED-BLOTCH, or FIERY SPOT, is commonly the consequence of disordered general health, of dyspepsia, and particularly, in females, of tight lacing. Sometimes it is slight and evanescent; at others, it approaches in severity to the milder forms of erysipelas, there being much swelling and inflammation. Chaps, galls, excoriations, and chilblains, are varieties of this disease produced by cold, excessive moisture, or friction. The treatment is similar to that of nettle-rash.

4. ROSE-RASH, FALSE MEASLES, or ROSEOLA, is an efflorescence, or rather a discoloration, of a rose-red tint, in small irregular patches, without wheals or papulæ, which spread over the surface of the body, and are ushered in by slight febrile symptoms. There are several varieties. The causes are the same as those which produce the preceding affections, and the treatment may be similar. In all of them strict attention to the diet, and a careful avoidance of cold applications, or exposure to cold, so as to cause a retrocession, are matters of the first moment.

RASP'BERRY. *Syn.* HINDBERRY. The fruit of *Rubus Idæus* (Linn.), a small shrub of the natural order *Rosaceæ*. It is cooling, antiscorbutic, and mildly aperitive. It is frequently used to communicate a fine flavour to liqueurs, confectionery, wine, &c. See FRUITS and VEGETABLES.

RATAFI'A. Originally, a liquor drank at the ratification of an agreement or treaty. It is now the common generic name in France of liqueurs compounded of spirit, sugar, and the odoriferous and flavouring principles of vegetables, more particularly of those containing the juices of recent fruits, or the kernels of apricots, cherries, or peaches. In its unqualified sense, this name is commonly understood as referring to cherry-brandy or peach-brandy.

Ratafias are prepared by distillation, maceration, or extemporaneous admixture, in the manner explained under the head LIQUEUR. The following list includes those which are commonly prepared by the French liquoristes:—

Ratafia d'Angelique. From angelica seeds, 1 dr.; angelica stalks, 4 oz.; blanched bitter almonds, bruised, 1 oz.; proof spirit or brandy, 6 quarts; digest for 10 days, filter; add, of water, 1 quart; white sugar, 3½ lbs.; mix well, and in a fortnight decant the clear portion through a piece of clear flannel.

Ratafia d'Anis. See ANISEED CORDIAL.

Ratafia de Baume de Tolu. From balsam of Tolu, 1 oz.; rectified spirit, 1 quart; dissolve, add water, 3 pints; filter, and further add of white sugar, 1½ lb. Pectoral and traumatic.

Ratafia de Brou de Noix. From young walnuts with soft shells (pricked or pierced), 60 in no.; brandy, 2 quarts; macé, cinnamon, and cloves, of each, 15 grs.; digest for 8 weeks; press, filter, add of white sugar, 1 lb.; and keeping it for some months before decanting it for use. Stomachic.

Ratafia de Cacao. *Syn.* R. DE CHOCOLAT. From Caracca cacao-nuts, 1 lb.; West Indian do., ½ lb.; (both roasted and bruised;) proof spirit, 1 gall.; digest for 14 days, filter, and

add, of white sugar, 2½ lbs.; tincture of vanilla, ½ dr.; (or, a shred of vanilla may be infused with the nuts in the spirit instead;) lastly, decant in a month, and bottle it.

Ratafia de Café. From coffee, ground and roasted, 1 lb.; brandy or proof spirit, 1 gall.; sugar, 2 lbs.; (dissolved in) water, 1 quart; as last.

Ratafia de Cassis. From black-currant juice, 1 quart; cinnamon, 1 dr.; cloves and peach kernels, of each, ½ dr.; brandy, 1 gall.; white sugar, 3 lbs.; digest for a fortnight, and strain through flannel.

Ratafia de Cerise. From Morello cherries, with their kernels bruised, 8 lbs.; brandy or proof spirit, 1 gall.; white sugar, 2 lbs.; as last.

Ratafia de Chocolat. Ratafia de cacao (see *above*).

Ratafia de Coings. From quince juice, 3 quarts; bitter almonds, 3 drs.; cinnamon and coriander seeds, of each, 2 drs.; mace, ½ dr.; cloves, 15 grs.; (all bruised;) rectified spirit (quite flavourless), ½ gall.; digest for a week, filter, and add of white sugar, 3½ lbs.

Ratafià de Crème. From crème de noyeau and sherry, of each, ¼ pint; capillaire, ½ pint; fresh cream, 1 pint; beaten together.

Ratafia de Curaçoa. Curaçoa.

Ratafia de Framboises. Raspberry cordial.

Ratafia de Genièvre. From juniper berries (each pricked with a fork, ¼ lb.; caraway and coriander seed, of each, 20 gr.; finest malt spirit (22 u. p.), 1 gall.; white sugar, 2 lbs.; digest a week, and strain with expression.

Ratafia de Grenoble. From the small wild black cherry (with the kernels bruised), 2 lbs.; proof spirit, 1 gall.; white sugar, 3 lbs.; citron peel, a few grains; as before.

Ratafia de Grenoble, de Teyssère. From cherries (bruised with the stones), 1 quart; rectified spirit, 2 quarts; mix, digest for 48 hours, then express the liquor, and heat it to boiling in a close vessel; when cold, add of sugar or capillaire, q. s., together with some noyeau, to flavour, and a little syrup of the bay laurel, and of galangal; in 3 months decant, and bottle it.

Ratafia de Noyeau. From peach or apricot kernels (bruised), 120 in no.; proof spirit or brandy, 2 quarts; white sugar, 1 lb.; digest for a week, press, and filter.

Ratafia de Œillets. From clove-pinks (without the white buds), 4 lbs.; cinnamon and cloves, of each, 15 grs.; proof spirit, 1 gall.; macerate for 10 days, express the tincture, filter, and add of white sugar, 2½ lbs.

Ratafia d'Ecorce d'Orange. Crème d'Orange.

Ratafia de Fleurs d'Oranger. From fresh orange petals, 2 lbs.; proof spirit, 1 gall.; white sugar, 2½ lbs.; as last. Instead of orange flowers, neroli, 1 dr., may be used.

Ratafia à la Provençale. From striped pinks, 1 lb.; brandy or proof spirit, 1 quart; white sugar, ¾ lb.; juice of strawberries, ¾ pint; saffron, 20 grs.; as before.

Ratafia des Quatre Fruits. From cherries, 30 lbs.; gooseberries, 15 lbs.; raspberries, 8 lbs.; black currants, 7 lbs.; express the juice, and to each pint add, of white sugar, 6 ozs.; cinnamon, 6 grs.; cloves and mace, of each, 3 grs.

Ratafia Rouge. From the juice of black cherries, 3 quarts; juices of strawberries and raspberries, of each, 1 quart; cinnamon, 1 dr.; mace and cloves, of each, 15 grs.; proof spirit or brandy, 2 galls.; white sugar, 7 lbs.; macerate, &c., as before.

Ratafia Sec. Take of the juice of gooseberries, 5 pints; juices of cherries, strawberries, and raspberries, of each, 1 pint; proof spirit, 6 quarts; sugar, 7 lbs.; as before.

Ratafia à la Violette. From orris powder, 3 oz.; litmus, 4 oz.; rectified spirit, 2 galls.; digest for 10 days, strain, and add of white sugar, 12 lbs., dissolved in soft water, 1 gall.

RATS. The common or brown rat is the *Mus Decumanus* (Linn.), one of the most prolific and destructive species of the *Rodentia*. It was introduced to these islands from Asia; and has since spread over the whole country, and multiplied at the expense of the black rat (*Mus Rattus*—Linn.), which is the old British species of this animal, until its inroads on our granaries, our stores, and dwelling-houses, have increased to such an extent, that its extirpation has become a matter of serious, if not of national, importance.

For the destruction of these noxious animals two methods are adopted:—

1. Trapping. To render the bait more attractive, it is commonly sprinkled with a little of one of the rat-scents noticed below. The trap is also occasionally so treated.

2. Poisoning. The following are reputed the most effective mixtures for this purpose:—

ARSENICAL PASTE. From oatmeal or wheaten flour, 3 lbs.; powdered indigo, ½ oz.; finely powdered white arsenic, ¼ lb.; oil of aniseed, ½ dr.; mix, add of melted suet, 2½ lbs.; and beat the whole into a paste. A similar compound has the sanction of the French Government.

ARSENICAL POWDER. From oatmeal, 1 lb.; moist sugar, ¼ lb.; white arsenic and rotten cheese, of each, 1 oz.; rat-scent, a few drops.

MILLERS' RAT POWDER. From fresh oatmeal, 1 lb.; nux vomica (in very fine powder), 1 oz.; rat-scent, 5 or 6 drops. This is highly spoken of by those who have used it.

MINERAL RAT-POISON. From carbonate of baryta, ¼ lb.; sugar and oatmeal, of each, 6 oz.; oils of aniseed and caraway, of each, a few drops.

PHILANTROPE MUOPHOBON. A French preparation, which, according to Mr. Beasley, consists of tartar emetic, 1 part, with farinaceous matter, 4 parts, and some other (unimportant) ingredients.

PHOSPHOR PASTE.

Among 'rat-scents' the following are said to be the most attractive:—

a. Powdered cantharides steeped in French brandy. For traps. It is said that rats are so fond of this, that if a little be rubbed about the hands they may be handled with impunity.

b. From powdered assafœtida, 8 grs.; oil of rhodium, 2 drs.; oil of aniseed, 1 dr.; oil of lavender, ½ dr.; mix by agitation.

c. From oil of aniseed, ½ oz.; tincture of assafœtida, ¼ oz.

d. From oil of aniseed, ½ oz.; nitrous acid, 2 to 3 drops; musk (triturated with a little powdered sugar), 1 gr.

RA'ZORS. See PAPER, PASTE, and SHAVING.

REA'GENTS. See TESTS.

REAL'GAR. This valuable red pigment is the bisulphide of arsenic. It is found native in some volcanic districts; but that of commerce is prepared by distilling (in an earthen retort) arsenical pyrites, or a mixture of sulphur and arsenic, of orpiment and sulphur, or of arenious acid, sulphur, and charcoal, in the proper proportions. See BISULPHIDE OF ARSENIC.

RECTIFICA'TION. A second distillation of a fluid, for the purpose of rendering it purer.

RED. A term denoting a bright colour, resembling blood. Red is a simple or primary colour, but of several different shades or hues, as scarlet, crimson, vermilion, orange-red, &c.

Red An'iline. *Syn.* RÓSANILINE. This artificial base is prepared by the action of bichloride of tin, mercurial salts, arsenic acid, and many other oxidising agents, upon aniline. The aniline reps of commerce, now so largely used for dyeing, are saline compounds, more or less pure, of rosaniline, with 1 equiv. of acid. These compounds are known under the names of 'magenta,' 'fuchsine,' 'roseine,' 'azaleine,' &c. In England the aniline red commonly employed is the acetate of rosaniline, which has been prepared by Mr. Nicholson in splendid crystals of very considerable dimensions. In France the hydrochlorate of rosaniline is chiefly employed. The free base presents itself in colourless crystalline plates, but its compounds with 1 equiv. of acid have, when dry, a beautiful green colour, with golden lustre, and furnish with water an intensely coloured red solution. See PURPLE (Aniline) and RED DYE, also TAR COLOURS.

RED DYE. The substances principally employed for dyeing reds are cochineal, lac-dye, and madder, which, under proper treatment, yield permanent colours of considerable brilliancy, the first and third more particularly so. Extremely beautiful but fugitive colours are also obtained from Brazil wood, safflower, archil, and some other substances. For purple-reds or crimsons (magenta, fuchsine, &c.), on silk or wool, the aniline reds (salts of rosaniline) are now extensively used. (See TAR-COLOURS.) The mode of applying them is noticed under PURPLE DYE. SILK is usually dyed of a permanent red or scarlet with cochineal, safflower, or lac-dye; wool, with cochineal and, still more frequently, with madder; and cotton, with madder (chiefly), Brazil wood, &c. The leading properties of these substances are given under their respective names, and the methods of employing them are generally referred to in the articles DYEING, MORDANTS, &c., and, therefore, need not be repeated here. The following may, however, be useful to the reader:—

1. First give the 'goods' a mordant of alum, or of alum-and-tartar, rinse, dry, and boil them in a bath of madder. If acetate of iron be used instead of alum, the colour will be purple, and by combining the two, as mordants, any intermediate shade may be produced.

2. The yarn or cloth is put into a very weak alkaline bath at the boiling temperature, then washed, dried, and 'galled' (or, when the calico is to be printed, for this bath may be substituted one of cow-dung, subsequent exposure to the air for a day or two, and immersion in very dilute sulphuric acid. In this way the stuff gets opened, and takes and retains the colour better). After the 'galling,' the goods are dried, and alumed twice; then dried, rinsed, and passed through a madder bath, composed of ¾ lb. of good madder for every lb. weight of the goods; this bath is slowly raised to the boiling-point in the course of 50 or 60 minutes, more or less, according to the shade of colour required; after a few minutes, the stuff is taken out, and slightly washed; the operation is then repeated, in the same manner, with fresh madder; it is, lastly, washed and dried, or passed through a hot soap bath, which carries off the fawn-coloured particles.

3. (ADRIANOPLE RED, TURKEY R.) This commences with cleansing or scouring the goods by alkaline baths, after which they are steeped in oily liquors brought to a creamy state by a little carbonate of soda; a bath of sheep's dung is next often used as an intermediate or secondary steep; the oleaginous bath, and the operation of removing the superfluous or loosely adhering oil with an alkaline bath, is repeated two or three times, due care being taken to dry the goods thoroughly after each distinct process; then follow the distinct operations of galling, aluming, maddering, and brightening, the last for removing the dun-coloured principle, by boiling at an elevated temperature with alkaline liquids and soap; the whole is generally concluded with treatment by spirit of tin. In this way are given the most brilliant reds on cotton.

Obs. Wool takes from half its weight of madder to an equal weight to dye it red; cotton and linen take rather less. On account

of the comparative insolubility of the colouring matter of madder, this dye-stuff must be boiled along with the goods to be dyed, and not removed from the decoction, as is the practice in using many other articles. Other dye-stuffs are frequently added to the madder bath, to vary the shades of colour. Decoction of fustic, weld, logwood, quercitron, &c., are often thus employed, the mordants being modified accordingly. By adding bran to the madder bath, the colour is said to be rendered much lighter, and of a more agreeable tint.

RED GUM. A slight eruptive disease of infancy, occasioned by teething, and, less frequently, by irritation from rough flannel worn next the skin. See STROPHULUS.

RED LAV'ENDER. See TINCTURE OF LAVENDER (Compound).

RED LIQ'UOR. The crude solution of acetate or sulpho-acetate of alumina employed in calico-printing. It is generally prepared by mixing crude sulphate of alumina with about an equal weight of crude pyrolignite of lime, both being in the state of solution.

RED PIG'MENTS. The preparation of the principal red pigments are described under their respective names. The following list includes most of the reds in use:—

Arme'nian Bole. *Syn.* BOLE ARMENIAN; BOLUS ARMENIÆ, L. Formerly imported from Armenia, Portugal, Tuscany, &c.; now generally made by grinding together a mixture of whiting, red oxide of iron, and red ochre, in nearly equal proportions.

Red, Brown. A factitious mixture of red oxide of iron and red ochre, in variable proportions.

Car'mine.

Carmina'ted Lake.

Red, Chrome. *Syn.* DICHROMATE OF LEAD, RED CHROMATE OF L.; PLUMBI DICHROMAS, P. CHROMAS RUBRUM, L. *Prep.* 1. Boil pure carbonate of lead with chromate of potassa, in excess, until it assumes a proper colour; then wash it well with pure water, and dry it in the shade.

2. Boil neutral chromate of lead with a little water of ammonia or lime water.

3. (Liebig and Wöhler.) Fuse saltpetre at a low red heat in a Hessian crucible, and throw in chromate of lead (pure chrome yellow), by small portions at a time, as long as a strong ebullition follows upon each addition of the pigment, observing to stir the mixture frequently with a glass rod; after repose for a minute or two, pour off the fluid part, and, as soon as the solid residuum is cold, wash it with water, and dry it by a gentle heat.

Obs. Great care must be taken, in conducting the last process, not to employ too much heat, nor to allow the saline matter to stand long over the newly formed chrome-red, as the colour is thus apt to change to a brown or orange. When well managed, the product has a crystalline texture, and so beautiful a red colour that it vies with native cinnabar. The liquid poured from the crucible is reserved for manufacturing chrome yellow.

Red, In'dian. *Syn.* PURPLE OCHRE; OCHRA PURPUREA PERSICA, TERRA PERSICA, L. This is a native production, brought from Ormus. A factitious article is prepared by calcining a mixture of colcothar and red ochre.

Lakes (Various).

Red, Light. From yellow ochre, by careful calcination. It works well with both oil and water, and produces an admirable flesh-colour by admixture with pure white. All the ochres, both red and yellow, are darkened by heat.

Red, Or'ange. *Syn.* SANDIX. Obtained from white lead, by calcination. Very bright.

Real'gar. Bisulphide of arsenic.

Red Bole. See ARMENIAN and VENETIAN BOLE.

Red Chalk. A clay iron ore, much used for pencils and crayons, and, when ground, also for paints.

Red Lead. *Syn.* MINIUM. The finest red lead is prepared by exposing ground and elutriated massicot, or dross of lead, in shallow iron trays (about 12 inches square, and about 4 or 5 inches deep), piled up on the hearth of a reverberatory furnace, to a heat of about 600 to 650° Fahr., with occasional stirring, until it acquires the proper colour. The furnace employed for the preparation of massicot during the day usually possesses sufficient residuary heat during the night for this process, by which fuel is saved. Lead for the above purpose should be quite free from copper and iron.

Red O'chre. A natural product abounding on the Mendip hills.

Red Or'piment. *Syn.* RED ARSENIC. Tersulphide of arsenic.

Rose Pink. This is whiting coloured with a decoction of Brazil wood to which a little pearlash has been added. A very pretty colour, but it does not stand. It is always kept in a damp state. The colour may be varied by substituting alum for pearlash, or by the addition of a little spirits of tin.

Red, Vene'tian. *Syn.* BOLUS VENETA, L. A species of ochre, brought from Italy.

Vermil'ion. (See that word.)

REDUC'TION. *Syn.* REVIVIFICATION. A term, in its fullest sense, applied to any operation by which a substance is restored to its neutral state; but now generally restricted, in chemistry, to the abstraction of oxygen, and hence frequently termed deoxidation or deoxidizement. This change is operated by either heating the substance in contact with carbon or hydrogen, or in exposing it to the action of some other body having a powerful affinity for oxygen. See POTASSIUM, &c.

REFI'NING. A term employed in commercial chemistry and metallurgy synonymously with purification. The separation of

the precious metals from those of less value, as in the operation of parting, constitutes the business of the 'refiner.' See GOLD, SILVER, &c.

REFRAC'TION (of Light). The deviation of a ray of light from its original path on entering a medium of a different density or power. For the practical application of this property, see GEMS.

REFRI'GERANTS. Medicines or agents which tend to lessen the animal temperature without causing any marked diminution of sensibility or nervous energy. Among internal refrigerants cold water, weak acidulous drinks, and saline aperients, are those which are, probably, the best known, and the most useful. Among external refrigerants are cold, cold water, evaporating lotions, weak solutions of subacetate of lead, &c.

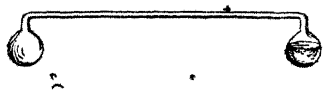
REFRIGERA'TION. The abatement of heat; the act or operation of cooling.

Among the purposes to which refrigeratory processes are applied in the arts, the principal are—the condensation of vapours—the cooling of liquids—the congelation of water, and—the production of extreme degrees of cold in chemical operations. The first of these is referred to under the heads DISTILLATION, STILL, &c.; and the second, under WORT. It is, therefore, only necessary to notice here the third and fourth applications of cold, artificially produced, above referred to.

The refrigeratory processes at present employed depend upon the greater capacity for heat which the same body possesses as its density lessens, or its attenuation increases; as exhibited in the sudden liquefaction of solids, the rapid evaporation of liquids, and the almost instantaneous return of atmospheric air, or other gaseous body, from a highly condensed state to its normal condition. The loss of sensible heat in the first example is the basis of the various processes of producing cold by what are commonly called 'FREEZING-' or 'FRIGORIFIC-MIXTURES,' all of which act upon the principle of liquefying solid substances without supplying heat. The caloric of liquidity being in these cases derived from that previously existing in the solid itself in a sensible state, the temperature must necessarily fall. The degree of cold produced depends upon the quantity of heat which is thus diffused through a larger mass, or which, as it were, disappears; and this is dependent on the quantity of solid matter liquefied, and the rapidity of the liquefaction. Saline compounds are the substances most frequently employed for this purpose, and those which have the greatest affinity for water, and thus liquefy the most rapidly, produce the greatest degree of cold. Similar changes occur during the evaporation of liquids. When heat passes from the sensible to the insensible state, as in the formation of vapour, cold is generated. This may be shown by pouring a few drops of ether or rectified spirit on the palm of the hand, when a strong sensation of cold is experienced. A still more familiar illustration of this fact is exhibited in the rapidity with which the animal body loses heat when enveloped in damp or wet clothing. The evaporation of water produces a degeee of cold which is greater than that of other liquids, in exact proportion as the insensible or latent heat of its vapour exceeds theirs. In the attenuation or rarefaction of gases similar phenomena occur.

It has been found that evaporation proceeds much more rapidly from the surface of fluids in a vacuum than in the atmosphere. Water may be easily frozen by introducing a surface of sulphuric acid unver the receiver of an air-pump, over which is placed a capsule filled with water, so that the vapour arising from the latter may be immediately absorbed by the former. After a few strokes of the piston the water is converted into a solid cake of ice. The acid operates by absorbing the aqueous vapours as soon as generated, and thus maintaining the integrity of the vacuum. Professor Leslie found that, when air is thus rarified 250 times, the surface of evaporation was cooled down 120° in winter; and when only 50 times, a depression of 80° or even 100° took place. "Sulphuric acid is capable of congealing more than 20 times its weight of water before it has imbibed nearly its own bulk of that liquid, or has lost about $\frac{1}{4}$th of its refrigerating power." (Ure.) Sulphuric acid, which has become diluted in this way, may be reconcentrated by heat. Any substance having a great tendency to absorb moisture may be substituted for the sulphuric acid. Fused chloride of calcium, quicklime, nitrate of magnesium, chloride of zinc, and oatmeal (dried nearly to brownness before a common fire), have been used for this purpose. Again, instead of employing an air-pump, a vacuum may be produced by the agency of steam, afterwards condensed by the affusion of cold water.

A pleasing philosophical toy, illustrative of the evaporative power of a vacuum, is the 'CRYOPHORUS,' or 'FROST-BEARER,' of Dr. Wollaston. This instrument consists of two



small glass globes, united by a tube, one of which is partly filled with water. The whole apparatus is perfectly free from air, and is, consequently, filled with attenuated aqueous vapours. No sooner is the pressure removed as by plunging the empty ball into a freezing mixture (which condenses the vapour), than rapid evaporation commences, and the water in the other ball is frozen in two or three minutes.

Even in hot climates ice may be produced under favorable circumstances by evapora-

tion. On the open plains, near Calcutta, this is effected by exposing a thin stratum of water to the atmosphere, during the fine clear nights of December, January, and February. The pans are made of porous earthenware, and water is poured in to the depth of about 1½ inch. A large number of these vessels are arranged in an excavation in the ground, 30 or 40 feet square and 2 feet deep, the bottom of which is covered, to the depth of 10 or 12 inches, with sugar canes or the stalks of Indian corn. At sunrise the pans are visited, the ice separated from the water, and packed as tight as possible in a deep cavity or pit, well screened from the heat.

Several machines have recently been invented by which water is frozen in large quantities, by exposure to condensed air in the act of its subsequent expansion. They are worked by either hand or steam power. The refrigerating apparatus invented by Mr. Kirk, of the Bathgate Paraffin Works, acts on this principle; and it does its work so efficiently that it produces a cooling effect equivalent to two tons of ice every twenty-four hours, at a very small expenditure of fuel. A small model worked by hand will readily freeze mercury. Kirk's apparatus is used at Bathgate to cause the crystallisation of solid paraffin from the heavy paraffin oils. Formerly, a machine, acting by the evaporation of ether, was employed for the same purpose.

For the production of an extremely low temperature, such as is required for the liquefaction of some gases, Faraday employed solid carbonic acid mixed with a little ether.

In the production of ice, or an extreme degree of cold, by saline mixtures, the salts should be in the crystallised state, and as rich as possible in water, but without being in the least damp. They should also be coarsely pulverised at the time of using them, and should not be mixed until immediately before throwing them into the liquid ingredients. The mixture should be made in a thick vessel, well clothed, to prevent the accession of external heat; and the substance to be acted on should be contained in a very thin vessel, so as to expose it more fully to the action of the mixture. On the large scale, a vessel called a 'FREEZING POT' or 'SABOTIÈRE' is commonly employed. The following table, though founded on experiments made more than 50 years ago by Mr. Walker, gives full and accurate information on the subject of freezing mixtures:—

TABLE *exhibiting a few of the most useful* FRIGORIFIC MIXTURES. *Drawn up from actual experiments performed by* Mr. WALKER.

Ingredients.	Thermometer sinks.	Deg. of cold produced.
Snow *or* pounded ice . . . 2 parts Chloride of sodium . . . 1 „	From any temperature. to — 5°	—
Snow *or* pounded ice . . . 5 „ Chloride of sodium . . . 2 „ Sal ammoniac . . . 1 „	From any temperature. to — 13°	—
Snow *or* pounded ice . . . 12 „ Chloride of sodium . . . 5 „ Nitrate of ammonia . . . 5 „	From any temperature. to — 25°	—
Snow . . . 8 „ Hydrochloric acid (*concentrated*) . 5 „	From + 32° to — 27°	59°
Snow . . . 2 „ Crystallized chloride of calcium . 3 „	From + 32° to — 50°	82°
Sal ammoniac . . . 5 „ Nitrate of potassa . . . 5 „ Water . . . 16 „	From + 50° to + 10°	40°
Nitrate of ammonia . . . 1 „ Water . . . 1 „	From + 50° to + 4°	46°
Nitrate of ammonia . . . 1 „ Carbonate of soda . . . 1 „ Water . . . 1 „	From + 50° to + 7°	57°
Phosphate of soda . . . 9 „ Nitrate of ammonia . . . 6 „ Diluted nitrous acid[1] . . . 4 „	From + 50° to — 21°	71°
Sulphate of soda . . . 8 „ Hydrochloric acid . . . 5 „	From + 50° to 0°	50°
Snow . . . 3 „ Diluted nitrous acid[1] . . . 2 „	From 0° to — 46°	46°
Snow . . . 2 „ Sulphuric acid . . . 1 „ Water . . . 1 „	From — 20° to — 60°	40°
Snow . . . 1 „ Crystallized chloride of calcium . 2 „	From 0° to — 66°	66°
Snow . . . 1 „ Crystallized chloride of calcium . 3 „	From — 40° to — 73°	33°
Snow . . . 8 „ Sulphuric acid . . . 5 „ Water . . . 5 „	From — 68° to — 91°	23°

[1] *Fuming 'nitrous acid,'* 2 parts; *water,* 1 part; by weight.

Obs. The materials in the first column are to be cooled, previously to mixing, to the temperature required in the second, by the use of other mixtures.

REG'ULUS. A term applied by the alchemists to various metallic matters obtained by fusion; as REGULUS OF ANTIMONY, ARSENIC, &c. It is now obsolete.

REL'ISHES. See SAUCES.

REMIT'TENT. A term applied to fevers, and other diseases, which exhibit a decided remission in violence during the twenty-four hours, but without entirely leaving the patient, in which they differ from intermittents or agues.

REN'NET. *Syn.* RUNNET, PREPARED CALF'S MAW. The fourth or true digesting stomach of the calf, freed from the outer skin, fat, and useless membrane, washed, treated with either brine or dry salt for a few hours, and then hung up to dry. When well prepared, the dried '*vells*' somewhat resemble parchment in appearance.

Uses, &c. Rennet is employed to curdle milk. A piece of the requisite size is cut off, and soaked for some hours in whey or water, after which the whole is added to the milk for curdling, slightly warmed, and the mixture is slowly heated, if necessary, to about 122° Fahr. In a short time after this temperature has been attained, the milk separates into a solid white coagulum (curd), and into a yellowish, translucent liquid (whey). Two square inches from the bottom of a good 'vell' are sufficient for a cheese of 60 lbs. It is the gastric juice of the stomach that operates these changes. The stomachs of all sucking quadrupeds possess the same properties. See CHEESE.

Rennet, Liquid. *Syn.* ESSENCE OF RENNET. *Prep.* From fresh rennet (cut small), 12 oz.; common salt, 3 oz.; knead them together, and leave the mixture at rest, in a cool place, for 5 or 6 weeks; then add, of water, 18 oz.; good rum or proof spirit, 2 oz.; lastly, digest for 24 hours, filter, and colour the liquid with a little burnt sugar.

Obs. 2 or 3 teaspoonfuls will curdle a quart of milk. Some persons use white wine instead of water, with simple digestion for a day or two.

RES'IN. *Syn.* RESINA, L. This name is applied to many vegetable principles composed of the elements carbon, hydrogen, and oxygen. The resins (RESINÆ) cannot be very accurately defined, but we may in a general way describe them as substances which are solid at ordinary temperatures, more or less transparent, inflammable, readily fusible, do not volatilise unchanged, become negatively electrified by rubbing; are insoluble in water, but soluble in alcohol; mostly inodorous, and readily incorporated with fatty bodies by fusion. Their sp. gr. varies from ·9 to 1·2. According to Liebig, they are oxidised essential oils. Common resin, rosin, or colophony, and the shellac of which sealing-wax is made, are familiar examples of these substances. (See *below*.)

Resin, Black. *Syn.* ROSIN‡, BLACK R.‡, COLOPHONY; RESINA NIGRA, COLOPHONIA, L. What remains of turpentine after the oil has been distilled. When this substance, whilst still fluid, is agitated with about 1-8th part of water, it forms the yellow resin of pharmacy. *Used* for violin bows, dark-coloured ointments, varnishes, &c.

Resin, Yel'low. *Syn.* YELLOW ROSIN‡, WHITE R.‡; RESINA FLAVA, RESINA (Ph. L.), L. Detergent. *Used* in ointments, plasters, &c. (See *above*.)

RES'INOIDS. *Syn.* RESINOUS EXTRACTS CONCENTRATED E.; EXTRACTA RESINA, L. Under this head, the so-called 'Eclectics,' who form a numerous class among American physicians, place their most important 'concentrated remedies.' "Viewed as pharmaceutical preparations eligible for use in medicine, though not purified so as to rank as distinctive proximate principles, these are very appropriately named 'resinous extracts,' or 'resins.' The term 'resinoid,' so commonly used, is less appropriate to the class, implying, as it does, a resemblance to resins, while all of these are either resins, oleo-resins, or more or less mixed proximate principles possessing no real resemblance to the class of resins." (Parrish.) Most of them are prepared from plants indigenous to North America, by precipitating a strong alcoholic tincture with water. They are all brought to the condition of powder, those which are naturally soft and oily being mixed with a sufficient quantity of sugar of milk, or other dry material. One of these eclectic remedies has been introduced into regular practice. See PODOPHYLLIN.

RESOLV'ENTS. *Syn.* DISCUTIENTS; RESOLVENTIA, L. Substances or agents which discuss or resolve inflammatory and other tumours. See DIGESTIVES.

RESPIRA'TION. The peculiar function by which the blood is submitted to the action of the air, for the purpose of removing carbonic acid, and restoring its vitality by the absorption of atmospheric oxygen.

The air expired from the lungs is found to have undergone a most remarkable change. It is now loaded with aqueous vapour, whilst a considerable portion of its oxygen has disappeared, and its place is supplied by about a like volume of carbonic acid. It is no longer capable of supporting animal life, and even a lighted taper plunged into it is immediately extinguished. In the mean time, the 'venous blood' which entered the lungs from the right chambers of the heart has lost its dingy hue, and has acquired the rich florid colour which is characteristic of 'arterial blood.' In this state it is returned to the left chambers of the heart, and is propelled by that organ to every part of the body, from which it passes by the capillaries to the veins, and by these again to the heart and lungs, to undergo the same changes and circulation as before. The carbon and hydrogen of the blood, ultimately derived from the food, are, in this course, gradually converted into carbonic acid and water, by a species of slow combustion; but how these changes are effected is not definitely ascertained.

The lungs, as is well known, receive the

not only employed to mix with genuine saffron, but are extensively sold to the country dealers for that purpose. Old and dry saffron is 'freshened up' by rubbing it between the hand, slightly oiled, and then repicking it.

Prop., &c. Saffron is anodyne, cordial, emmenagogue, and exhilarant; but is now seldom employed, except as an adjuvant, in medicine. Amongst cooks, confectioners, and liquorists, it is largely used on account of its fine colour.

Mead'ow Saffron. See COLCHICUM.

SAGAPE'NUM. This substance is described in the London Pharmacopœia as a gum resin, the production of an uncertain species of *Ferula*. The mass of the sagapenum sold to the retail trader is, however, a factitious article, formed by softening a mixture of assafœtida, 3 parts, and galbanum, 15 parts, over a water or steam bath, and then stirring in about $\frac{1}{17}$th of their weight of oil of turpentine, with a little oil of juniper. This mixture is labelled 'Gum Sagapeni Opt,' an inferior sort being made by adding sundry portions of yellow resin and paste of gum tragacanth to the above.

PREPARED SAGAPENUM (SAGAPENUM PRÆPARATUM—Ph. L.) is ordered to be prepared in the same manner as 'prepared ammoniacum.'

Obs. Sagapenum is the feeblest of all the fetid gum-resins.—*Dose.* 5 to 15 grs., made into pills; as an antispasmodic and emmenagogue.

SA'GO. *Syn.* SAGO (Ph. L. E. & D.), L. "The fæcula (starch) from the stem of *Sagus farinifera, S. Rumphii*, and, perhaps, of other species of palms." (Ph. L.) It forms the principal portion of the pith of the Sago palms, the Gommuti palm, the Talipot palm, and other allied trees. Its properties and uses, for the most part, resemble those of arrow-root. It is used for making puddings, jellies, &c.

SAL. [L.] Salt. A word much used in compound names, handed down to us from the old chemists.

Sal Absin'thii. Carbonate of potassium.

Sal Acetosel'læ. Binoxalate and quadroxalate of potassium.

Sal Alem'broth. Ammoniated mercury (white precipitate).

Sal Ammo"niac. Chloride of ammonium.

Sal de Duobus. Sulphate of potassium.

Sal Diure'ticus. Acetate of potassium.

Sal Enix'um. Crude bisulphate of potassium.

Sal Gem'mæ. Rock or fossil salt (chloride of sodium).

Sal Mar'tis. Sulphate of iron.

Sal Mirab'ile. Sulphate of sodium.

Sal Perla'tum. Phosphate of sodium.

Sal Polycrest'us. Sulphate of potassium.

Sal Prunel'la. *Syn.* SORE-THROAT SALT, CRYSTAL MINERAL; POTASSÆ NITRAS FUSA, NITRUM TABULATUM, SAL PRUNELLÆ, L. From nitre, fused in a Hessian crucible, and poured out on a smooth surface, or into moulds, to cool. Its usual form and size is that of an ordinary musket-bullet, with the tail, in which state it is known in the drug trade as 'sal prunellæ globosum.' When in cakes, it is often called 'sal p. in placentis,' or 's. p. tabulatum.' A small portion allowed to dissolve slowly in the mouth, the saliva being slowly swallowed, often removes incipient inflammatory sore throat.

Sal Saturn'i. Sugar of lead (neutral acetate of lead).

Sal Seignette'. Rochelle salt (tartrate of potassium and sodium).

Sal Volat'ile. Sesquicarbonate of ammonia. The name is commonly used as an abbreviation of aromatic spirit of ammonia. See SPIRITS (Medicinal).

SAL'ADS are generally made of esculent vegetables, either singly or mixed, chosen according to taste or time of year, and 'dressed' with oil, vinegar, and salt, and sometimes also with mustard and other condiments. Sliced boiled egg is a common addition. Cold meat, poultry, and game, sliced small, with some cucumber or celery, and a little onion or chopped parsley, or, instead of them, some pickles, make a very relishing salad. Fish are also employed in the same manner.

Salad, Let'tuce. *Prep.* Take two large lettuces, remove the faded leaves and the coarser green ones; next cut the green tops off, pull each leaf off separately, rinse it in cold water, cut it lengthways, and then into four or six pieces; put these into a bowl, and sprinkle over them, with your fingers, 1 small teaspoonful of salt, ½ do. of pepper, 3 do. of salad oil, and 2 do. of English or 1 of French vinegar; then with the spoon and fork turn the salad lightly in the bowl until thoroughly mixed; the less it is handled the better. A teaspoonful each of chopped chervil and tarragon is an immense improvement.

Obs. The above seasoning is said to be enough for ¼ lb. of lettuce. According to Soyer, it is "such as the Italian count used to make some years since, by which he made a fortune in dressing salads for the tables of the aristocracy." The above may be varied by the addition of 2 eggs, boiled hard, and sliced, a little eschalot, or a few chives or young onions. Several other salad herbs, especially endive, water-cresses, and mustard-and-cress, may be 'dressed' in the same manner; always remembering that the excellence of a salad depends chiefly on the vegetables which compose them being recently gathered and carefully cleansed.

To improve the appearance of the above and other salads, when on the table or sideboard, before being used, the gay flower of the nasturtium or marigold, with a little sliced beet-root or radish, and sliced cucumber, may be tastefully intermixed with them.

Salad, Lobs'ter. *Prep.* (Soyer.) 'Have the bowl half filled with any kind of salad herb you like, as endive, lettuce, &c.; then break

lobster in two, open the tail, extract the meat in one piece, break the claws, cut the meat of both in small slices, about a quarter of an inch thick, and arrange these tastefully on the salad; next take out all the soft part from the belly, mix it in a basin with 1 teaspoonful of salt, ½ do. of pepper, 4 do. of vinegar, and 4 do. of oil; stir these well together, and pour the mixture on the salad; lastly, cover it with 2 hard eggs, cut into slices, and a few slices of cucumber." "To vary this, a few capers and some fillets of anchovy may be added, stirred lightly, and then served, either with or without some salad sauce. If for a dinner, ornament it with some flowers of the nasturtium and marigold."

SAL'EP. *Syn.* SALOP, SALOOP. The tuberous roots of *Orchis mascula*, and other allied species, washed, dried, and afterwards reduced to coarse powder. That imported from Persia and Asia Minor occurs in small oval grains, of a whitish-yellow colour, often semitranslucent, with a faint, peculiar smell, and a taste somewhat resembling gum tragacanth. It consists, chiefly, of bassorin and starch, is very nutritious, and is reputed aphrodisiac. It is employed in the same way as sago. A decoction of about 1 oz. of this substance in a pint of water was formerly sold at street-stalls. A tea made of sassafras chips, flavoured with milk and coarse brown sugar or treacle, was also sold in the same way, and under the same name.

FRENCH SALEP is prepared from the potato. Dr. Ure says that the *Orchis mascula* of our own country, properly treated, would afford an article of salep equal to the Turkey, and at a vastly lower price.

SAL'ICIN. $C_{13}H_{18}O_7$. A white, crystalline substance, discovered by Le Roux and Buchner, in the bark and leaves of several species of *Salix* and *Populus*. It occurs most abundantly in the white willow (*Salix alba*) and the aspen (*Salix helix*), but is also found in all the bitter poplars and willows. From willow bark which is fresh, and rich in salicin, it may be obtained by the cautious evaporation of the cold aqueous infusion.

Prep. 1. (Merck.) Exhaust willow bark by repeated coction with water, concentrate the mixed liquors, and, while boiling, add litharge until the liquid is nearly decoloured; filter, remove the dissolved oxide of lead, first by sulphuric acid, and afterwards by sulphuret of barium; filter, and evaporate, that crystals may form; the crystals must be purified by re-solution and recrystallisation.

2. As No. 1, but using a stream of sulphuretted hydrogen, to free the solution from lead.

3. (P. Cod.) To a strong filtered decoction of willow bark add milk of lime, to throw down the colour; filter, evaporate the liquor to a syrupy consistence, add alcohol (sp. gr. ·847), to separate the gummy matter, filter, distil off the spirit, evaporate the residuum, and set it aside in a cool place to crystallise; the crystals are purified by solution in boiling water, agitation with a little animal charcoal, and recrystallisation.

Prop., &c. Salicin forms white, silky needles and plates; it is intensely bitter; inodorous; neutral; non-basic; fuses at 230° Fahr., with decomposition; burns with a bright flame; is soluble in 5½ parts of water at 60°, and in much less at 212°; dissolves readily in alcohol; but is insoluble in ether. It is tonic, like sulphate of quinine, but less liable to irritate the stomach. It is given in indigestion and intermittent diseases, in from 5 to 10 gr. doses.

Pur. & tests.—1. It is entirely soluble in water and rectified spirit.—2. When strongly heated, it is wholly dissipated, and, if kindled, burns with a bright flame, leaving a bulky charcoal.—3. Its solution is absolutely neutral to test-paper.—4. Concentrated sulphuric acid causes it to agglutinate into resin-like lumps, with the accession of an intense blood-red colour.—5. When its aqueous solution is mixed with some hydrochloric acid, or dilute sulphuric acid, and the mixture is boiled for a short time, the liquid suddenly becomes turbid, and deposits SALIRETIN, under the form of a granular crystalline precipitate. This is characteristic.—6. No reagent deposits salicin without decomposition. See SALICYLIC and SALICYLOUS ACIDS.

SAL'ICYL. C_7H_4O. A compound radical, forming the basis of the so-called SALICYL-COMPOUNDS, or SALICYL-SERIES. It is known only in combination. The volatile oil of meadow-sweet is a natural hydride of salicyl, a substance which, when artificially prepared, is better known under the name of SALICYLOUS ACID. (See *below*.)

SALICYL'IC ACID. $H_2C_7H_4O_4$. A peculiar volatile, crystallisable acid, discovered by Piria. It is obtained by fusing salicylous acid with solid hydrate of potassa in slight excess, until the mixture turns white and gas is disengaged, and treating a solution of the residuum with hydrochloric acid, in slight excess, to separate the potassa; the salicylic acid separates in crystals, which are purified by solution in hot water. It may also be obtained from the oil of partridge-berry (*Gaultheria procumbens*), by acting on it with a strong and hot solution of potassa, and afterwards separating the acid as before. This oil is methylo-salicylic ether, or salicylate of oxide of methyl. In its general properties, salicylic acid closely resembles benzoic acid.

SALICYL'OUS ACID. $C_7H_6O_2$. *Syn.* SALICYLOL, HYDROSALICYLIC ACID†, HYDRIDE OF SALICYL, ARTIFICIAL OIL OF MEADOW-SWEET. A nearly colourless, oily, inflammable liquid, discovered by Pagenstecher in the volatile oil of *Spiræa ulmaria* (meadow-sweet), which, when pure, entirely consists of it; and by Piria, as a product of the decomposition of salicin.

Prep. The oil of meadow-sweet is mixed with a strong solution of caustic potassa, and

the yellow crystalline mass which separates on agitation is purified by pressure between folds of bibulous paper and recrystallisation from alcohol; the resulting crystals (salicylite of potassium) are then decomposed by the addition of dilute sulphuric acid, the floating oil separated from the water, and freed from moisture by careful distillation from chloride of calcium.

Prop., &c. Salicylous acid is soluble in ether and alcohol, and slightly so in water, to which it imparts its peculiar fragrance and the characteristic property of striking a deep violet colour with the sesquisalts of iron. It is distinguished from salicylic acid, which also exhibits this reaction, by its liquid form and odour.

SALI'VA. See MASTICATION.

SALM'ON. *Syn.* SALMO, L. The *Salmo Salar* (Linn.), a well-known, soft-finned abdominal fish. Its normal locality is at the mouth or estuary of the larger rivers of the northern seas, which, during the breeding season, it ascends, sooner or later, in the summer months, against all obstacles, for the purpose of depositing its spawn.

The salmon is an excellent and highly esteemed fish; but it is rich, oily, and difficult of digestion, and, therefore, ill adapted to the delicate or dyspeptic. When pickled, salted, or smoked, it is only fitted for persons of very strong stomachs, although in this state it is regarded as a great delicacy by epicures.

Salmon is preferably cooked by boiling. One of weighing 10 lbs. will require to be gently simmered for about an hour, reckoning from the time the water commences boiling. For fish of other weights, from 6 to 7 minutes per lb. may be allowed. See FISH, &c.

SALOOP'. Sassafras (chips) tea, flavoured with milk and sugar. A wholesome and useful drink in cutaneous and rheumatic affections. See SALEP.

SALT. *Syn.* SAL, L.; SEL, Fr. Salts may be regarded as acids in which one or more atoms of hydrogen, a constant constituent of all true acids, are replaced by a metal or other basic radical. This relationship between acids and salts will be better understood by reference to the subjoined list of acids and their corresponding potassium and ammonium salts:

Acids.	Salts.
HCl (Hydrochloric acid)	— KCl (Chloride of potassium.)
" " "	— NH_4Cl (Chloride of ammonium).
HNO_3 (Nitric acid)	— KNO_3 (Nitrate of potassium).
" " "	— NH_4NO_3 (Nitrate of ammonium).
H_2SO_4 (Sulphuric acid)	— K_2SO_4 (Sulphate of potassium).
" " "	— $(NH_4)_2SO_4$ (Sulphate of ammonium).

Acids are, in fact, hydrogen salts. The so-called DOUBLE SALTS are, according to one view, combinations of two salts of the same acid, but of different basic radicles; thus, common alum is a compound of sulphate of aluminum and sulphate of potassium.

The salts are a most important class of bodies, and their applications and uses in the arts of life and civilisation are almost infinite. See NOMENCLATURE, &c.

Salt, Bitter Pur'ging. Epsom salt.

Salt, Cathar'tic. Of GLAUBER, sulphate of sodium; ENGLISH or BITTER S., sulphate of magnesium (Epsom salt).

Salt, Common. *Syn.* CULINARY SALT. Chloride of sodium.

Salt, Diuret'ic. Acetate of potassium.

Salt, Ep'som. Sulphate of magnesium.

Salt, Feb'rifuge. Chloride of potassium.

Salt, Fu''sible. Phosphate of ammonium.

Salt, Glauber's. Sulphate of sodium.

Salt, Macqueer's. Binarseniate of potassium.

Salt, Microcos'mic. Phosphate of sodium and ammonium.

Salt, Red. Common salt wetted with an infusion of beet-root, or cochineal, or tincture of red sanders wood, then dried, and rubbed through a sieve. *Used* to impart a colour to gravies, &c. Infusion of saffron also gives a beautiful colour for this purpose. It has been proposed to colour Epsom salt in this way, to distinguish it from oxalic acid.

Salt, Rochelle. Tartrate of potassium and sodium.

Salt, Sea. Chloride of sodium.

Salt, Sed'ative. Boracic acid.

Salt, Smelling. See SALTS (*below*).

Salt, Sore-throat. Sal prunella.

Salt, Taste'less. Phosphate of sodium.

Salt, Veg'etable. Tartrate of potassium.

Salt, Vol'atile. Common carbonate of ammonium.

Salt of Lem'ons. *Syn.* SAL LIMONUM, L. Citric acid. That sold in the shops for the removal of ink spots from linen is binoxalate or quadroxalate of potassium, either alone or mixed with one half its weight of cream of tartar.

Salt of Sor'rel. Binoxalate or quadroxalate of potassium.

Salt of Steel. Sulphate of iron.

Salt of Tar'tar. Carbonate of potassium.

Salt of Vit'riol. Sulphate of zinc.

Salt of Wormwood. Carbonate of potassium.

SALTPE'TRE. Nitrate of potassium.

SALT'ING. PICKLING. *Syn.* This is an easy method of preserving butcher's meat, fish, and, indeed, most animal substances. It is performed in two ways:—

1. (DRY SALTING.) This, as practised in Hampshire, Yorkshire, and in various large establishments elsewhere, consists in merely well rubbing ordinary culinary salt, mixed with a little saltpetre, into the meat, until every crevice is thoroughly penetrated, and, afterwards, sprinkling some over it, and placing it on a board or in a trough, in such a manner that the brine may drain off. On the small scale, in private families, a mixture of salt, 2 lbs., with saltpetre, 1½ or 2 oz., either with

or without about an oz. of good moist sugar, is commonly used for the purpose, and imparts a fine flavour to the meat. In both cases the pieces are turned every day, or every other day, until sufficiently cured, a little fresh salt being added as required. Sometimes the fresh meat is packed at once in casks, with the best coarse-grained or bay salt. This method is that commonly adopted for sea stores.

2. (WET SALTING, or PICKLING IN BRINE.) When the meat is allowed to lie in the liquor that runs from it (see *above*), or is at once plunged into strong brine, it is said to be 'pickled,' or 'wet salted.' On the small scale, this is most conveniently performed by rubbing the fresh meat with salt, &c., as above, and, after it has lain a few hours, putting it into a pickle formed by dissolving about 4 lbs. of good salt and 2 oz. of saltpetre in 1 gall. of water, either with or without the addition of ½ to 1 lb. of moist sugar. This pickling liquor gets weaker by use, and should, therefore, be occasionally boiled down a little, and skimmed, at the same time adding some more of the dry ingredients. Three to ten days, depending on the size, is sufficiently long to keep meat in the brine. When it is taken out it should be hung up to dry, after which it may be packed in barrels with coarse-grained salt, or smoked, whichever may be desired. Saltpetre added to brine gives the meat a red colour, and brown sugar improves the flavour.

The sooner animal substances, more especially flesh, are salted after being killed, the better, as they then possess considerable absorbent power, which they gradually lose by age. See PUTREFACTION, SCURVY, SMOKING, &c.

SALTS (Smelling). *Syn.* SAL VOLATILIS OLEOSUS, L. Sesquicarbonate of ammonia commonly passes under the name of 'SMELLING SALTS,' and, with the addition of a few drops of essential oil, is frequently employed to fill 'SMELLING BOTTLES'; but when a strong and durable pungency is desired, the carbonate should alone be used, as in one or other of the following formulæ:—

1. Carbonate (not sesquicarbonate) of ammonia, 1 lb.; oil of lavender (Mitcham), 2 oz.; essence of bergamot, 1 oz.; oil of cloves, ¼ oz.; rub them together, and sublime; keep the product in well-stopped bottles.

2. Carbonate of ammonia, 1 lb.; oil of lavender, 2 oz.; oils of bergamot and lemon, of each, 1 oz.; as the last.

3. Carbonate of ammonia, ½ lb.; essence of bergamot, 1 oz.; oil of verbena, ¼ oz.; otto of roses, 1 dr.; as before.

4. Carbonate of ammonia, ¾ lb.; essences of bergamot and lemon, of each, ½ oz.; essence de petit grain, ¼ oz.; oil of cloves, 1 dr., as before.

5. (Extemporaneous.)—*a*. From sal ammoniac, 1 dr.; pure potassa, 3 drs.; grind them together, and add, of essence of lemons, 15 drops; oil of cloves, 3 or 4 drops.—*b*. From carbonate or sesquicarbonate of ammonia (bruised), q. s.; volatile ammoniacal essence, a few drops. (See page 465.)

According to Dr. Paris, GODFREY'S SMELLING SALTS are made by resubliming volatile salt with subcarbonate of potassa and a little spirits of wine (and essential oil).

SALVE. A name indiscriminately applied by the vulgar to any consistent, greasy preparation used in medicine.

Salve, Lip-. *Syn.* CERATUM LABIALE, L. *Prep.* 1. (RED or PERUVIAN.) From spermaceti ointment, ½ lb.; alkanet root, ½ oz.; melt them together until sufficiently coloured, strain, and, when the strained fat has cooled a little, add of balsam of Peru, 3 drs.; stir well, and in a few minutes pour off the clear portion from the dregs; lastly, stir in of oil of cloves, 20 or 30 drops. This never gets rancid.

2. (ROSE.) See CERATE.

3. (WHITE.) From the finest spermaceti ointment or cerate, 3 oz.; finely powdered white sugar, 1 oz.; neroli or essence de petit grain, 10 or 12 drops, or q. s.

Obs. Numerous formulæ are extant for lip-salves, as for other like articles, but the preceding are those generally employed in trade. The perfumes may be varied at will and the salve named after them. A very small quantity of finely powdered borax is occasionally added. FRENCH LIP-SALVE is said to contain alum, in fine powder; and GERMAN LIP-SALVE is said to be made of cacao butter. See CERATE, POMMADE, and OINTMENT.

SAND. *Syn.* ARENA, L. River and sea sand consist chiefly of finely divided siliceous matter, mixed, occasionally, with carbonate of lime. That of Lynn and Alum Bay is nearly purely silica, and is, therefore, selected for the manufacture of glass. Sand is used by moulders in metal, and as a manure for heavy land. It is a large and necessary portion of every fertile soil.

SAN'DAL WOOD. 1. (RED SANDERS WOOD, R. SAUNDERS W.; LIGNUM SANTALI RUBRI, LIGNUM SANTALINUM RUBRUM, PTEROCARPI LIGNUM —Ph. L. & E.) The wood of *Pterocarpus santalinus*. It is *used* in medicine as a colouring matter. It is also employed in dyeing and to stain varnishes. WOOL may be dyed a carmine red by dipping it alternately into an infusion of this wood and an acidulous bath (Trommsdorff.) Prepared with a mordant of alum and tartar, and then dyed in a bath of sandal wood and sumach, it takes a reddish-yellow. (Bancroft.) See SANTALIN.

2. (WHITE SANDAL WOOD, WHITE SANDERS WOOD, SANTALUM ALBUM.) The young timber, or according to others, the outside wood of *Santalum album* (Linn.).

3. (YELLOW SANDAL WOOD; SANTALUM CITRINUM, S. FLAVUM.) The old timber, or according to others, the heart of the same tree. Both the latter are much esteemed on

account of their fragran[illegible] essential oil.

SAN'DARACH. *S[illegible]*nce, and yield a valuable resin obtained from *[illegible]n.* SANDRAC, GUM S. A *Juniperus communis* (*Thuja articulata*, and slightly fragrant, is [illegible] in warm climates). It is spirit, and has a sp. [illegible] freely soluble in rectified *used* as incense, pow[illegible]egr. of 1·05 to 1·09. It is

SAN'DERS WO[illegible] [illegible]nce, in varnishes, &c.

SAN'DIVER. [illegible]OD. See SANDAL WOOD.

VITRI, SAL VITR[illegible] *Syn.* GLASS GALL; FELL swims on glass [illegible]I, L. The saline scum that sionally *used* in [illegible] when first made. It is occa-

SANGUINA'R[illegible] tooth-powders.

Obtained from t[illegible]INE. *Syn.* SANGUINARINA, E. *densis* (Linn.), o[illegible]he root of *Sanguinaria Cana-*anhydrous alcoh[illegible]r blood-root, by digesting it in sulphuric acid; [illegible]ol; exhausting it with weak monia; dissolvi[illegible]k precipitating by liquor of am-tating sulphat[illegible]ng out by ether, and precipi-of sulphuric [illegible]e of sanguinarine by the addition juice and an acid. The sulphate may be de-composed by ammonia, which precipitates the alkaloid as a white pearly substance, of an acrid taste, very soluble in alcohol, also soluble in ether and volatile oils. With acids it forms soluble salts, remarkable for their beautiful red, crimson, and scarlet colours. These salts are *used* in medicine as expectorants, in doses of fractions of a grain.

The 'sanguinarin' of the American 'Eclectics' is prepared by precipitating a saturated tincture of blood-root by water. It contains an uncertain proportion of the alkaloid, and is of a deep reddish-brown colour. See RESINOIDS.

SAN'TALIN. The colouring principle of red sanders wood.

SAN'TONIN. $C_{15}H_{18}O_3$. *Syn.* SANTONIC ACID; SANTONINUM, L. The crystalline and characteristic principle of the seed of several varieties of *Artemisia*.

Prep. (Ph. Baden. 1841.) Take of worm-seed, 4 parts; hydrate of lime, 1½ part; mix, and exhaust them with alcohol of 90%; distil off 3-4ths of the spirit, and evaporate the remainder to one half, which, at the boiling temperature, is to be mixed with acetic acid in excess, and afterwards with water; on repose, impure santonine subsides; wash this with a little weak spirit, then dissolve it in rectified spirit, 10 parts, decolour by ebullition for a few minutes with animal charcoal, and filter; the filtrate deposits colourless crystals of santonine as it cools; these are to be dried, and kept in opaque bottles.

Prop., &c. Prismatic or tabular crystals; inodorous; tasteless, or only slightly bitter; fusible; volatilisable; soluble in 4500 parts of cold and about 250 parts of boiling water; soluble in cold alcohol and ether; freely soluble in hot alcohol. It is much esteemed as a tasteless worm medicine, and is especially adapted to remove lumbricales (large round worms).—*Dose.* 6 to 18 or 20 grs., repeated night and morning, followed by a brisk purge.

SAP GREEN. See GREEN PIGMENTS.

SAPONIFICA'TION. See SOAP.

SAP'ONIN. *Syn.* SAPONINUM, L. A white non-crystallisable substance, obtained by the action of hot diluted alcohol on the root of *Saponaria officinalis* (Linn.), or soap wort.

Prop., &c. Saponin is soluble in hot water, and the solution froths strongly on agitation. The smallest quantity of the powder causes violent sneezing.

SARCOCOL'LA. A gum-resin supposed to be derived from one or more plants of the natural order *Renæaceæ*, growing in Arabia and Persia. It somewhat resembles gum arabic, except in being soluble in both water and alcohol, and in having a bitter-sweet taste. It was formerly used in surgery.

SAR'COSINE. $C_3H_7O_2N$. A feebly basic substance, obtained by boiling kreatine for some time with a solution of pure baryta. It forms colourless, transparent plates, freely soluble in water, sparingly so in alcohol, and insoluble in ether; it may be fused and volatilised.

SARSAPARIL'LA. *Syn.* SARSÆ RADIX (B. P.), RADIX SARZÆ, RADIX SARSAPARILLÆ, SARZA (Ph. L. & E.), SARSAPARILLA (Ph. D. & U. S. P.). "Jamaica sarza. The root of *Smilax officinalis*, Kunth" (Ph. L.); "and probably of other species." (Ph. E.)

The sarsaparillas of commerce are divided by Dr. Pereira into two classes:—'Mealy sarsaparillas' and 'non-mealy sarsaparillas.' In the first are placed Brazilian or Lisbon, Carthagena or gouty Vera Cruz, and Honduras; the second includes Jamaica, Lima, and true Vera Cruz.

The mealy sarsaparillas are distinguished by "the mealy character of the inner cortical layers, which are white or pale-coloured. The meal or starch is sometimes so abundant, that a shower of it, in the form of white dust, falls when we fracture the roots." The medulla or pith is also frequently very amylaceous.

The non-mealy sarsaparillas "are characterised by a deeply coloured (red or brown), usually non-mealy, cortex. The cortex is red, and much thinner than in the mealy sorts." "If a drop of oil of vitriol be applied to a transverse section of the root of the non-mealy sarsaparillas, both cortex and wood acquire a dark-red or purplish tint;" whilst in the preceding varieties, the mealy coat, and, sometimes, the pith, is but little altered in colour. "The decoction of non-mealy sarsaparilla, when cold, is somewhat darkened, but does not yield a blue colour when a solution of iodine is added to it." The aqueous extract, when rubbed down with a little cold distilled water in a mortar, does not yield a turbid liquid, nor become blue on the addition of iodine. The reverse is the case with the decoction and extract of the mealy varieties.

The JAMAICA, RED JAMAICA, or RED-BEARDED SARSAPARILLA (SARZA JAMAICENSIS —Ph. D.), is the variety which should alone be used in medicine. This kind yields from

Dover's powder. In malignant scarlet fever a smart emetic should be given early, and mercurials and diaphoretics at once freely exhibited. Acidulated gargles may be used for the throat, and, when the heat of the body is much above the natural standard, sponging the whole body with cold water, or with vinegar-and-water, may be had recourse to. If the malignant symptoms run high, and assume a typhoid or putrid character, the system must be supported with stimulant tonics, as, wine, bark, capsicum, &c.

According to Hahnemann, Koreff, and Randhahn, belladonna is a prophylactic against scarlet fever. The homœopathists also hold it to be almost a specific in the disease.

Scarlet fever is common to all ages of life, but children and young persons are the most subject to it. Unlike the smallpox, it occasionally attacks the same person more than once. It is most common in dirty, close, damp situations.

SCENE'-PAINTING. A variety of distemper painting employed in theatres, &c., governed by perspective, and having for its object the production of striking effects when viewed at a distance. Water, size, turpentine, and the ordinary pigments, are the materials used for the purpose.

SCENT BAGS. See SACHETS.

SCENT BALLS. *Syn.* PASTILLES DE TOILETTE ODORANTES, Fr. These are prepared from any of the materials noticed under POT POURRI, SCENTED POWDERS, and SACHETS, made into a paste with mucilage of gum tragacanth, and moulded into any desired forms, as that of balls, beads, medallions, &c. The larger ones are frequently polished.

SCENTED CAS'SOLETTES. See POT POURRI, and *above*.

SCENTS (Pommade). *Prep.* 1. (COWSLIP.) From essence of bergamot, 8 oz.; essence of lemon, 4 oz.; oil of cloves, 2 oz.; essence de petit grain, 1 oz.

2. (JONQUILLE.) From essence of bergamot and lemon, of each, 8 oz.; oils of orange peel and cloves, of each, 2 oz.; oil of sassafras, 1 oz.; liquid storax, ½ oz.; digest, with warmth and agitation, for a few hours, and decant the clear portion in a week.

3. (MILLEFLEUR.) From essence of ambergris (finest), 4 oz.; essence of lemon, 3 oz.; oil of cloves and English oil of lavender, of each, 2 oz.; essence de petit grain, essence of bergamot, and balsam of Peru (genuine), of each, 1 oz.; as the last.

Obs. The above are employed to scent pomatums, hair oils, &c. 1 oz. of any one of them, dissolved in 1 pint of the strongest rectified spirit, produces a delicious perfume for the handkerchief.

SCENTS (Snuff). *Prep.* 1. Essence of bergamot, 2 oz.; otto of roses and neroli, of each, 1 dr.

2. Oil of lavender, 1 oz.; essence of lemon, 4 oz.; essence of bergamot, 4 oz.

3. To the last, add of oil of cloves, 2 oz.

4. Essence of musk and ambergris, of each, 1 oz.; liquor of ammonia, ½ dr. See SNUFF, &c.

SCHEELE'S GREEN. See GREEN PIGMENTS.

SCHLIPPE'S SALT. Sulphantimoniate of sodium.

SCHWARTZ'S DROPS. See WORM DROPS.

SCIAT'ICA. See RHEUMATISM.

SCIL'LITIN. *Syn.* SCILLITINA, SCILLITITE. A whitish, resinous, translucent, bitter, deliquescent substance, obtained by Vögel from squills. It is soluble in water, alcohol, and acetic acid, and is purgative, acrid, and poisonous.

SCORBU'TUS. See SCURVY.

SCO"RIA. Dross; the refuse or useless part of any substance, more especially that left from bodies which have been subjected to the action of fire. It is frequently used in the plural (SCORLÆ).

SCOTT'S DROPS. See PATENT MEDICINES.

SCOUR'ING. The common method of cleaning cloth is by beating and brushing it, unless it be very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as with ARTICLES OF WEARING APPAREL, as follows:—A little curd soap is dissolved in water, and, after mixing it with a little clarified ox-gall, is applied to all the spots of grease, dirt, &c., and well rubbed into them with a stiff brush until they appear to be removed; after which the article is well cleaned all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. The cloth is next thoroughly rinsed in clean water, and hung up to dry. For dark-coloured cloths, some fuller's earth is often added to the mixture of soap and gall. When the article is nearly dry, the nap is laid smooth, and it is carefully pressed (if with a hot iron, on the wrong side), after which a soft brush, moistened with a drop or two of olive oil, is frequently passed over it, to give it a finish and gloss.

Cloth is also cleaned in the dry way:—The spots being removed, as above, and the wetted parts having become dry, clean damp sand is strewed over it, and beaten into it with a brush, after which the article is well gone over with a hard brush, when the sand comes out, and brings the dirt with it.

BUFF and DRAB CLOTH is generally cleaned by covering it with a paste made with pipe-clay and water, either with or without a little umber to temper the colour, which, when dry, is rubbed and brushed off.

When the article requires renovation as well as scouring, it is placed, whilst still damp, on a board, and the threadbare parts are rubbed with a half-worn hatter's card filled with flocks, or with a teasel, or a prickly thistle, until a nap is raised; it is next hung up to dry, after which it is 'finished off' as before. When the

cloth is much faded, it is usual to give it a 'dip,' as it is called, or to pass it through a dye bath to freshen up the colour. BLACK and DARK BLUE CLOTH, if rusty or faded, is commonly treated to a coat of 'reviver,' instead of being 're-dipped,' and is then hung up until next day, before being pressed and finished off. See SPOTS and STAINS.

SCOURING DROPS. See DROPS.

SCUDAMORE'S LOTION. See GOUT LOTION.

SCURF. *Syn.* FURFURA. Scurf "is a natural and healthy formation, and though it may be kept from accumulating, it cannot be prevented. It is produced on every part of the body where hair is found, although, from the more active growth of hair on the scalp, the facilities for collecting, and the contrast of colour, it strikes the eye most disagreeably in that situation. This will show how futile any attempt must be which shall have for its object to prevent the formation of the scurf. It may be removed, and should be removed, every day, with the hair-brush; but prevention is impossible, inasmuch as it is opposed to a law of nature. Occasionally, as a morbid action, an unusual quantity of scurf is produced, in which case medical means may be adopted to bring the scalp into a more healthful state." (Eras. Wilson.) In such cases the daily use of some mild stimulating or detergent wash, with due attention to the stomach and bowels, will generally abate this annoyance.

SCURVY. *Syn.* SCORBUTUS, L. This disease commences with indolence, sallow looks, debility, and loss of spirits; the gums become sore and spongy, the teeth loose, and the breath fetid; the legs swell, eruptions appear on different parts of the body, and, at length, the patient sinks under general emaciation, diarrhœa, and hæmorrhages.

The treatment of ordinary cases of this disease mainly consists in employing a diet of fresh animal and green vegetable food, with mild ale, beer, or lemonade, as beverages; scrupulously avoiding salted and dried meat. The fresh-squeezed juice of lemons is, perhaps, of all other substances, the most powerful remedy in this disease in its early stages, and is useful in all of them. Effervescing draughts formed with the bicarbonate of potassa (not soda) are also excellent.

SEALING WAX. See WAX.

SEA SICKNESS. The most effectual preventive of sea sickness appears to be the horizontal position. When there is much pain, after the stomach has been well cleared, a few drops of laudanum may be taken, or an opium plaster may be applied over the region of the stomach. Persons about to proceed to sea should put their stomach and bowels in proper order, by the use of mild aperients, and even an emetic, if required, when it will generally be found that a glass of warm and weak brandy-and-water, to which 15 or 20 drops of laudanum, or, still better, 1 or 2 drops of creasote, have been added, will effectually prevent any disposition to sea sickness, provided the bowels be attended to, and excess in eating and drinking be at the same time avoided. A spoonful of crushed ice, in a wine-glassful of cold water, or weak brandy-and-water, will often afford relief when all other means fail. Smoking at sea is very apt to induce sickness. M. F. Curie, in the *Comptes Rendus*,' asserts that drawing in the breath as the vessel descends, and exhaling it as it ascends, on the billows, by preventing the movements of the diaphragm acting abnormally on the phrenetic nerves, prevent sea sickness. On this Mr. Atkinson, at one of the meetings of the British Association, observed that—if a person, seated on board ship, holding a tumbler filled with water in his hand, makes an effort to prevent the water running over, at the same time allowing not merely his arm, but also his whole body, to participate in the movements, he will find that this has the effect of preventing the giddiness and nausea that the rolling and tossing of the vessel have a tendency to produce in inexperienced voyagers. If the person is suffering from sickness at the commencement of his experiment, as soon as he grasps the glass of liquid in his hand, and suffers his arm to take its course and go through the movements alluded to, he feels as if he were performing them of his own free will, and the nausea abates immediately, and very soon ceases entirely, and does not return so long as he suffers his arm and body to assume the postures into which they seem to be drawn. Should he, however, resist the free course of his hand, he instantly feels a thrill of pain, of a peculiarly stunning kind, shoot through his head, and experiences a sense of dizziness and returning nausea.

SED'ATIVES. *Syn.* SEDATIVA, L. Medicines and agents which diminish the force of the circulation or the animal energy, and allay pain. Foxglove, henbane, tobacco, potassio-tartrate of antimony, and several of the neutral salts and acids, act as sedatives. Cold is, perhaps, the most powerful agent of this class.

SEED. *Syn.* SEMEN, L. The seeds of plants are conspicuous for their vast number and variety, and their extreme usefulness to man. The seeds of certain of the *Graminaceæ* furnish him with his daily bread; some of those of the *Leguminosæ*, in either the immature or ripe state, supply his table with wholesome esculents, or provide a nourishing diet for his domestic animals; whilst those of numerous other plants, dispersed through every class, order, and family, yield their treasures of oil, medicinals, or perfumes, for his use.

SELEN'IC ACID. H_2SeO_4. *Syn.* ACIDUM SELENICUM, L. *Prep.* By fusing selenium with nitrate of potassium or of sodium, acting on the fused mass with water, precipitating the resulting solution with acetate or nitrate of

permanent straw-yellow colour when steeped in nitric acid of the sp. gr. 1·20 to 1·30. The fibres of white or light coloured silk are similarly stained by a solution of picric acid. A thread of silk, when inflamed, shrivels and burns with difficulty, evolves a peculiar odour, and leaves a bulky charcoal. By these properties silk is distinguished from cotton and linen.

The cleaning and renovation of articles of wearing apparel made of silk are matters requiring some care. No silk goods look well after being washed, however carefully it may be done; and this method should therefore never be resorted to but from absolute necessity. It is recommended to sponge faded silks with warm water and curd soap, then to rub them with a dry cloth on a flat board, and afterwards to iron them on the wrong side with an ordinary smoothing iron. Sponging with spirit, benzol, or pure oil of turpentine, also greatly improves old silk, and is often preferable to any other method. The odour of the benzol passes off very quickly, that of the turpentine after exposure for a few days. When the ironing is done on the right side, thin paper should be spread over the surface, to prevent 'glazing.' See DYEING, GILDING, &c.

SILK'WORM GUT. See GUT.

SIL'LABUB. *Prep.* Grate off the yellow peel of a lemon with lump sugar, and dissolve the sugar in ¾ pint of wine; add the juice of ½ a lemon, and a ¼ pint of cream; beat the whole together until of a proper thickness, and then put it into glasses.

Obs. ¾ to 1 pint of new milk is often substituted for the cream, and strong cider or perry for the wine. Grated nutmeg is often added. When 'whipped' to a froth, it is called 'WHIPPED SILLABUB.' See CREAM (Whipped).

SILVER. Ag. *Syn.* ARGENTUM, L. This metal, like gold, appears to have been as much valued in the remotest ages of antiquity of which we have any record, as at the present time. It is found in nature both in the metallic state and mineralised, in the state of alloy, and combined with sulphur, chlorine, and other metallic sulphurets. In Great Britain it is found in combination chiefly with lead. It is extracted from its ores principally by the process of amalgamation, founded on its easy solubility in mercury, and by subsequent cupellation. It is only prepared on the large scale.

Chemically pure silver may be obtained by the methods noticed subsequently.

Prop. Pure silver has a very white colour, high degree of lustre, is exceedingly malleable and ductile, and is the best conductor of heat and electricity known. Its hardness is between that of copper and gold; its sp. gr. is 10·475 to 10·500; it melts at about 1873° Fahr., or bright redness (Daniell); is freely soluble in nitric acid, and dissolves in sulphuric acid by the aid of heat; it refuses to oxidise alone at any temperature, but, when strongly heated in open vessels, it absorbs many times its bulk of oxygen, which is again disengaged at the moment of solidification; its surface is rapidly tarnished by sulphuretted hydrogen and by the fumes of sulphur.

Pur. "Entirely soluble in diluted nitric acid. This solution, treated with an excess of muriate of soda, gives a white precipitate entirely soluble in ammonia water, and a fluid which is not affected by sulphuretted hydrogen." (Ph. E.)

Tests. 1. The compounds of silver, mixed with carbonate of soda, and exposed on a charcoal support to the inner flame of the blowpipe, afford white, brilliant, and ductile metallic globules, without any incrustation of the charcoal.—2. The salts of silver are non-volatile and colourless, but most of them acquire more or less a black tint by exposure to full daylight.

The soluble salts of silver give—1. A white curdy precipitate (chloride of silver) with hydrochloric acid and the soluble metallic chlorides, which is soluble in ammonia and insoluble in nitric acid, and blackened by exposure to light; 2. White precipitates with solutions of the alkaline carbonates, oxalates, and ferrocyanides;—3. Yellow precipitates with the alkaline arsenites and phosphates;—4. With the arseniates, red precipitates;—5. With the fixed alkalies, brown precipitates;—6. With sulphuretted hydrogen and hydrosulphuret of ammonia, a black powder, which is insoluble in dilute acids, alkalies, alkaline sulphurets, and cyanide of potassium, but readily soluble, with separation of sulphur, in boiling nitric acid; and—7. With phosphorus, and with metallic copper or zinc, pure silver.

Assay. 1. The method of assaying silver by cupellation has been explained under ASSAY and CUPELLATION; and that method is alone applicable when the alloy contains a very small quantity of silver, as a few ounces only per ton. When the reverse is the case, as with the silver of commerce, the following is a much more accurate method:—

2. *Humid assay of silver.*—*a.* Dissolve 10 grs. of the silver for assay in 100 grs. of nitric acid, sp. gr. 1·28, by the aid of heat, the solution being made in a tall stoppered glass tube, furnished with a foot; then place it in a very delicate balance, bring it into an exact state of equilibrium, and add the test solution (see *below*), gradually and cautiously, until the whole of the silver be thrown down; the number of grains now required to restore the equilibrium of the balance or scales gives the exact quantity of pure silver in 1000 parts of the sample.—*Obs.* To ensure accuracy, after each addition the stopper should be placed in the tube, and the latter violently agitated for a short time, when the liquor will rapidly clear and enable us to see when the operation

is concluded. We must then, as a check, add a small quantity of a solution of nitrate of silver to the liquor in the tube, after having first carefully taken the weight. If too much of the test liquor has been added, this will produce a fresh precipitate, and the assay cannot then be depended on.—Instead of weighing the quantity of test liquor used, a tube graduated into 100 parts, and holding 1000 grs., may be employed, every division of which required to throw down the silver, will represent the $\frac{1}{10}$th of a grain. See ALKALIMETRY and ACIDIMETRY.

b. The precipitate of chloride of silver may be collected in a paper filter, and be dried, washed, fused, and weighed. The previous weight of the paper, deducted from the gross weight of the filter and its contents, gives the quantity of chloride of silver present, which, multiplied by 0·7527S, gives the weight of the pure silver in the sample.

Test liquor. Dissolve 54·27 (54¼) grs. of pure sea salt in 9945·73 grs. (or 22 oz. and 320¾ grs. avoirdupois) of distilled water; filter, and keep the liquor in a stoppered bottle for use. Pure sea salt is obtained by boiling together, for a few minutes, in a glass vessel, a solution of common salt with a little pure bicarbonate of soda; then adding to the filtered liquor sufficient hydrochloric acid to render it neutral to litmus and turmeric paper, and, lastly, evaporating and crystallising.

Obs. The presence of mercury, lead, or sulphuret of silver, interferes with the accuracy of the above assay. When mercury is present, the precipitate blackens less readily by exposure to light; and when it contains $\frac{4}{1000}$ or $\frac{5}{1000}$ of chloride of mercury, it remains of a dead white; with $\frac{3}{1000}$ it is not sensibly discoloured by the diffused light of a room, with $\frac{2}{1000}$ only slightly darkened, with $\frac{1}{1000}$ more so, but with pure chloride of silver, the effect is very rapid and intense. When this metal is present, which is, however, seldom the case, the assay sample must be placed in a small crucible, and exposed to a full red heat, before solution in the acid. Another method, proposed by M. Levol, and modified by M. Gay-Lussac, is to add to the nitric solution of the silver sufficient acetate of ammonia or crystallised acetate of soda to saturate all the nitric acid existing in the liquor, either in the free state or combined with the silver. When the alloy contains lead, shown by the precipitated chloride being partly soluble in water, it may either be laminated and subjected to the action of acetic acid before solution in the nitric acid; or, the test solution of chloride of soda should be replaced by one of chloride of lead; (139·355 grs. of the latter are equiv. to 58·732 grs. of the former). The presence of sulphuret of silver is detected whilst dissolving the sample in nitric acid, by the black flocks which may be observed floating about the liquor in an insoluble state. These flakes may be dissolved by fuming nitric acid, or by adding pure concentrated sulphuric acid to the solution, which should be then heated for about a ½ hour in a steam-bath. When thus treated, the precipitate produced by the test liquor represents the whole of the silver contained in the alloy.

Uses, &c. Metallic silver, unless in a state of very minute division, has no action on the human body. A plate of silver is ordered, in the Ph. L., as a test of the presence of nitric acid in the acetic and phosphoric acids; and metallic silver (preferably granulated) is employed by the other colleges in the preparation of the nitrate. Its numerous applications in the arts are well known. The standard silver of England contains 111 parts of silver, and 9 parts of copper.

Concluding remarks. The researches of Tillet, D'Arcet, and Gay-Lussac, have clearly shown that the percentage of silver in an alloy, as indicated by cupellation, is always below its real richness in that metal, owing to loss in the process; and, that the cupelled button always retains a trace of lead and copper, the precise quantity of which is variable. The following Table exhibits the additions to be made on this score, when the quantity assayed (assay pound) is 20 grs.:—

Weight after cupellation.	Actual richness in *pure silver.*	Percentage of richness in *pure silver.*
19·979	20	100
18·95	19	95
17·92	18	90
16·917	17	85
15·914	16	80
14·91	15	75
13·905	14	70
12·905	13	65
11·906	12	60
10·906	11	55
9·906	10	50
7·921	8	40
5·948	6	30
3·949	4	20
1·982	2	10

In assaying lead ores very poor in silver, the best quantity to be taken for cupellation is 500 grs.; and from that quantity 0·0148 of silver, including compensation for loss, represents one ounce of silver to the ton. A cupel may absorb its own weight of lead. If the quantity of lead to be absorbed is more considerable, another cupel may be turned topsy-turvy, and the cupel in which the assay is to be made may be placed upon it. See ASSAY, and M. Gay-Lussac's elaborate memoir on the "*Humid Assay of Silver.*"

For the recovery or reduction of silver from the chloride and its other compounds, several methods are employed:—

a. The washed chloride is placed in a zinc or iron cup, along with a little water strongly acidulated with sulphuric acid; or in a glass or porcelain cup along with a zinc plate; the whole may then be left to itself for some hours; or, to hasten the reduction, gently heated, or even boiled; the precipitated silver is washed with pure water, and dried.

b. (Hornung.) Digest the chloride with some ammonia and pure copper filings, for 24 hours, then wash and dry the powder.

c. (M. Levol.) The washed chloride is mixed with an equal weight of sugar, and the mixture is digested in an excess of a moderately strong solution of caustic potassa, with occasional agitation for 24 hours; or the whole is boiled for some time; the reduced silver is washed with distilled water.

d. (Mohr.) The dry chloride is mixed with 1-3rd of its weight of powdered black resin, and moderately heated in a crucible until the flame ceases to have a greenish-blue colour; the heat is then suddenly increased so as to melt the metal into a button or ingot.

e. (M. Gay-Lussac.) If the chloride, dry it, and throw it, in successive portions, into twice its weight of carbonate of potassa fused in a red-hot Hessian crucible; effervescence ensues, and the pure silver subsides to the bottom.—If a "soluble salt," as the nitrate, acidulate the solution, and precipitate it by means of a polished plate of copper; the silver is then obtained in the form of powder. The products of the above processes, when the latter are carefully conducted, are chemically pure silver.

Silver, Acetate of. *Syn.* ARGENTI ACETAS, L. *Prep.* By adding a solution of acetate of potassa to a like solution of nitrate of silver, washing the precipitate with cold water, redissolving it in a little hot water, and setting the solution aside to crystallise. Small colourless needles.

Silver, Ammoniuret of. See FULMINATING SILVER (Berthollet's, Nos. 1 and 2, *page* 547).

Silver, Ammonio-chloride of. *Syn.* ARGENTO-CHLORIDE OF AMMONIA; ARGENTI AMMONIO-CHLORIDUM, L. *Prep.* Add, gradually, chloride of silver (recently precipitated and well washed) to concentrated liquor of ammonia, as long as it is dissolved on agitation, applying a gentle heat towards the end; then heat the solution to the boiling-point, concentrate a little, and allow it to cool very slowly; collect the crystals which form, dry them by pressure (with care) between folds of bibulous paper, and at once preserve them from the light and air.—*Dose.* $\frac{1}{10}$ to $\frac{1}{5}$ gr.

Silver, Ben'zoate of. $AgC_7H_5O_2$. Thin transparent plates, which are blackened by exposure to the light. See BENZOATE.

Silver, Bro'mide of. AgBr. Resembles the chloride.

Silver, Car'bonate of. Ag_2CO_3. *Syn.* ARGENTI CARBONAS, L. A white insoluble powder, obtained by precipitating a cold solution of nitrate of silver with another of carbonate of sodium. It is decomposed by heat.

Silver, Chlo"ride of. AgCl. *Syn.* ARGENTIC CHLORIDE. *Prep.* Precipitate a solution of nitrate of silver by dilute hydrochloric acid or a solution of common salt; wash the precipitate, and dry it in the shade.—*Dose.* $\frac{1}{4}$ to 3 grs., thrice daily; in epilepsy, chronic dysentery, cholera, diarrhœa, &c. Dr. Perry regards it as preferable to the nitrate. When fused, chloride of silver forms horn silver, the 'luna cornea' of the older writers.

Silver, Cy'anide of. AgCN. *Syn.* ARGENTIC CYANIDE, HYDROCYANATE OF SILVER. *Prep.* Add dilute hydrocyanic acid to a solution of nitrate of silver, as long as a precipitate falls; wash this with distilled water, and dry it.

Prop., &c. Cyanide of silver is a white powder, soluble in ammonia, and decomposed by contact with vegetable substances; light turns it violet-coloured.—*Dose.* $\frac{1}{10}$ to $\frac{1}{5}$ gr.; in syphilis, &c. It has been proposed as a source of hydrocyanic acid. (Everitt.)

Silver Hyposul'phite of. $Ag_2S_2O_3$. *Syn.* ARGENTI HYPOSULPHIS, L. A white substance, insoluble in water, and very prone to decomposition. It is very soluble in the alkaline hyposulphites, forming compounds possessing an intensely sweet taste. See HYPOSULPHUROUS ACID.

Silver, I'odide of. AgI. *Syn.* ARGENTIC IODIDE; ARGENTI IODIDUM, L. *Prep.* Precipitate a solution of nitrate of silver with another of iodide of potassium; wash the precipitate with distilled water, and dry it in the shade. Pale greenish-yellow; insoluble in water and in liquor of ammonia; soluble in a solution of hyposulphite of soda. *Used* in some of the French hospitals in the stomach affections of scrofulous subjects; also in epilepsy.—*Dose.* $\frac{1}{12}$ to 1 gr.

Silver, Ni'trate of. $AgNO_3$. *Syn.* ARGENTI NITRAS, L. This article is found in commerce under two forms:—

1. CRYSTALLISED. *Prep.* By dissolving grain silver in nitric acid diluted with about twice its weight of water, evaporating the solution until it is strong enough to crystallise on cooling, and then allowing it to cool very slowly. Colourless; transparent, anhydrous, rhombic prisms or tables; soluble in an equal weight of cold and in half their weight of boiling water; soluble in alcohol; fuse when heated, and at a higher temperature suffer decomposition; blackened by light, and by contact with organic substances. Its solution in distilled water is not sensibly darkened by light, in the absence of organic matter. *Used* for solutions, and in photography.

2. FUSED (LUNAR CAUSTIC; ARGENTI NITRAS—B. P., Ph. L. & E., A. N. FUSUM—Ph. D.). *Prep.* (Ph. D.) Refined silver, 3 oz.; pure nitric acid, 2 fl. oz.; distilled water, 5 fl. oz.; mix in a glass flask, and apply a gentle heat until the metal is dissolved; transfer the solution to a porcelain capsule (or a large porcelain

vented by Dr. Arnott, will be found entirely successful, and most economical. Its general introduction would be a great advance in both domestic and public hygiene; and, being hence of national importance, should be enforced by law.

SMO″KING. This is done, on the large scale, by hanging up the articles (previously more or less salted) in smoking rooms, into which smoke is very slowly admitted from smothered dry-wood fires, kindled in the cellar, for the purpose of allowing it to cool and deposit its cruder part before it arrives at the meat. This process requires from six days to as many weeks to perform it properly, and is best done in winter. In farm-houses, where dry wood is burnt, hams, &c., are often smoked by hanging them up in some cool part of the kitchen chimney. When the meat is cut into slices, or scored deeply with a knife, to allow the smoke to penetrate it, it is called 'BUCANING.'

"The quality of the wood has an influence upon the smell and taste of the smoke-dried meat; smoke from beech wood and oak being preferable to that from fir and larch. Smoke from the twigs and berries of juniper, from rosemary, peppermint, &c., impart somewhat of the aromatic flavour of these plants." (Ure.) The occasional addition of a few cloves or all-spice to the fuel gives a very agreeable flavour to the meat.

Hung beef, a highly esteemed variety of smoked beef, is prepared from any part, free from bone and fat, by well salting and pressing it, and then drying and smoking it in the usual manner. It is best eaten shredded. See PUTREFACTION, SALTING, &c.

SNAKE-ROOT. See SENEGA. For 'Virginian snake-root' see SERPENTARY. Snake-weed (*Bistortæ radix*) is the root of *Polygonum Bistorta* (Linn.).

SNIPE. The *Scolopax Gallinago*, a well-known bird indigenous to this country. It is fine flavoured, but rather indigestible.

SNUFF. *Syn.* PULVIS TABACI, L.; TABAC EN POUDRE, Fr. A powder, prepared from tobacco, for the purpose of being sniffed up the nose as a stimulant or intoxicant.

The finer kinds of snuff are made from the soft portions of the best description of manufactured leaf-tobacco, separated from the damaged portion; but the ordinary snuffs of the shops are mostly prepared from the coarser and damaged portions, the mid-ribs, stems, or stalky parts, that remain from the manufacture of 'shag tobacco,' the dust or powder sifted from the bales, and the fragments that are unfit for other purposes.

Prep. The proper material being chosen, and if not in a sufficiently mature state rendered so by further fermentation, they are sufficiently dried by a gentle heat or exposure to the air to admit of being pulverised. This is performed, on the large scale, in a mill, and on the small scale, with a kind of pestle and mortar. During the operation the tobacco is frequently sifted, that it may not be reduced to too fine a powder, and is several times slightly moistened with rose or orange-flower water, or eau d'ange, which are the only liquids fit for the superior kinds of snuff. In preparing the dry snuffs, no moisture is used. The scent or other like matters are next added, and, after thorough admixture, the snuff is packed in jars or canisters.

Adult. During the grinding of tobacco it is frequently mixed with dark-coloured rotten wood, various English leaves, colouring, and other matter. Ammonia, hellebore, euphorbium, and powdered glass, are common additions to snuffs to increase their pungency. We have seen powdered sal ammoniac sent by the hundredweight at one time to a certain celebrated London tobacconist. The moist kinds of snuff are generally drugged with pearlash, for the triple purpose of keeping them damp and increasing their pungency and colour. The dry snuffs, especially 'Scotch' and 'Welsh,' are commonly adulterated with quicklime, the particles of which may be occasionally distinguished even by the naked eye. This addition causes their biting and desiccating effect on the pituitary membrane. "We were once severely injured by taking snuff which, after our suspicions were awakened, we found to contain a mixture of red lead and umber." (Cooley.)

Var. Snuffs are divided into two kinds—DRY SNUFFS, as 'Scotch,' 'Irish,' 'Welsh,' and 'Spanish snuff,' 'Lundyfoot,' &c.; and—MOIST SNUFFS, or RAPPEES, including 'black' and 'brown rappee,' 'carotte,' 'Cuba,' 'Hardham's mixture,' 'prince's mixture,' 'princeza,' 'queen's snuff,' &c. The last three also come under the denomination of SCENTED SNUFFS.

The immense variety of snuffs kept in the shops, independently of the above-named conditions, depend for their distinguishing characteristics on the length of the fermentation, the fineness of the powder, the height to which they are dried, and the addition of odorous substances. Tonquin beans, essence of tonquin bean, ambergris, musk, civet, leaves of orchis fusca, root and oil of calamus aromaticus, powder and essence of orris root, and the essences or oils of bergamot, cedra, cloves, lavender, petit grain, neroli, and roses (otto), as well as several others, either alone or compounded, are thus employed. TABAC PARFUMÉE AUX FLEURS is perfumed by putting orange flowers, jasmins, tuberoses, musk roses, or common roses, to the snuff in a close chest or jar, sifting them out after 24 hours, and repeating the treatment with fresh flowers, as necessary. Another way is to lay paper, pricked all over with a large pin, between the flowers and the snuff.

MACOUBA SNUFF is imitated by moistening the tobacco with a mixture of treacle and water, and allowing it to ferment well.

SPANISH SNUFF is made from unsifted 'Havannah snuff,' reduced by adding ground

Spanish nutshells, sprinkling the mixture with treacle water, and allowing it to sweat for some days before packing.

YELLOW SNUFF is prepared from ordinary pale snuff moistened with a mixture of yellow ochre diffused in water, to which a few spoonfuls of thin mucilage have been added; when dry, the colour that does not adhere to the snuff is separated with a fine sieve.

RED SNUFF. As last, but using red ochre.

Snuff, Asarabac'ca. *Syn.* CEPHALIC SNUFF, COMPOUND POWDER OF ASARABACCA; PULVIS ASARI COMPOSITUS, L. *Prep.* 1. (Ph. D. 1826.) Asarabacca leaves, 1 oz.; lavender flowers, 1 dr.; (both dried;) mix and powder them.

2. (Ph. E. 1817.) Asarabacca leaves, 3 drs.; leaves of marjoram and flowers of lavender, of each, 1 dr.; as before. Both are used as errhines in headaches and ophthalmia. See CEPHALIC SNUFF, ASARABACCA, &c.

Snuff, Chephal'ic. *Prep.* 1. From asarabacca leaves and Lundyfoot snuff, of each, 2 oz.; lavender flowers, ½ oz.; essence of bergamotte and oil of cloves, of each, 2 or 3 drops; mixed and ground to a powder, the perfume being added last.

2. (Boeli's.) From tobacco or pure snuff and valerian root, of each, ½ oz.; reduced to powder, and scented with the oils of lavender and marjoram, of each, 5 or 6 drops.

Obs. The first formula is an excellent one; and the product is very useful in nervous headaches, dimness of sight, &c. See ASARABACCA SNUFF (*above*).

Snuff, Eye. *Prep.* From finely levigated tribasic sulphate of mercury ('Turpeth mineral'), ½ dr.; pure dry Scotch or Lundyfoot snuff, 1 oz.; triturate them well together. A pinch of this, occasionally, has been recommended in inflammation of the eyes, dimness of sight, headache, polypus, &c.; but it should be used with caution, and not too often.

SOAP. *Syn.* SAPO, L.; SAVON, Fr. SPANISH, CASTILE, or HARD SOAP, made with olive oil and soda (SAPO, SAPO EX OLIVÆ OLEO ET SODÂ CONFECTUS—Ph. L.; SAPO DURUS—B. P., Ph. E. & D.), and SOFT SOAP, made with olive oil and potash (SAPO MOLLIS—B. P., Ph. L. & E., SAPO EX OLIVÆ OLEO ET POTASSÂ CONFECTUS—Ph. L.), are the only kinds directed to be employed in medicine. The former is intended whenever 'soap' is ordered, and is the one which is principally employed internally; the latter is used in ointments, &c., and in some of the officinal pills.

Prep. The fatty or oleaginous matter is boiled with a weak alkaline lye (soap-lye) rendered caustic by quicklime, and portions of stronger lye are added from time to time, the ebullition being still continued, until these substances, reacting on each other, combine to form a tenacious compound, which begins to separate from the water; to promote this separation and the granulation of the newly formed soap, some common salt is generally added, and the fire being withdrawn, the contents of the boiler are allowed to repose for some hours, in order that the soap may collect into one stratum, and solidify; when this happens it is put into wooden frames or moulds, and when it has become stiff enough to be handled it is cut into bars or pieces, and exposed to the air, in a warm situation, to further harden and to dry.

Var. The principal varieties of soap found in commerce are:—

ALMOND SOAP (SAPO AMYGDALINUS), made from almond oil and caustic soda, and chiefly used for the toilet.

CASTILE SOAP, SPANISH S., MARSEILLES S.; SAPO CASTILIENSIS, SAPO HISPANICUS. A olive-oil soda soap, kept both in the white and marbled state. The former is said to be the purest; the latter, the strongest.

CURD SOAP, made with tallow (chiefly) and soda.

MEDICATED SOAPS, containing various active ingredients. The chief of these are noticed *below*.

MOTTLED SOAP, made with refuse kitchen stuff, &c.

SOFT SOAP (of commerce), made with whale, seal, or cod oil, tallow, and caustic potash.

TOILET SOAPS, prepared from any of the preceding varieties, and variously coloured and scented. Formulæ are given *below*.

YELLOW SOAP, RESIN SOAP, made with tallow, resin, and caustic soda. Soluble glass is now largely employed in place of resin.

Soaps are also divided into SOFT or POTASH SOAPS and HARD or SODA SOAPS.

Assay. 1. For the WATER. A piece, fairly taken from the sample, and weighing 100 grs., is reduced to thin shavings, which are dried by the heat of boiling water, until they cease to lose weight. The loss indicates the proportion of free water. This should not exceed 35% for ordinary curd and mottled soap, 40% for yellow soap, and about 15 to 16% for Castile soap.

2. For the ALKALI. 100 grs. of the soap are dissolved in 4 or 5 fl. oz. of boiling water, and the solution tested by the common method of alkalimetry. Curd and yellow soap usually contain from 6 to 7%, mottled soap from 7 to 8%, and Castile soap 8 to 9% of soda.

3. For the OIL or FAT. The solution tested for alkali (see No. 2) is heated, and then allowed to cool slowly; when cold, the floating fatty matter is removed, freed from water, and weighed. When the fat or oil has little consistence, 100 grs. of pure white wax is added to the soap solution, before heating it. The weight obtained, in grains in the one case, and the excess above 100 grs. in the other, give the proportion of oil or fat present. This, in ordinary mottled soap, should be about 60 grs.; in yellow soap, 65%; in curd soap, 60%; and in Castile soap, 75%.

4. UNSAPONIFIED FATTY MATTER.—*a*. Pure soap is entirely soluble in distilled water and insoluble in saline solution; if a film of fatty matter forms on its solution in the former, after repose, that portion has not been saponified.

b. The fat separated from soap (see No. 2), when it has been perfectly saponified, is entirely soluble in alcohol.

5. OTHER IMPURITIES. Pure soap is soluble in rectified spirit, forming a colourless or nearly colourless solution. The undissolved portion, if exceeding 1%, is adulteration.

Uses, &c. The common uses of soap need not be enumerated. As a medicine, it acts as a mild purgative and lithontriptic, and it has been thought by some to be useful in certain affections of the stomach arising from deficiency of bile. *Externally*, it is stimulant and detergent.—*Dose.* 3 to 20 or 30 grs., made into pills, and usually combined with aloes or rhubarb.

Concluding remarks. Prior to the researches of Chevreul, no correct ideas were entertained as to the constitution of soap. It was long known that the fixed oils and fats, in contact with caustic alkaline solutions at a high temperature, undergo the remarkable change which is called saponification; but here the knowledge of the matter stopped. Chevreul discovered that if the soap, so produced, be afterwards decomposed by the addition of an acid, the fat which separates is found to be completely changed in character; to have acquired a strong acid reaction when applied in a melted state to test paper, and to have become soluble with the greatest facility in warm alcohol; in other words—that a new substance, capable of forming salts, and exhibiting all the characteristic properties of an acid, has been generated out of the elements of the neutral fat under the influence of the base. Stearin, when thus treated, yields stearic acid, palmatin gives palmatic acid, olein gives oleic acid, and common animal fat, which is a mixture of several neutral bodies, affords, by saponification by an alkali and subsequent decomposition of the soap, a mixture of the corresponding fatty acids. These bodies are not, however, the only products of saponification; the change is always accompanied by the formation of a very peculiar sweet substance, called glycerin, which remains in the mother-liquor from which the acidified fat has been separated. The process of saponification itself proceeds with perfect facility, even in a closed vessel; no gas is disengaged; the neutral fat, of whatsoever kind, is simply resolved into an alkaline salt of the fatty acid, which is soap, and into glycerin, a neutral body resembling syrup, and, like that liquid, miscible with water in every proportion.

"When yellow soap is made with the cheaper kinds of fat, it will hardly acquire a sufficient degree of firmness or hardness to satisfy the thrifty washerwoman. It melts away too rapidly in hot water, a defect which may be well remedied by the introduction into the soap of a little (1-20th) fused sulphate of soda; and this salt concreting, gives the soap a desirable hardness, whilst it improves its colour, and renders it a more desirable article for the washing tub." (Ure.) This process was patented by Dr. Normandy, but soon proved a source of annoyance and molestation to him on the part of the Board of Excise, it being an enormous crime in law to attempt to improve and cheapen soap.

"Soda which contains sulphurets is preferred for making mottled or marbled soap, whereas the desulphuretted soda makes the best white curd soap." "The Barillas always contain a small proportion of potash, to which their peculiar value, in making a less brittle or more plastic hard soap than the factitious sodas, may, with great probability, be ascribed." (Ure.)

The mottled appearance is usually given, in the London Soap-works, by watering the nearly finished soap with a strong lye of crude soda, by means of a watering can furnished with a rose spout. For 'Castile soap,' a solution of sulphate of iron is so employed. See SOAPS (Medicated and Toilet).

Soap, Arsen'ical. *Syn.* SAPO ARSENICALIS, L. *Prep.* (Bécœurs.) From carbonate of potash, 12 oz.; white arsenic, white soap, and air-slaked lime, of each 4 oz.; powdered camphor, 4 oz.; made into a paste with water, q. s. *Used* to preserve the skins of birds, and other small animals.

Soap, Black. *Syn.* SAPO NIGER, S. MOLLIS COMMUNIS, L. A crude soft soap, made of fish oil and potash; but the following mixture is usually sold for it:—soft soap, 7 lbs.; train oil, 1 lb.; water, 2 gall.; boil to a proper consistence, adding ivory black or powdered charcoal, q. s. to colour. *Used* by farriers.

SOAPS (Medicated). A few only of these deserve notice here:—

Soap, Antimo'nial. *Syn.* SAPO ANTIMONIALIS, SAPO STIBIATUS, L. *Prep.* (Hamb. Cod. 1845.) Golden sulphuret of antimony, 2 drs.; solution of caustic potassa, 6 drs. (or q. s.); dissolve and triturate the solution with medicated (Castile) soap (in powder), 1½ oz., until the mass assumes a pilular consistence. It should be of a grayish-white colour.

Soap, Chlorina'ted. *Syn.* SAPO CALCIS CHLORINATÆ, L.; SAVON ANTISYPHILITIQUE, Fr. *Prep.* From Castile soap (in powder), 11 oz.; chloride of lime (dry and good), 1 oz.; mix, beat them to a mass with rectified spirit, q. s.; (holding in solution) oil of verbena or of ginger grass, ½ oz.; lastly, form the mass into flat tablets, and wrap these in thin sheet gutta percha. A most excellent detergent and stimulant soap in various affections, admirably adapted for hospital use, and for removing

stains from the skin and rendering it white. It is the most powerful known agent against infection from contagious diseases communicable by contact.

Soap, Cro'ton. *Syn.* SAPO CROTONIS, L. *Prep.* From croton oil and liquor of potassa, equal parts; triturated together in a warm mortar until they combine. Cathartic.—*Dose.* 1 to 3 grs.

Soap of Gua'iacum. *Syn.* SAPO GUAIACI, SAPO GUAIACINUS, L. *Prep.* (Ph. Bor.) Liquor of potassa, 1 oz.; water, 2 oz.; mix in a porcelain capsule, apply heat, and gradually add of resin of guaiacum (in powder), 6 drs., or as much as it will dissolve; next decant or filter, and evaporate to a pilular consistence. —*Dose.* 10 to 30 grs.; in chronic rheumatism, various skin diseases, &c.

Soap, I'odine. *Syn.* SAPO IODURATUS, L. *Prep.* From Castile soap (sliced), 1 lb.; iodide of potassium, 1 oz.; (dissolved in) water, 3 fl. oz.; melt them together in a glass or porcelain vessel, over a water bath. Excellent in various skin diseases; also as a common soap for scrofulous subjects.

Soap of Jal'ap. See page 663.

Soap, Macquer's Acid. *Syn.* SAPO VITRIOLICUS, L. *Prep.* From Castile soap, 4 oz., softened by heat and a little water, and then continually triturated in a mortar with oil of vitriol (added drop by drop). Detergent. *Used* where alkalies would be prejudicial.

Soap, Mercu"rial. *Syn.* SAPO MERCURIALIS, L. *Prep.* 1. (SAPO SUBLIMATIS CORROSIVI.) From Castile soap (in powder) 4 oz.; corrosive sublimate, 1 dr.; (dissolved in) rectified spirit, 1 fl. oz.; beaten to a uniform mass in a porcelain or wedgwood-ware mortar.

2. (SAPO HYDRARGYRI PRECIPITATI RUBRI —Sir H. Marsh.) From white Windsor soap, 2 oz.; nitric oxide of mercury (levigated), 1 dr.; otto of roses, 6 or 8 drops; (dissolved in) rectified spirit, 1 to 2 fl. drs.; as the last. Both the above are employed as stimulant detergents and repellants, in various skin diseases; also as SAVON ANTISYPHILITIQUE.

Soap, Sul'phuretted. *Syn.* SAPO SULPHURIS, SAPO SULPHURATUS, L. *Prep.* (Sir H. Marsh.) From white soap, 2 oz.; sublimed sulphur, ½ oz.; beaten to a smooth paste in a marble mortar with 1 or 2 fl. drs. of rectified spirit strongly coloured with alkanet root, and holding in solution otto of roses, 10 or 12 drops. In itch and various other cutaneous diseases.

Soap, Tar. *Syn.* SAPO PICIS LIQUIDÆ, SAPO PICEUS, L. *Prep.* From tar, 1 part; liquor of potassa and soap (in shavings), of each, 2 parts; beat them together until they unite. Stimulant. *Used* in psoriasis, lepra, &c.

Soap, Tur'pentine. *Syn.* STARKEY'S SOAP; SAPO TEREBINTHINÆ, S. TEREBINTHINATUS, L.; SAVON TÉRÉBINTHINE, Fr. *Prep.* (P. Cod.) Subcarbonate of potash, oil of turpentine, and Venice turpentine, equal parts; triturate them together, in a warm mortar, with little water, until they combine; put the product into paper moulds, and in a few days slice it, and preserve it in a well-stopped bottle.

SOAPS (Toilet). Of Toilet soaps there are two principal varieties:—

1. (HARD.) The basis of these is, generally, a mixture of suet, 9 parts, and olive oil, 1 part, saponified by caustic soda; the product is variously scented and coloured. They are also made of white tallow, olive, almond, and palm-oil soaps, either alone or combined in various proportions, and scented.

2. (SOFT.) The basis of these is a soap made of hog's lard and potash, variously scented and coloured.

On the small scale, the perfume is generally added to the soap melted in a bright copper pan by the heat of a water bath; on the large scale, it is mixed with the liquid soap, at the soap-maker's, before the latter is poured into the frames.

The following are examples of a few of the leading toilet soaps:[1]—

Soap, Bitter-al'mond. *Syn.* SAVON D'AMANDE, Fr. *Prep.* From white tallow soap, 56 lbs.; essential oil of almonds, ½ lb.; as before.

Savon au Bouquet. [Fr.] *Prep.* From tallow soap, 30 lbs.; olive-oil soap, 10 lbs.; essence of bergamot, 4 oz.; oils of cloves, sassafras, and thyme, of each, 1 oz.; pure neroli, ½ oz.; brown ochre (finely powdered), ½ lb.; mixed as the last.

Soap, Cin'namon. *Prep.* From tallow soap, 14 lbs.; palm-oil soap, 7 lbs.; oil of cinnamon (cassia), 3 oz.; oil of sassafras and essence of bergamot, of each, ½ oz.; levigated yellow ochre, ½ lb.

Soap, Float'ing. *Prep.* From good oil soap, 14 lbs.; water, 3 pints; melted together by the heat of a steam or water bath, and assiduously beaten until the mixture has at least doubled its volume, when it must be put into the frames, cooled, and cut into pieces. Any scent may be added.

Soap, Hon'ey. *Prep.* 1. From palm-oil soap and olive-oil soap, of each, 1 part; curd soap, 3 parts; melted together and scented with the oil of verbena, rose-geranium, or ginger-grass.

2. From the finest bright-coloured yellow soap, scented with the oils of ginger-grass and bergamot.

Soap, Musk. As CINNAMON SOAP, but with essence of musk, supported with a little essence of bergamot and oil of cloves, as perfume, and burnt sugar, to colour.

Soap, Naples. From olive oil and potash.

Soap, Orange-flower. As SAVON À LA ROSE, with oil of neroli or essence de petit grain, supported with a little of the essences of ambergris and Portugal, for perfume.

Soap, Palm-oil. *Syn.* VIOLET SOAP. Made of palm oil and caustic soda lye. It has a pleasant odour of violets and a lively colour.

Soap, Pearl. *Syn.* ALMOND CREAM; CRÈME

[1] See also SAVONETTES.

D'AMANDES, Fr. *Prep.* From a soap made of lard and caustic potash lye; when quite cold, it is beaten in small portions at a time in a marble mortar, until it unites to form a homogeneous mass, or 'pearls,' as it is called; essence of bitter almonds, q. s., to perfume, being added during the pounding.

Savon à la Rose. [Fr.] *Prep.* From a mixture of olive-oil soap, 36 lbs.; best tallow soap, 24 lbs.; (both new and in shavings;) water, 1 quart; melted in a covered bright copper pan, by the heat of a water bath, then coloured with vermilion (finely levigated), 2½ oz.; and, after the mixture has cooled a little, scented with otto of roses, 3 oz.; essence of bergamot, 2½ oz.; oils of cloves and cinnamon, of each, 1 oz.

Soap, Sha''ving. See PASTE (Shaving).

Soap, Transpa''rent. *Prep.* From perfectly dry almond, tallow, or soft soap, reduced to shavings, and dissolved, in a closed vessel or still, in an equal weight of rectified spirit, the clear portion, after a few hours' repose, being poured into moulds or frames; after a few weeks' exposure to a dry atmosphere, the pieces are 'trimmed up' and stamped, as desired. It may be scented and coloured, at will, by adding the ingredients to it while in the soft state. A rose colour is given by tincture of archil; and yellow, by tincture of turmeric or annotta. It does not lather well.

Soap, Windsor. *Syn.* SAPO VINDESORÆ, S. VINDESORIENSIS, L. *Prep.* 1. (WHITE; S. V. ALBUS.) The best 'English' is made of a mixture of olive oil, 1 part, and ox tallow or suet, 9 parts, saponified by caustic soda. 'French Windsor-soap' is made of hog's lard, with the addition of a little palm oil. That of the shops is merely ordinary curd soap, scented with oil of caraway, supported with a little oil of bergamot, lavender, or origanum. To the finer qualities a little of the essences of musk and ambergris is occasionally added. 1½ lb. of the mixed scents is the common proportion per cwt.

2. (BROWN; S. V. FUSCUS.) This merely differs from the last in being coloured with burnt sugar, or (less frequently) with umber. Originally, it was the white variety, that had become mellow and brown with age.

SO'DA. See SODIUM.

SO'DIUM. Na. *Syn.* NATRIUM. The metallic base of soda. It was first obtained by Sir H. Davy, in 1807, by means of a powerful galvanic battery; but it may be more conveniently and cheaply procured, in quantity, by the method described under POTASSIUM. The process, when well conducted, is, however, much easier and more certain than that for the last-named metal.

Prep. The anhydrous carbonate of sodium, 6 parts, is dissolved in a little water, and the solution mixed with charcoal in fine powder, 2 parts, and charcoal in small lumps, 1 part; the whole is then evaporated to dryness, transferred to an iron retort, and treated in the manner described page 961.

Obs. Very important improvements ha been made in the manufacture of this metal Deville, consisting partly in the simplificati of the receiver, and partly in the addition carbonate of calcium to the mixture, which dition appears to facilitate the reduction the sodium in a most remarkable manner.

Prop., &c. Sodium is a soft silver-wh metal, scarcely solid at common temperatur fuses at 194° Fahr., and volatilises at a heat; it oxidises very rapidly in the air; wl placed on the surface of cold water, it deco poses that liquid with great violence, generally without flame, in which it diff from potassium; on hot water it burns witl bright yellow flame—in both cases a soluti of pure soda being formed. Sp. gr. ·972; i more malleable than any other metal, and m be easily reduced into very thin leaves (Ur its other properties resemble those of pot sium, but are of a feebler character. W oxygen it forms two oxides; with chlorine chloride (common salt); and—with brom iodine, fluorine, &c., bromide, iodide, fluor &c., all of which may be obtained by sim processes to the respective compounds of tassium, which, for the most part, resemble.

Uses. Until recently, sodium has beer garded as a mere mechanical or philosopl curiosity; it has now, however, become great practical importance, from being ployed in the manufacture of the metals alu nium, magnesium, &c.

Tests. Sodium salts are recognised by t solubility in water, and by their giving a cipitate with none of the ordinary reage They give a rich yellow colour to the col less Bunsen or the pale blue blowpipe fl They can, to a certain extent, be also dis guished from potassium salts by the carbo being an easily crystallisable salt, efferves in dry air; the carbonate of potassium b crystallised with difficulty, and deliquesc Platinum chloride does not give a precipi with sodium chloride; neither does picric a perchlorate of ammonium, nor tartaric aci

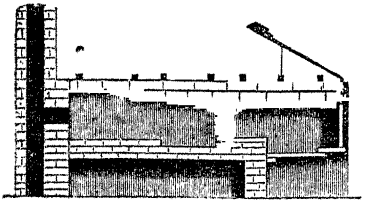
Sodium, Acetate of. $NaC_2H_3O_2$. *Syn.* TATE OF SODA; SODÆ ACETAS (B. P., Ph. D. Prepared from carbonate of sodium as the responding potassium salt; but the resul solution is evaporated to a pellicle, and aside to crystallise. Its crystals are stri oblique rhombic prisms; it effloresces slig in the air, and is soluble in 4 parts of wat 60° Fahr. Diuretic.—*Dose.* 20 to 40 grs.

Sodium, Arseniates of. These salts are and their properties and doses are the sam the corresponding potassium salts.

Sodium, Carbonate of. $Na_2CO_3.10Aq.$ CARBONATE OF SODA, MONO-CARBONATE SODA, SUBCARBONATE OF S.†, SALT OF BARIL SODÆ CARBONAS (B. P., Ph. L. E. & D. The carbonate of sodium of commerce (W.

ING SODA) was formerly prepared from the ashes of seaweed, and other marine vegetables, in a somewhat similar manner to that by which carbonate of potassium is obtained; but it is now usually obtained from chloride of sodium, by the action of heat, sulphuric acid, and carbonaceous matter.

Prep. (From common salt or sulphate of sodium.) The latter is generally obtained by decomposing the former with sulphuric acid, the evolved gas being passed into water, or through flues filled with coke, over which a very small stream of cold water constantly flows, by which it is condensed, and forms 'LIQUID HYDROCHLORIC ACID,' a substance afterwards consumed, in large quantities, in the manufacture of chloride of lime, and for other purposes. The sulphate of sodium, obtained from this or any other source, is well mixed with an equal weight of chalk or lime-



Scotch Soda Furnace.

stone, and about half its weight of small coal, each being previously ground to powder, and the mixture is exposed to a strong heat in a 'reverbatory furnace' (see *engr.*) until the decomposition of the sulphate is complete, the mass during the calcination being frequently stirred about with a long iron rod; the semi-liquid is now raked into an iron trough, where it is allowed to cool, whilst the furnace is re-charged with fresh materials. The crude dark-gray product, thus obtained, is known as 'ball alkali,' or 'British barilla,' and usually contains about 22 or 23% of pure hydrate of sodium. This is now lixiviated with tepid water, and the solution, after defecation, evaporated to dryness; the residuum is mixed with a certain quantity of sawdust, coal-dust, or charcoal, and roasted in a reverberatory furnace, at a heat not exceeding 700° Fahr., until all the sulphur is expelled. The product is the 'soda-ash,' 'soda salt,' or 'British alkali,' of commerce, and contains about 50% of pure sodium, partly in the state of carbonate, and partly as hydrate, the remainder being chiefly sulphate of sodium and common salt. When this is purified by solution in water, defecation, evaporation, and crystallisation, it furnishes commercial crystallised carbonate of soda. When this last is redissolved, and the filtered solution is carefully crystallised, it constitutes the ordinary carbonate of sodium used in pharmacy and medicine.

When it is required anhydrous (SODÆ CARBONAS EXSICCATA, B. P., Ph. L.; SODÆ CARBONAS SICCATUM, Ph. E. & D.), the crystallised carbonate is heated to redness, and, when cold, powdered.

Prop., &c. Carbonate of sodium forms large, transparent, oblique rhombic prisms, which, as ordinarily met with, and of the formulæ $Na_2CO_3 . 10Aq$; but by particular management may be had with fifteen, nine, seven, or sometimes with only one molecule of water of crystallisation (Fownes); it is soluble in twice its weight of water at 60°, and less than an equal weight at 212° Fahr. As a medicine, it is deobstruent and antacid, and is given in *doses* of 10 to 30 grs. It is also, occasionally, used to make effervescing draughts. When taken in an overdose, it is poisonous. The antidotes are the same as for carbonate of potassium. The crude carbonate is largely employed in the manufacture of soap, glass, &c.

53 grs. of the dried carbonate are equal to 143 of the crystallised salt. The medicinal properties of both are similar. It has, however, the disadvantage of being difficultly soluble in water.

The ordinary carbonate of sodium generally contains either sulphates or chlorides, or both; and these may be detected as under CARBONATE OF POTASSIUM. "When supersaturated with nitric acid, it precipitates only slightly or not at all, chloride of barium or nitrate of silver; and 143 grs. require at least 960 grain-measures of solution of oxalic acid" (B. P.). At a high temperature, 100 grs. lose 62-5 grs. of water.

Sodium, Sesquicarbonate of. $Na_4H_2(CO_3)_3$. A salt found native on the banks of the soda lakes of Sotrena, in Africa, whence it is exported as "Trona."

Sodium, Bicarbonate of. $NaHCO_3$. *Syn.* SESQUICARBONATE OF SODA, SODÆ BICARBONAS (B. P., Ph. L. E. & D.). This salt can be prepared in exactly the same manner as the corresponding salt of potassium. Another method is as follows:—Take of crystallised carbonate of sodium, 1 part; dried carbonate of sodium, 2 parts; (both in powder;) triturate them well together, and surround them with an atmosphere of carbonic acid gas, under pressure; let the action go on until no more gas is absorbed, which will generally occupy 10 to 14 hours, according to the pressure employed), then remove the salt, and dry it at a heat not above 120° Fahr.

Prop., &c. A crystalline white powder; it is soluble in 10 parts of water at 60° Fahr., but it cannot be dissolved in even warm water without partial decomposition; it is more pleasant tasted and more feebly alkaline than the carbonate of the same base. When absolutely pure, it does not darken turmeric paper, or only very slightly. The dose is from 10 to 40 grains, as an antacid and absorbent. It is much employed in the preparation of effer-

Fahr., but at a higher temperature its solubility rapidly lessens; insoluble in alcohol; fuses when heated. It is seldom wilfully adulterated. When pure, the solution is neutral to test paper; nitrate of silver throws down scarcely anything from a dilute solution; nitrate of baryta more, which is not dissolved by nitric acid. It loses 55·5% of its weight by a strong heat.

Uses. It is purgative, but, being extremely bitter-tasted, is now less frequently used than formerly. Its nauseous flavour is said to be covered by lemon juice.—*Dose.* ½ to 1 oz. The dried salt (SODÆ SULPHAS EXSICCATA) is twice as strong. LYMINGTON GLAUBER'S SALT is a mixture of the sulphates of soda and potassa obtained from the mother-liquor of sea-salt.

Sodium, Sul'phide of. *Prep.* (P. Cod.) Saturate a solution of caustic soda (sp. gr. 1·200) with sulphuretted hydrogen, closely cover up the vessel, and set it aside that crystals may form; drain, press them in bibulous paper, and at once preserve them in a well-closed bottle. *Used* to make mineral waters, and in certain skin diseases.

The anhydrous sulphides resembles closely and are prepared in the same manner as the potassium sulphides.

Sodium, Tartrate of, and Potassium. $KNaC_4H_4O_6.4Aq$. *Syn.* TARTRATE OF POTASSA AND SODA, ROCHELLE SALT, SEIGNETTE'S S., TARTARISED SODA†; SODÆ TARTARATA (B. P.), SODÆ POTASSIO-TARTRAS (Ph. L.), SODÆ ET POTASSÆ TARTRAS (Ph. E. & D.), SODA TARTARIZATA†, L. *Prep.* (Ph. L. 1836.) Take of carbonate of sodium, 12 oz.; boiling water, 2 quarts; dissolve, and add, gradually, of powdered bitartrate of potassium, 16 oz. (or q. s.); strain, evaporate to a pellicle, and set it aside to crystallise; dry the resulting crystals, and evaporate the mother-liquor that it may yield more of them. The formulæ of the other Colleges are nearly similar.

Prop., &c. Large, transparent, hard, right rhombic prisms, often occurring in halves; slightly efflorescent; soluble in 5 parts of water at 60° Fahr. Its "solution neither changes the colour of litmus nor of turmeric. On the addition of sulphuric acid, bitartrate of potassium is thrown down; on adding either nitrate of silver or chloride of barium nothing is thrown down, or only what is redissolved by the addition of water." (Ph. L.) By heat it yields a mixture of the pure carbonates of potassium and sodium.

Potassio-tartrate of sodium is a mild and cooling laxative.—*Dose.* ½ to 1 oz., largely diluted with water. It forms the basis of the popular aperient called SEIDLITZ POWDERS.

Sodium, Vale"rianate of. $NaC_5H_9O_2$. *Syn.* SODÆ VALERIANAS (Ph. D.), L. *Prep.* (Ph. D.) Dilute oil of vitriol, 6½ fl. oz., with water, ½ pint; then dissolve of powdered bichromate of potassium, 9 oz., with the aid of heat, in water, 3½ pints; when both solutions have cooled, put them into a matrass, and having added of fusel oil (alcohol amylicum—Ph. D.), 4 fl. oz., shake them together repeatedly until the temperature, which first rises to 150°, has fallen to 80° or 90° Fahr.; a condenser being connected, next apply heat so as to distil over about 4 pints of liquid; saturate this exactly with a pint, or q. s., of solution of caustic soda, separate the liquid from the oil which floats upon the surface, and evaporate it until the residual salt is partially liquefied; the heat being now withdrawn, and the salt concreted, this last, whilst still warm, is to be divided into fragments, and preserved in well-stopped bottles.

Obs. This salt is intended to be used in the preparation of the VALERIANATES OF IRON, QUININE, and ZINC.

SOILS. These are classified by agriculturists according to their chief ingredients; as loamy, clayey, sandy, chalky, and peaty soils. Of these the first is the best for most purposes, but the others may be improved by the addition of the mineral constituents of which they are deficient. Sand and lime or chalk are the proper additions to clayey soils, and clay, gypsum, or loam, to sandy and gravelly ones. Clayey soils are expensive to bring into a fertile state; but when this is once effected, and they are well manured, they yield immense crops of wheat, oats, beans, clover, and most fruits and flowers of the rosaceous kinds.

The fertilisation of soils is suggested partly by chemical analysis, practical experience, and geological observations. In cases where a barren soil is examined with a view to its improvement, it is, when possible, compared with an extremely fertile soil in the same neighbourhood, and in a similar situation; the difference given by their analyses indicates the nature of the manure required, and the most judicious methods of cultivation; and thus a plan of improvement is suggested, founded upon scientific principles.

The analysis of soils may be briefly and generally described as follows:—

1. The general character of the soil, as loamy, sandy, stoney, rather stoney, &c., being noted, 3 or 4 lbs. of it, fairly selected as an average specimen, may be taken during a period of ordinary dry weather. From this, after crushing or bruising the lumps with a piece of wood, all stones of a larger size than that of a filbert may be picked out, and their proportion to the whole quantity duly registered.

2. 1000 grs. of the remainder may be next dried by the heat of boiling water, until the mass ceases to lose weight; and, afterwards, exposed to a moist atmosphere for some time. The loss of weight in the first case, and the increase of weight in the second, indicate the absorbent powers of the soil.

3. The matter from No. 2, freed from siliceous stones by garbling, may be gradually heated to dull redness in a shallow open vessel,

avoiding waste from decrepitation, &c. The loss of weight, divided by 10, gives the percentage quantity of vegetable or organic matter present (nearly).

4. Another 1000 grs. (see No. 1) may be next washed with successive portions of cold water as long as anything is removed. The residuum, after being dried, indicates the proportion of sand and gravel (nearly).

5. Another portion of the soil (100, 200, or more grs., according to its character) is tested in the manner described under CARBONATE and ALKALIMETRY. The loss of weight in carbonic acid indicates the quantity of carbonate of lime present in the sample examined; 22 grs. of the former being equal to 50 grs. of the latter.

6. Another like portion of the soil may be gently boiled for 4 or 5 hours, along with dilute hydrochloric acid, in a flask furnished with a long glass tube passing through the cork, to prevent loss (see ETHER); after that time the whole must be thrown upon a filter, and what refuses to pass through (silica) washed with distilled water, dried, ignited, and weighed.

7. The filtrate and washings from No. 6 are next successively treated for alumina (pure clay), lime, phosphate of lime, phosphoric acid, oxide of iron, alkalies (potassa or soda), ammonia (both ready formed and latent), &c. &c., in the manner noticed under GLASS, GUANO, and the names of the respective substances referred to. See AGRICULTURE, MANURES, &c.

SOL'ANINE. *Syn.* SOLANIA, SOLANINA, L. A peculiar basic substance, obtained from the leaves and stem of *Solanum Dulcamara*, or *bitter-sweet*, and other species of the *Solanaceæ*.

SOL'DERING. The union of metallic surfaces by means of a more fusible metal fluxed between them. The method of autogenous soldering, invented by M. De Richmont, is an exception to this definition. In all cases the surfaces must be perfectly clean, and in absolute contact, and the air must be excluded, to prevent oxidation. For this last purpose the brazier and silversmith use powdered borax made into a paste with water; the coppersmith, powdered sal ammoniac; and the tinman, powdered resin. Tin-foil applied between the joints of fine brass work, first wetted with a strong solution of sal ammoniac, makes an excellent juncture, care being taken to avoid too much heat. See SOLUTION (Soldering), and *below*.

SOL'DERS. *Prep.* 1. (For copper, iron, and dark brass.) From copper and zinc, equal parts; melted together. For pale brass more zinc must be used.

2. (Fine solder.) From tin, 2 parts; lead, 1 part. Melts at 350° Fahr. *Used* to tin and solder copper, tin plates, &c.

3. (For German silver.) From German silver, 5 parts; zinc, 4 parts; melted together, run into thin flakes, and then powdered. Also as No. 7.

4. (Glazier's.) From lead, 3 parts; tin, 1 part. Melts at 500° Fahr.

5. (For gold.) Gold, 12 pennyweights; copper, 4 do.; silver, 2 do.

6. (For lead and zinc.) From lead, 2 parts; tin, 1 part.

7. (For pewter, Britannia metal, &c.) From tin, 10 parts; lead, 5 parts; bismuth, 1 to 3 parts.

8. (For silver.) From fine brass, 6 parts; silver, 5 parts; zinc, 2 parts.

9. (For tin plate.) From tin, 2 parts; lead, 1 part. The addition of bismuth, 1 part, renders it fit for pewter.

SOLE. The *Solea vulgaris*, a well-known fish. It is perhaps more frequently eaten than any other flat fish, and, when skilfully cooked, exceeds them all in delicacy, nutritiousness, and flavour.

SOLU'TION. *Syn.* SOLUTIO, L. Under the head of solutions (SOLUTIONES), in pharmacy, are properly included only those liquids which consist of water, or an aqueous menstruum, in which has been dissolved an appropriate quantity of any soluble substance to impart to the liquor its peculiar properties. When spirit is the menstruum, the liquid receives the name of alcoholic solution, spirit, or tincture. In the B. P. and the Ph. L. & D. aqueous solutions are named LIQUORS (LIQUORES); whilst in the Ph. E., and in the old Pharmacopœias generally, they are termed WATERS (AQUÆ).

The following list embraces all the solutions of the British pharmacopœias, with a few others likely to be useful to the reader. Some other preparations to which the name has been given will be found under LIQUORS, TINCTURES, &c.

Solution of Ac'etate of Ammo"nia. *Syn.* LIQUOR OF ACETATE OF AMMONIA, WATER OF A. OF A., MINDERERUS' SPIRIT; AMMONIÆ ACETATIS LIQUOR (B. P.), LIQUOR AMMONIÆ ACETATIS (Ph. L. & D.), AMMONIÆ ACETATIS AQUA (Ph. E.), L. *Prep.* 1. (Ph. L.) From dilute acetic acid, 1 pint; exactly neutralised by sesquicarbonate of ammonia (in coarse powder), 9 drs., or q. s. Sp. gr. 1·022.

2. (Ph. E.) Distilled vinegar (preferably from French vinegar), sp. gr. 1·005, 24 fl. oz.; carbonate (sesquicarbonate) of ammonia, 1 oz., or q. s. Sp. gr. 1·011.

3. (Ph. D.) Sesquicarbonate of ammonia, 2½ oz.; dilute acetic acid, 3 pints. Sp. gr. 1·012.

4. (B. P.) Carbonate of ammonia, 3¼, or sufficient; acetic acid (28 per cent.), 10; distilled water, 50. Dissolve the carbonate in the acid, and add the water.

Prop., &c. Free from colour and odour. It changes the colour neither of litmus nor turmeric. Sulphuretted hydrogen being dropped in, it is not discoloured, neither is anything thrown down on the addition of

chloride of barium. What is precipitated by nitrate of silver is soluble in water, but especially so in nitric acid. Potassa being added, it emits ammonia; and sulphuric acid being added, it gives off acetic vapours. The fluid being evaporated, what remains is completely destroyed by heat.

Uses, &c. Solution of acetate of ammonia is a very common and excellent febrifuge and diaphoretic, and, in large doses, aperient saline liquor. Taken warm, in bed, it generally proves a powerful sudorific; and as it operates without heat, it is much used in febrile and inflammatory disorders. Its action may likewise be determined to the kidneys, by walking about in the cold air.—*Dose.* 2 to 6 drs., twice or thrice daily, either by itself or along with other medicines. *Externally,* as a discutient and refrigerant lotion; and diluted (1 oz. to 9 oz. of water), as a collyrium in chronic ophthalmia. For this last purpose it must be free from excess of ammonia.

5. (Concentrated.) Saturate acetic acid, sp. gr. 1·038, ½ gal., with carbonate of ammonia (in powder), 2½ lbs., or q. s.; carefully avoiding excess.

Obs. This article is in great demand in the wholesale drug trade, under the name of 'concentrated liquor of acetate of ammonia' (LIQ. AMMON. ACET. CONC.). It is very convenient for dispensing. 1 fl. dr. added to 7 fl. drs. of water forms the LIQUOR AMMONIÆ ACETATIS of the Ph. L.

Solution of Acetate of Lead. See SOLUTION OF DIACETATE OF LEAD.

Solution of Acetate of Morphia. *Syn.* LIQUOR MORPHIÆ ACETATIS (B. P., Ph. L. & D.), L. *Prep.* 1 (Ph. L.) Acetate of morphia, 4 drs.; acetic acid, 15 drops; distilled water, 1 pint; proof spirit, ½ pint; mix, and dissolve. 60 drops (minims) contain 1 gr. of acetate of morphia.—*Dose.* 5 to 15 or 20 drops.

2. (B. P.) Acetate of morphia, 4 grs.; diluted acetic acid, 8 minims; rectified spirit, 2 drs.; distilled water, 6 drs.; dissolve in the mixed liquids.—*Dose.* 10 to 60 minims.

3. (Ph. D.) Acetate of morphia, 82 grs.; rectified spirit, 5 fl. oz.; distilled water, 15 fl. oz. 120 drops (minims) contain 1 gr. of the acetate.—*Dose.* 10 to 45 or 50 drops, or similar to that of tincture of opium.

4. (Magendie.) Each fl. dr. contains 1½ gr. of acetate (nearly).—*Dose.* 5 to 15 drops. Anodyne, hypnotic, and narcotic; in those cases in which opium is inadmissible. See MORPHIA.

Solution of Al'um (Compound). *Syn.* BATE'S ALUM WATER; LIQUOR ALUMINIS COMPOSITUS (Ph. L.), AQUA ALUMINOSA COMPOSITA†, L. *Prep.* (Ph. L.) Alum and sulphate of zinc, of each, 1 oz.; boiling water, 3 pints; dissolve, and filter (if necessary). Detergent and astringent. Used as a lotion for old ulcers, chilblains, excoriations, &c.; and, largely diluted with water, as an eye-wash and injection.

Solution of Ammo″nia. See LIQUOR AMMONIA.

Solution of Ammo″nio-ni′trate of Sil′ve *Syn.* HUME'S TEST; SOLUTIO ARGENTI AM MONIATI (Ph. E.), L. *Prep.* (Ph. E.) Nitra of silver (pure crystallised), 44 grs.; distille water, 1 fl. oz.; dissolve, and add ammon water, gradually, until the precipitate, at firs thrown down, is very nearly, but not entirel redissolved. Used as a test for arsenic.

Solution of Ammo″nio-sul′phate of Cop′pe *Syn.* LIQUOR CUPRI AMMONIO-SULPHATI (Ph. L.), CUPRI AMMONIATI SOLUTIO (Ph. E. C. A. AQUA, L. *Prep.* (Ph. L.) Ammonic sulphate of copper, 1 dr.; water, 1 pint; dis solve, and filter. Stimulant and detergent Applied to indolent ulcers, and, when largel diluted, to remove specks on the cornea; als used as a test for arsenic.

Solution for Anatom′ical Preparations, & *Syn.* ANTISEPTIC SOLUTION. *Prep.* 1. Nearl saturate water with sulphurous acid, and ad a little creasote.

2. Dissolve chloride of tin, 4 parts, in wate 100 parts, to which 3% of hydrochloric aci has been added.

3. Dissolve corrosive sublimate, 1 part, an chloride of sodium, 3 parts, in water, 1C parts, to which 2% of hydrochloric acid has bec added.

4. Mix liquor of ammonia (strong) with times its weight (each) of water and rectifi spirit.

5. Sal ammoniac, 1 part; water, 10 or 1 parts. For muscular parts of animals.

6. Sulphate of zinc, 1 part; water, 15 to 2 parts. For muscles, integuments, and cerebr masses.

7. (Dr. Babington.) Wood naphtha, 1 par water, 7 parts; or wood naphtha undiluted, an injection.

8. (Sir W. Burnett.) Concentrated solutic of chloride of zinc, 1 lb.; water, 1 gal. Th substances are immersed in the solution for to 4 days, and then dried in the air.

9. (Gannal.) Alum and culinary salt, each, ½ lb.; nitre, ¼ lb.; water, 1 gal.

10. (Goadsby.)—*a.* From bay salt, 2 oz. alum, 1 oz.; bichloride of mercury, 1 gr. water, 1 pint. For ordinary purposes.

b. To the last add of bichloride of mercur 1 gr.; water, 1 pint. For very tender tissue and where there is a tendency to mouldiness.

c. From bay salt, ¼ lb.; bichloride of me cury, 1 gr.; water, 1 pint. For subjects co taining carbonate of lime.

d. From bay salt, ¼ lb.; arsenious aci 10 grs.; water, 1 pint; dissolve by heat. F old preparations.

e. To the last add of bichloride of mercur 1 gr. As the last, when there is a tendency the softening of parts; and, diluted, for mo lusca. These solutions are approved of b Prof. Owen.

11. (M. Réboulet.) Nitre, 1 part; alu 2 parts; chloride of lime, 4 parts; water,

or 20 parts; to be afterwards diluted according to circumstances. For pathological specimens.

12. (Dr. Stapleton.) Alum, 2½ oz.; nitre, 1 dr.; water, 1 quart. For pathological specimens.

13. (For FEATHERS—Beasley.) Strychnia, 16 grs.; rectified spirit, 1 pint.

Obs. These fluids are used for preserving ANATOMICAL PREPARATIONS, OBJECTS OF NATURAL HISTORY, &c., by immersing them therein, in close vessels; or, for temporary purposes, applying them by means of a brush or piece of rag. The presence of corrosive sublimate is apt to render animal substances very hard. See PUTREFACTION.

Solution, Antisep'tic. See *above*.

Solution, Arsenical. *Syn.* MINERAL SOLUTION; SOLUTIO ARSENICALIS, SOLUTIO MINERALIS, L. *Prep.* 1. (Devergie.) As SOLUTION OF ARSENITE OF POTASSA, Ph. L., but of only 1-50th the strength, and flavoured with compound spirit of balm, and coloured to a deep rose with cochineal.

2. (Pearson.) Arseniate of soda, 4 grs.; water, 4 fl. oz.; dissolve.—*Dose.* 10 to 30 drops during the day. (See *below*.)

Solution of Arse"nious Acid. See AGUE DROPS and ARSENIOUS ACID.

Solution of Ar'senite of Potas'sa. *Syn.* FOWLER'S MINERAL SOLUTION; LIQUOR POTASSÆ ARSENITIS (Ph. L.), LIQUOR ARSENICALIS (B. P., Ph. E. D. & U. S.), L. *Prep.* (B. P., Ph. L. & E.) Arsenious acid, coarsely powdered, and carbonate of potassa, of each, 80 grs.; distilled water, 1 pint; boil until dissolved, and add, to the cold solution, compound tincture of lavender, 5 fl. drs.; water, q. s. to make the whole exactly measure a pint. Tonic, antiperiodic, and alterative.—*Dose.* 4 or 5 drops, gradually and cautiously increased; in agues and various scaly skin diseases. It is preferably taken soon after a meal. See ARSENIOUS ACID, &c.

Solution of Atropia. *Syn.* LIQUOR ATROPIÆ (B. P.). *Prep.* Atropia, 4 grs.; rectified spirit, 1 dr.; dissolve and add water, 7 drs.; mix.—*Dose.* 1 minim.

Solution of Bismuth and Citrate of Ammonia. *Syn.* LIQUOR BISMUTHI ET AMMONIÆ CITRATIS (B. P.). Purified bismuth, 1; nitric acid, 2; citric acid, 2; solution of ammonia, a sufficiency; mix the nitric acid with an ounce of distilled water, and add the bismuth in successive portions. When effervescence has ceased, apply for ten minutes a heat approaching that of ebullition, and decant the solution from any insoluble matter. Evaporate the solution until it is reduced to 2, then add the citric acid previously dissolved in 4 of distilled water, and afterwards the solution of ammonia in small quantities at a time, until the precipitate formed is redissolved, and the solution is neutral or slightly alkaline to test paper; dilute with distilled water to the volume of 20.—*Dose.* ½ to 1 dr.

Solution, Brandish's. See SOLUTION OF POTASSA.

Solution, Burnett's. A solution of chloride of zinc. See SOLUTION FOR ANATOMICAL PREPARATIONS (*above*), also DISINFECTING COMPOUNDS.

Solution of Car'bonate of Ammo"nia. *Syn.* SOLUTION OF SESQUICARBONATE OF AMMONIA, CARBONATE OF AMMONIA WATER; LIQUOR AMMONIÆ SESQUICARBONATIS (Ph. L.), AQUA AMMONIÆ CARBONATIS (Ph. E.). *Prep.* (Ph. L. & E.) Sesquicarbonate of ammonia, 4 oz.; distilled water, 1 pint; dissolve. Stimulant and antacid.—*Dose.* ½ to 1 fl. dr., in water.

Solution of Carbonate of Magnesia. *Syn.* LIQUOR MAGNESIÆ CARBONATIS (B. P.). Prepared by impregnating water with carbonic anhydride under pressure, in which freshly precipitated carbonate of magnesia is suspended. *Dose.* 1 to 2 oz.

Solution of Carbonate of Potas'sa. *Syn.* OIL OF TARTAR†, WATER OF SUBCARBONATE OF POTASH†; LIQUOR POTASSÆ CARBONATIS Ph. L. & D.), L. P. SUBCARBONATIS†, L. *Prep.* (Ph. L.) Carbonate of potassa, 20 oz. (10 oz.—Ph. D.); water, 1 pint; dissolve and filter (or decant). Sp. gr.—Ph. L., 1·473; Ph. D., 1·310. *Dose.* 10 drops to 1 dr., as an antacid, &c.

Solution of Carbonate of So'da. *Syn.* SUBCARBONATE OF SODA WATER†; SODÆ CARBONATIS LIQUOR (Ph. D.), L. *Prep.* (Ph. D.) Carbonate of soda (in crystals) 1½ oz.; distilled water, 1 pint. Sp. gr. 1·026.—*Dose.* ¼ to 1½ fl. oz., as an antacid; in heartburn, dyspepsia, &c.

Solution of Chloride of Antimony. *Syn.* ANTIMONII CHLORIDI LIQUOR (B. P.). *Prep.* Dissolve black sulphide of antimony in boiling hydrochloric acid. Used as an escharotic, and in the preparation of oxide of antimony.

Solution of Chlo"ride of Ar'senic. *Syn.* LIQUOR ARSENICI HYDROCHLORICUS (B. P.), LIQUOR ARSENICI CHLORIDI (Ph. L), L. *Prep.* 1. (Ph. L.) Arsenious acid (in coarse powder), ½ dr.; hydrochloric acid, 1½ fl. dr.; distilled water, 1 fl. oz.; boil until the solution of the arsenious acid is complete, and, when cold, add enough distilled water to make the whole exactly measure a pint.—*Dose.* 4 to 5 drops.

2. (B. P.) Arsenious acid, 80 grs.; hydrochloric acid, 2 drs.; distilled water, 20 oz.; boil the two acids with 4 oz. of the water until a solution is effected, then add sufficient distilled water to make up 20 oz.—*Dose.* 2 to 8 minims.

Solution of Chloride of Ba"rium. *Syn.* SOLUTION OF MURIATE OF BARYTA†; LIQUOR BARII CHLORIDI (Ph. L. & D.), SOLUTIO BARYTÆ MURIATIS (Ph. E.), L. *Prep.* (Ph. L. & E.) Dissolve chloride of barium, 1 dr. (1 oz.—Ph. D.), in water, 1 fl. oz. (8 oz. (Ph. D.), and filter the solution. Sp. gr. (Ph. D.) 1·088.—*Dose.* 5 drops, gradually increased to 10 or 12, twice or thrice daily; in scrofula, scirrhous affections, and worms; *ex-*

ternally, largely diluted, as a lotion in scrofulous ophthalmia.

Solution of Chloride of Cal'cium. *Syn.* SOLUTION OF MURIATE OF LIME†; CALCII CHLORIDI LIQUOR (Ph. D.), CALCIS MURIATIS SOLUTIO (Ph. E.). *Prep.* 1. (Ph. L. 1836.) Fused chloride of calcium, 4 oz. (crystals, 8 oz. —Ph. E.); water, 12 fl. oz.; dissolve, and filter.

2. (Ph. D.) Fused chloride of calcium, 3 oz.; water, 12 oz. Sp. gr. 1·225.—*Dose.* 10 drops to 1 dr., or more; in scrofulous and glandular diseases, &c.

Solution of Chloride of Zinc. *Syn.* LIQUOR ZINCI CHLORIDI (B. P.). *Prep.* Granulated zinc, 8; hydrochloric acid, 22; solution of chlorine, q. s.; carbonate of zinc, ¼; distilled water, 10. Mix the acid and water in a porcelain dish, add the zinc, and apply a gentle heat to promote the action until gas is no longer evolved; boil for half an hour, supplying the water lost by evaporation, and allow the product to cool. Filter it into a bottle, and add solution of chlorine by degrees, with frequent agitation, until a brown sediment appears. Filter the liquid into a porcelain basin, and evaporate until it is reduced to the bulk of 20.

Solution of Chlo"rinated Lime. *Syn.* BLEACHING LIQUID, SOLUTION OF CHLORIDE OF LIME‡, L. OF HYPOCHLORITE OF LIME; SOLUTIO CALCIS HYPOCHLORIS, S. CALCIS CHLORIDI, CALCIS CHLORINATÆ LIQUOR (Ph. D.), L. *Prep.* 1. (Ph. D.) Chlorinated lime ('chloride of lime'), ½ lb.; water, ½ gal.; triturate them together, then transfer the mixture to a stoppered bottle, and shake it repeatedly for the space of 3 hours; lastly, filter through calico, and preserve it in a well-stopped bottle.

2. Chloride of lime (dry and good, and rubbed to fine powder), 9½ lbs.; tepid water, 6 galls.; mix in a stoneware bottle capable of holding 8 galls., agitate frequently for a day or two, and, after 2 or 3 days' repose, decant the clear portion, and keep it in well-corked bottles, in a cool situation. If filtered, it should be done as rapidly as possible, and only through coarsely powdered glass in a covered vessel.

Obs. The last is the usual strength sold in trade, under various attractive names, to give it importance. It is used as a disinfectant, bleacher, and fumigation; and, diluted with water, as a lotion, injection, or collyrium, in several diseases. See HYPOCHLORITE OF CALCIUM.

Solution of Chlorinated Potas'sa. *Syn.* SOLUTION OF CHLORIDE OF POTASH‡, S. OF HYPOCHLORITE OF POTASSA, JAVELLE'S BLEACHING LIQUID; SOLUTIO POTASSÆ HYPOCHLORIS, LIQUOR POTASSÆ CHLORIDI, L. POTASSÆ CHLORINATÆ, L.; EAU DE JAVELLE, Fr. *Prep.* 1. Dissolve carbonate of potassa, 1 part, in water, 10 parts, and pass chlorine gas through the solution to saturation.

2. Chloride of lime (dry and good), 1 part; water, 15 parts; agitate them together for an hour; next dissolve of carbonate of potassa, 2 oz., in water, ¼ pint; mix the two solutions, and after a time either decant or filter. *Uses, &c.*, as the last.

Solution of Chlorinated Soda. *Syn.* SOLUTION OF CHLORIDE OF SODA‡, S. OF HYPOCHLORITE OF SODA, LABARRAQUE'S DISINFECTING LIQUID; SOLUTIO SODÆ HYPOCHLORIS, HYPOCHLORIS SODICUS AQUA SOLUTUS (P. Cod.), LIQUOR SODÆ CHLORINATÆ (Ph. L. & D.), L. *Prep.* 1. (Ph. L.), Carbonate of soda (in crystals), 1 lb.; water, 1 quart; dissolve, and pass through the solution the chlorine evolved from a mixture of common salt, 4 oz.; binoxide of manganese, 3 oz.; sulphuric acid, 2½ fl. oz. (4 oz.—Ph. L. 1836); diluted with water, 3 fl. oz.; placed in a retort, heat being applied to promote the action, and the gas being purified by passing through 5 fl. oz. of water before it enters the alkaline solution.

2. (Ph. D.) Chlorinated lime, ½ lb., and water, 3 pints, are triturated together in a marble mortar, after which the mixture is transferred to a stoppered bottle, agitated frequently during three hours, and then filtered through calico; in the mean time carbonate of soda (cryst.), 7 oz., is dissolved in water. 1 pint; the two solutions are next mixed, and, after agitation for about 10 minutes, the whole is filtered as before. The filtrate is to be preserved in a well-stopped bottle.

Obs. This solution is used as an antiseptic, disinfectant, and bleaching liquid.—*Dose.* 20 to 30 drops, in any bland fluid, in scarlet fever, sore throat, &c; it is also made into a lotion, gargle, injection, and eye-water. Meat in a nearly putrid state, unfit for food, is immediately restored by washing or immersion in this liquid.

Solution of Chlo"rine. *Syn.* CHLORINE WATER; SOLUTIO CHLORINII, LIQUOR CHLORINI (Ph. L. & D.), CHLORINEI AQUA (Ph. E.), L. *Prep.* 1. (Ph. L.) On binoxide of manganese (in powder), 2 drs., placed in a retort, pour hydrochloric acid, 1 fl. oz., and pass the chlorine into distilled water, ½ pint, until it ceases to be evolved.

2. (Ph. E.) Muriate of soda (common salt), 60 grs.; red oxide of lead, 350 grs.; triturate them together, and put them into 8 fl. oz. of distilled water, contained in a stoppered bottle; then add of sulphuric acid, 2 fl. drs.; and having replaced the stopper, agitate the whole, occasionally, until the oxide of lead turns white; lastly, after subsidence, pour off the clear liquid into another stoppered bottle.

3. (Ph. D.) Introduce into a gas bottle peroxide of manganese (in fine powder), ½ oz.; add of hydrochloric acid, 3 fl. oz. (diluted with), water, 2 fl. oz.; apply a gentle heat, and cause the evolved gas to pass through water, 2 fl. oz., and then into a 3-pint bottle containing distilled water, 20 fl. oz., and whose mouth is

loosely plugged with tow; when the air has been entirely displaced by the chlorine, cork the bottle loosely, and shake it until the chlorine is absorbed; it should now be transferred to a pint stoppered bottle, and preserved in a dark and cool place.

Prop., &c. Irritant and acrid, but, when largely diluted, stimulant and antiseptic.—*Dose.* ½ to 2 fl. dr., in ½ pint of water, sweetened with a little sugar, in divided doses, during the day; in scarlatina, malignant sore throat, &c. On the large scale, liquid chlorine may be procured by passing the gas obtained by any of the methods named under CHLORINE, into water, until it will absorb no more.

Solution of Cit'rate of Ammo"nia. *Syn.* LIQUOR AMMONIÆ CITRATIS (B. P., Ph. L.), L. *Prep.* (Ph. L.) Dissolve citric acid, 3 oz., in distilled water, 1 pint; and to the solution add of sesquicarbonate of ammonia (in powder), 2½ oz., or q. s. to exactly neutralise the liquor —*Dose.* 2 to 6 fl. drs.

Solution of Citrate of Magne'sia. *Syn.* SOLUTIO MAGNESIÆ CITRATIS, L. See *page* 729.

Solution of Citrate of Morphia. *Syn.* LIQUOR MORPHIÆ CITRATIS, SOLUTIO M. C., L. *Prep.* (Magendie.) Pure morphia, 13 grs.; citric acid, 8 or 10 grs.; water, 1 fl. oz.; tincture of cochineal, 2 fl. drs.—*Dose.* 3 to 12 drops.

Solution of Copai'ba. See SPECIFIC SOLUTION.

Solution of Corro'sive Sub'limate. *Syn.* SOLUTION OF CHLORIDE OF MERCURY; LIQUOR HYDRARGYRI BICHLORIDI† (Ph. L.). *Prep.* 1. (Ph. L.) Corrosive sublimate and sal ammoniac, of each, 10 grs.; water, 1 pint; dissolve.—*Dose.* As an alterative, 10 to 30 drops; as an antisyphilitic, ½ to 2 fl. drs., in simple or sweetened water. It must not be allowed to touch anything metallic. It also forms a most useful lotion in various skin diseases.

2. See MERCURIAL LOTIONS.

Solution of Diac'etate of Lead. See SOLUTION OF SUBACETATE OF LEAD.

Solution, Donovan's. See SOLUTION OF HYDRIODATE OF ARSENIC AND MERCURY (*below*).

Solution, Escharotic (Freyburg's). *Syn.* SOLUTIO ESCHAROTICA, L. *Prep.* From camphor, 30 grs.; corrosive sublimate, 60 to 100 grs.; rectified spirit, 1 fl. oz.; dissolve. In syphilitic vegetations, and specially condylomes. It is spread over the diseased surface, either at once or after the application of a ligature.

Solution of Flints. *Syn.* LIQUOR OF FLINTS; LIQUAMEN SILICUM, LIQUOR POTASSÆ SILICATIS, L. *Prep.* 1. Soluble glass dissolved in water.

2. (Bate.) Powdered quartz, 1 part; dry carbonate of potash, 2 parts (3 parts—Turner); triturate them together, fuse the mixture in a Hessian crucible, and allow the resulting glass to deliquesce by exposure in a damp situation.—*Dose.* 5 or 6 to 30 drops; in gouty concretions, stone, &c. "It resolves the stone, and opens obstructions." See SOLUBLE GLASS.

Solution, Gannal's. See *page* 1057.

Solution, Goadsby's. See *page* 1057.

Solution, Goulard's. See SOLUTION OF SUBACETATE OF LEAD.

Solution, Hahnemann's Prophylac'tic. *Syn.* LIQUOR BELLADONNÆ, SOLUTIO PROPHYLACTICA, L. *Prep.* From extract of belladonna (alcoholic), 3 grs.; distilled water, 6 fl. drs.; rectified spirit, 2 fl. drs.; dissolve. *Used* against scarlet fever.—*Dose.* 2 or 3 drops for a child under 12 months; and an additional drop for every year above that age to maturity.

Solution of Hydri'odate of Ar'senic and Mer'cury. *Syn.* DONOVAN'S SOLUTION; SOLUTIO ARSENICI ET HYDRARGYRI IODIDI, ARSENICI ET HYDRARGYRI HYDRIODATIS LIQUOR (Ph. D.), L. *Prep.* 1. (Donovan.) Triturate metallic arsenic, 6·08 grs., mercury, 15·38 grs., and iodine, 50 grs., with alcohol, 1 fl. dr., until dry; to this add, gradually, of distilled water, 8 fl. oz., and again well triturate; next put the whole into a flask, add of hydriodic acid, ½ fl. dr., and boil for a few minutes; lastly, when cold, add distilled water, q. s. to make the whole measure exactly 8 fl. oz.

2. (Ph. D.) Pure arsenic (in fine powder), 6 grs.; pure mercury, 16 grs.; pure iodine, 50½ grs.; alcohol, ½ fl. dr.; triturate as before, add, gradually, of water, 8 fl. oz.; heat the mixture until it begins to boil, and, afterwards, make up the cold and filtered solution to exactly 8 fl. oz. 6 fl. dr.

3. (Wholesale.) From metallic arsenic, 61 grs.; iodine, 500 grs.; mercury, 154 grs.; rectified spirit, 1½ fl. oz.; distilled water, 2 quarts; hydriodic acid, 5 fl. drs.; as No. 1; the product being made up with distilled water so as to measure exactly 4 pints, or 80 fl. oz., or to weigh 5 lbs. 1¼ oz. (av.), when cold.

Obs. Great care must be taken that the whole of the arsenic be dissolved, which can only be affected by the most careful trituration. Soubeiran recommends the employment of 1 part, each, of the respective iodides, with 98 parts of water, as furnishing a simpler and equally effective product, proportions which are almost exactly those employed by Mr. Donovan.—*Dose.* 10 to 30 drops, twice or thrice a day, preferable soon after a meal; in lepra, psoriasis, lupus, and several other scaly skin diseases. It is a most valuable medicine in these affections.

Solution of Hyrochlo"rate of Mor'phia. *Syn.* SOLUTION OF MURIATE OF MORPHIA; LIQUOR MORPHIÆ HYDROCHLORATIS (Ph. L.), SOLUTIO MORPHIÆ MURIATIS (Ph. E.), MORPHIÆ MURIATIS LIQUOR (Ph. D.), L. *Prep.* 1. (Ph. L.) Hydrochlorate of morphia, 4 drs.; proof spirit, ½ pint; distilled water, 1 pint; dissolve by the aid of a gentle heat. 60 drops (minims) of this solution contain 1 gr. of hydrochlorate of morphia.—*Dose.* 5 to 15 or 20 drops.

2. (Ph. E. & D.) Muriate of morphia, 90 grs.; rectified spirit, 5 fl. oz.; distilled water,

15 fl. oz. 107 drops (minims) contain 1 gr. of the hydrochlorate.—*Dose.* 10 to 30 or 40 drops, or nearly as laudanum.

3. (Apothecaries' Hall.) Muriate of morphia, 16 grs.; rectified spirit, 1 fl. dr.; water, 1 fl. oz.; 30 drops (minims) contain 1 gr.—*Dose.* 3 to 10 drops. See SOLUTION OF ACETATE OF MORPHIA, &c.

Solution of Hypochlo"rite of Lime. Solution of chlorinated lime.

Solution of I'odide of Ar'senic. *Syn.* LIQUOR ARSENICI PERIODIDI, L. *Prep.* (Wackenroder.) Each drachm contains $\frac{1}{8}$ gr. of teriodide of arsenic; equivalent to $\frac{1}{48}$ gr. of metallic arsenic, and $\frac{1}{19}$ gr. (nearly) of iodine.

Solution of Iodide of Mer'cury and Potas'sium. *Syn.* LIQUOR IODOHYDRARGYRATIS POTASSII IODIDI, L. *Prep.* (Dr. Channing.) Iodide of potassium, $3\frac{1}{2}$ grs.; biniodide of mercury, $4\frac{1}{2}$ grs.; distilled water, 1 fl. oz.; dissolve.—*Dose.* 2 to 5 or 6 drops, three times a day, much diluted; in dyspepsia, indurations, enlargement of the spleen, dropsy, &c.

Solution of Iodide of Potas'sium (Componnd). *Syn.* IODURETTED WATER, COMPOUND SOLUTION OF IODINE; LIQUOR POTASSII IODIDI COMPOSITUS (Ph. L. & D.), LIQUOR IODINEI COMPOSITUS (Ph. E.), L. *Prep.* 1. (Ph. L. & D.) Iodide of potassium, 10 grs.; iodine, 5 grs.; water, 1 pint; dissolve.—*Dose.* 1to 6 drs.; in the usual cases where iodine is employed.

2. (Ph. E.) Iodide of potassium, 1 oz.; iodine, 2 drs.; water, 16 fl. oz. This is 30 times as strong as the preceding.—*Dose.* 5 to 20 drops.

Solution of I'odine. See *above.*

Solution of I'ron (Alkaline). *Syn.* LIQUOR FERRI ALKALINI, L. *Prep.* (Ph. L. 1824.) Iron filings, $2\frac{1}{2}$ drs.; nitric acid, 2 fl. oz.; water, 6 fl. oz.; dissolve, decant, gradually add of solution of carbonate of potash, 6 fl. oz., and in 6 hours decant the clear portion. This was intended as an imitation of Stahl's Tinctura Martis Alkalina. It is tonic, emmenagogue, &c.—*Dose.* 20 to 60 drops.

Solution, Javelle's. See *page* 1059.

Solution, Labarraque's. See *page* 1059.

Solution of Lime. *Syn.* LIME WATER; SOLUTIO CALCIS HYDRATIS, LIQUOR CALCIS (Ph. L. & D.), AQUA CALCIS (Ph. E.), L. *Prep.* (Ph. L.) Upon the lime, $\frac{1}{2}$ lb., first slaked (by sprinkling it) with a little of the water, pour the remainder of water, 12 pints, and shake them well together (for 5 minutes—Ph. D.); immediately cover the vessel, and set it aside for three hours; then keep the solution with the remaining lime (equally divided) in stoppered glass vessels, and, when it is to be used, decant the required portion from the clear solution (replacing it with more water, and agitating briskly, as before—Ph. E.).

Obs. Cold water dissolves more lime than hot water. 1 pint of water at 32° Fahr. dissolves $13\frac{1}{4}$ grs., at 60° it dissolves $11\frac{1}{2}$ grs., but at 212° only $6\frac{1}{2}$ grs. (Phillips.)

Uses, &c. Lime water is antacid, astringent, antilithic, tonic, and vermifuge.—*Dose.* A wine-glassful, or more, 2 or 3 times a day, in milk or broth; in dyspepsia, diarrhœa, calculous affections, &c.; and, externally, as a detersive and discutient lotion.

Solution of Lime (Saccharated). *Syn.* LIQUOR CALCIS SACCHARATUS. *Prep.* Slaked lime, 1; refined sugar (in powder), 2; distilled water, 20; digest for some hours and strain.—*Dose.* 15 to 60 minims in milk.

Solution, Mackenzie's. *Prep.* From nitrate of silver, 20 grs., dissolved in distilled water, 1 fl. oz. *Used* to wash the throat and fauces, and to sponge the trachea, in affections of those parts.

Solution of Magne'sia. *Syn.* AERATED MAGNESIA WATER, CARBONATED M. W., FLUID MAGNESIA, CONDENSED SOLUTION OF M., CONCENTRATED S. OF M.; LIQUOR MAGNESIÆ CARBONATIS, AQUA M. C., L.; EAU MAGNESIENNE, Fr. *Prep.* (Dinneford's.) Water and Howard's heavy carbonate of magnesia, in the proportion of $17\frac{1}{2}$ grs. of the latter to every fl. oz. of the former, are introduced into a cylindrical tinned copper vessel, and carbonic acid, generated by the action of sulphuric acid on whiting, is forced into it by steam power, for $5\frac{1}{2}$ hours, during the whole of which time the cylinder is kept in motion. Sir J. Murray's is similar. The Paris Codex orders recently precipitated carbonate of magnesia to be used while still moist. Antacid and laxative. See FLUID MAGNESIA.

Solution, Min'eral. See SOLUTION OF ARSENITE OF POTASSA.

Solution of Mor'phia. See SOLUTIONS OF ACETATE, HYDROCHLORATE, and SULPHATE.

Solution of Nitrate of Mercury (Acid). *Syn.* LIQUOR HYDRARGYRI NITRATIS ACIDUS (B. P.). *Prep.* Mercury, 4; nitric acid, 5; distilled water, $1\frac{1}{2}$; mix the nitric acid with the water in a flask, and dissolve the mercury in the mixture without the application of heat. Boil gently for 15 minutes, cool, and preserve the solution in a stoppered bottle. *Used* alone, as a caustic; 1 to 2 minims to 1 oz. water, as a gargle; and 1 minim to 2 oz. water, as an injection in gonorrhœa.

Solution of Nitrate of Sil'ver. *Syn.* LIQUOR ARGENTI NITRATIS (Ph. L.), SOLUTIO A. N. (Ph. E.), L. *Prep.* (P. L.) Nitrate of silver (cryst.), 1 dr. (40 grs.—Ph. E.); distilled water, 1 fl. oz. (1600 grs.—Ph. E.); dissolve. *Used* as an escharotic, &c. It should be kept from the light. See LOTION, SILVER, &c.

Solution of O'pium (Sed'ative). See LIQUOR.

Solution of Oxysulphate of Iron‡. *Syn.* LIQUOR FERRI OXYSULPHATIS, L. *Prep.* From sulphate of iron (in powder) and nitric acid, of each, 3 drs.; triturated together for 15 minutes, and then dissolved in distilled water, $1\frac{1}{2}$ fl. oz. —*Dose.* 5 or 6 to 12 drops.

Solution of Permanganate of Potassa. *Syn.* LIQUOR POTASSÆ PERMANGANATIS (B. P.). *Prep.* Permanganate of potassa, 4 grs.; distilled water, 1 oz.; dissolve. Diluted with

40 parts of water, it is used as a gargle or as a cleansing wash for diseased surface.—*Dose.* 2 to 4 drs.

Solution of Perchloride of Iron. *Syn.* LIQUOR FERRI PERCHLORIDI (B. P.). *Prep.* Stronger solution of perchloride of iron (see *below*), 1; distilled water, 3.—*Dose.* 10 to 30 minims.

Solution of Perchloride of Iron (Stronger). *Syn.* LIQUOR FERRI PERCHLORIDI FORTIOR (B. P.). *Prep.* Iron wire, 2 oz.; hydrochloric acid, 12 oz.; nitric acid, 9 drs.; distilled water, 8 grs. Mix 8 of the hydrochloric acid with the water, and pour the mixture on the iron wire, applying a gentle heat, so that the whole of the metal may be dissolved; filter the solution, and add to it the remainder of the hydrochloric and nitric acids; heat the mixture briskly, until, on the sudden evolution of red fumes, the liquid becomes of an orange-brown colour, then evaporate by the heat of a water bath until it is reduced to 10 fl. oz. *Used* as an application to diphtheritic patches, for injecting nævi, as a powerful styptic, and in the preparation of SOLUTION OF PERCHLORIDE OF IRON. (See *above*.)

Solution of Perni'trate of Iron. *Syn.* SOLUTION OF PERSESQUINITRATE OF IRON; FERRI PERNITRAS LIQUOR (Ph. D.), SOLUTIO PERSESQUINITRAS FERRI (Kerr), L. *Prep.* (Ph. D.). Take of pure nitric acid, 3 fl. oz.; water, 16 fl. oz.; mix, add fine iron wire, 1 oz.; dissolve, and to the clear solution add as much water as will make the whole measure 1½ pint. Sp. gr. 1·107.—*Dose.* 5 or 6 to 30 drops, or more; in passive hæmorrhages, mucous discharges, chronic diarrhœa with prostration, &c.

Solution of Persulphate of Iron. *Syn.* LIQUOR FERRI PERSULPHATIS. *Prep.* Sulphate of iron, 8; sulphuric acid, ½; nitric acid, ½; distilled water, 12. Add the sulphuric acid to 10 of the water, and dissolve the sulphate of iron in the mixture with the aid of heat. Mix the nitric acid with the remaining 2 of the water, and add the dilute acid to the solution of sulphate of iron. Concentrate the whole by boiling until, by the sudden evolution of ruddy vapours, the liquid ceases to be black, and acquires a red colour. A drop of the solution is now to be tested with ferricyanide of potassium, and if a blue precipitate be formed, a few additional drops of nitric acid should be added and the boiling renewed, in order that the whole may be converted into persulphate of iron. When the solution is cold, make up the quantity to 11 by the addition, if necessary, of distilled water. *Used* in making several preparations of iron; it is also a good styptic.

Solution of Perchloride of Mercury. *Syn.* LIQUOR HYDRARGYRI PERCHLORIDI (B. P.). *Prep.* Corrosive sublimate, 10 grs.; chloride of ammonium, 10 grs.; distilled water, 20 oz.; dissolve.—*Dose.* 30 to 120 minims.

Solution for Plate. *Syn.* PLATE LIQUOR; SOLUTIO PRO ARGENTO, L. *Prep.* From alum, cream of tartar, and common salt, of each, 1 oz.; water, ½ gal.; dissolve. *Used* to increase the lustre and whiteness of silver plate, the articles being boiled in it.

Solution of Potas'sa. *Syn.* SOLUTION OF HYDRATE OF POTASSA, LIQUOR OF POTASSA, POTASH WATER, CAUSTIC P. W.; LIQUOR POTASSÆ (B. P., Ph. L.), AQUA POTASSÆ (Ph. E.), POTASSÆ CAUSTICÆ LIQUOR (Ph. D.), AQUA KALI PURI†, LIXIVIUM SAPONARIUM†, AQUA KALI CAUSTICUM†, LIXIVIUM CAUSTICUM†, L. *Prep.* 1. (Ph. L.) Lime (recently burnt), 8 oz.; boiling distilled water, 1 gal.; sprinkle a little of the water on the lime in an earthen vessel, and, when it is slaked and fallen to powder, add of carbonate of potassa, 15 oz., dissolved in the remainder of the water; bung down, and shake frequently, until the mixture is cold, then allow the whole to settle, and decant the clear supernatant portion into perfectly clean and well-stoppered green-glass bottles. Sp. gr. 1·063. It contains 6·7% of pure potassa.

2. (Ph. E.) Carbonate of potassa (dry), 4 oz.; quicklime, 2 oz.; water, 45 fl. oz.; boiling briskly for a few minutes after each addition of the milk of lime; to yield at least 35 fl. oz., by decantation, after 24 hours' repose in a deep, narrow, glass vessel. Sp. gr. 1·072.

3. (Ph. D.) Pure carbonate of potassa, 1 lb.; distilled water, 1 gal.; dissolve, heat the solution to the boiling-point in a clean iron vessel, gradually add to it of fresh quicklime, 10 oz., previous slaked with water, 7 fl. oz., and continue the ebullition for 10 minutes, with constant stirring; next allow it to cool out of contact with the air, and, when perfectly clear, decant it by means of a syphon, and bottle it as before. Sp. gr. 1·068.

4. (B. P.) Carbonate of potash, 2; slaked lime, 1½; distilled water, 20; dissolve the carbonate of potash in the water, and having heated the solution to the boiling-point in a clean iron vessel, gradually mix the slaked lime, and continue the ebullition for 10 minutes with constant stirring; decant the clear liquid. —*Dose.* 15 to 60 minims 3 times a day in beer, milk, or *Mistura Amygdalæ*.

5. (Wöhler.) Nitrate of potassa, 1 part, is mixed, in alternate layers, with clippings of sheet copper, 2 or 3 parts, and then heated to moderate redness for about ½ an hour in a copper or iron crucible; when cold, the potassa is washed out with distilled water, and the solution, after repose in a closed vessel, decanted as before. Not a trace of copper can be detected in the liquid. The clippings may be again used if mixed with a little fresh metallic copper.

6. (Wholesale.) From carbonate of potash (kali), 1 lb., and quicklime, ½ lb., to each gal. of water.

7. (BRANDISH'S ALKALINE SOLUTION; LIQUOR POTASSÆ BRANDISHII.) From American pearlashes, 6 lbs.; quicklime and wood-ashes (from the ash), of each, 2 lbs.; boiling water, 6 galls. (old meas.); to each gal. of the clear

product is added 12 or 15 drops of oil of juniper. This 'solution' is much asked for in trade. Ordinary liquor of potassa is generally sold for it.

Pur. "Nothing, or scarcely anything, is thrown down from this solution on the addition of lime water; and when it has been first saturated by nitric acid, no precipitate falls on the addition of carbonate of soda, chloride of barium, or nitrate of silver. What is thrown down by bichloride of platinum is yellowish." (Ph. L.)

Uses, &c. Liquor of potassa is antacid, diuretic, resolvent, and lithontriptic.—*Dose,* 10 to 30 or 40 drops, in any bland diluent (not acidulous); in heartburn, gout, calculi, indurations, scrofula, lepra, psoriasis, &c.

Obs. Quicklime fails to abstract the carbonic acid from the alkaline carbonates in solutions much stronger than those above referred to. Weaker solutions may, however, be easily concentrated by evaporation in iron vessels. See HYDRATE OF POTASSA, and *below.*

Solution of Potas'sa (Effervescing). *Syn.* LIQUOR POTASSÆ EFFERVESCENS (B. P.); EFFERVESCING POTASH WATER, SUPERCARBONATE OF POTASSA W.; AQUA POTASSÆ EFFERVESCENS (Ph. E.), A. P. SUPERCARBONATIS, L. *Prep.* (Ph. L. & E.) Bicarbonate of potash, 1 dr.; distilled water, 1 pint; dissolve, force in carbonic acid gas, in excess, and keep it in a well-stoppered bottle. Resembles soda water, but sits better on the stomach. It is almost specific in the early stages of scurvy.

Obs. An excellent substitute for this preparation is to pour a bottle of soda water into a tumbler containing 20 grs. of powdered bicarbonate of potash, and to drink it immediately.

Solution of Potas'sio-tar'trate of An'timony. *Syn.* SOLUTIO ANTIMONII POTASSIO-TARTRATIS, ANTIMONII TARTARIZATI LIQUOR (Ph. D.), L. *Prep.* (Ph. D.) Tartarised antimony, 1 dr.; rectified spirit, 7 fl. oz.; distilled water, 1 pint; dissolve. Strength, doses, and uses, similar to those of antimonial wine (*which see*), than which it keeps better.

Solution, Prophylac'tic. See HAHNEMANN'S SOLUTION.

Solution of Sesquicar'bonate of Ammonia. See SOLUTION OF CARBONATE OF AMMONIA.

Solution of Sil'icate of Potas'sa. See SOLUTION OF FLINTS.

Solution of So'da. *Syn.* SOLUTION OF HYDRATE OF SODA, LIQUOR OF SODA, CAUSTIC SODA WATER; LIQUOR SODÆ (B. P., Ph. L.), SODÆ CAUSTICÆ LIQUOR (Ph. D.), L. *Prep.* 1. (Ph. L.) Carbonate of soda (cryst.), 32 oz.; lime, 9 oz.; boiling distilled water, 1 gal.; proceed as for solution of potassa. "In 100 grs. are contained 1 gr. of (pure) soda." (Ph. L.) Sp. gr. 1·061.

2. (Ph. D.) Carbonate of soda (cryst.), 2 lbs.; fresh-burned lime, 10 oz.; water, 1 gal. 7 fl. oz.; as liquor of potassa. Sp. gr. 1·056.

3. (B. P.) Carbonate of soda, 7; slaked lime, 3; distilled water, 40; dissolve the carbonate in the water, boil in a clean iron vessel, gradually mixing the lime, and stirring constantly for ten minutes; decant into a green glass bottle, with air-tight stopper. Sp. gr. 1·047.—*Dose.* ½ to 1 dr.

Solution of Soda (Effervescing). *Syn.* SODA WATER; LIQUOR SODÆ EFFERVESCENS, AQUA S. E. (Ph. E.), A. S. SUPERCARBONATIS, SODÆ CARBONATIS AQUA ACIDULA, L. *Prep.* (Ph. E.) Bicarbonate of soda, 1 dr.; distilled water, 1 pint; dissolve, and force carbonic acid gas into the solution, under pressure. *Used* as an antacid and grateful stimulant, often proving gently laxative. The soda water of the shops cannot be substituted for this preparation, as, in opposition to its name, it is usually made without soda.

Solution of Sulphate of Atropia. *Syn.* LIQUOR ATROPIÆ SULPHATIS (B. P.). *Prep.* Sulphate of atropia, 4 grs.; distilled water, 1 oz.; dissolve.—*Dose.* 1 to 2 minims.

Solution, Sol'dering. *Prep.* Dissolve zinc in hydrochloric acid nearly to saturation, add 1-5th part of powdered sal ammoniac, and simmer for 5 minutes. *Used* to make solder flow easily and take well; applied with a feather. See SOLDERING.

Solution, Specif'ic (Frank's). *Syn.* SPECIFIC SOLUTION OF COPAIBA; LIQUOR COPAIBÆ ALKALINA, L. *Prep.* Take of balsam of copaiba, 2 parts; liquor of potassa (Ph. L.), 3 parts; water, 7 parts; boil the mixture for 2 or 3 minutes, put it into a separator, and allow it to stand for 5 or 6 days; then draw it off from the bottom, avoiding the upper stratum of oil, and to the clear liquid add of sweet spirit of nitre (perfectly free from acid), 1 part; should it turn foul or milky, a very little liquor of potassa will usually brighten it; if not, place it in a clean separator, and let it stand, closely covered, for a few days, and then draw it off from the bottom as before, when it will be perfectly transparent, without filtering. Some persons add the sweet spirit of nitre whilst the solution is still warm, mix it in as rapidly as possible, and immediately cork or fasten up the vessel. This is a good way when the article is wanted in a hurry, but is objectionable from the loss of spirit thereby occasioned, and the danger, without care, of bursting the separator.

Obs. A receipt for this article, upon the authority of Battley, has been going the round of the pharmaceutical works for many years. It is as follows:—Take 12 oz. of balsam of copaiba, and 6 oz. of calcined magnesia; rub together, add a pint of proof spirit, filter, and then add ½ oz. of sweet spirits of nitre." ('Gray's Supplement.') The product of this formula, utterly unlike 'Frank's Specific Solution,' is a colourless tincture, scarcely flavoured with copaiba, and holding very little of the active matter of the balsam in solution, owing to the compound formed with the magnesia being insoluble in spirit. Such is the

affinity of this earth for copaiba (copaibic acid), that it will even take it from caustic potassa. See COPAIBA, and its preparations.

Solution of Strychnia. *Syn.* LIQUOR STRYCHNIÆ (B. P.). *Prep.* Strychnia, in crystals, 4 grs.; dilute hydrochloric acid, 6 minims; rectified spirit, 2 drs.; distilled water, 6 drs.; mix the hydrochloric acid with 4 drs. of the water, and dissolve the strychnia in it by means of heat; then add the spirit and the remainder of the water.—*Dose.* 4 to 10 minims.

Solution of Subac'etate of Lead. *Syn.* LIQUOR OF SUBACETATE OF LEAD, L. OF DIACETATE OF L.†, GOULARD'S EXTRACT; LIQUOR PLUMBI, L. PLUMBI DIACETATIS (Ph. L.), PLUMBI DIACETATIS SOLUTIO (Ph. E.), PLUMBI SUBACETATIS LIQUOR (Ph. D.), L. *Prep.* 1. (Ph. L.) Acetate of lead, 27 oz.; litharge, in fine powder, 16 oz.; water, 3 quarts; boil for ½ an hour, constantly stirring, and then add enough distilled water to make the whole measure 3 quarts; lastly, filter, if required, and keep it in a closed vessel. The proportions ordered in the Ph. E. are similar. Sp. gr. 1·260.

2. (Ph. D.) Acetate of lead, 6 oz.; litharge, 4 oz.; distilled water, 1 quart; boil, &c., as before; to produce, 1 quart. Sp. gr. 1·066.

3. (Wholesale.) From finely powdered litharge, 32 lbs.; distilled vinegar, 32 galls.; boil in a perfectly bright copper pan for 2 hours, cool, add water to make up 32 galls., again simmer for 1 minute, cover up the vessel, and in an hour decant the clear portion. Common trade strength. (See *below*.)

Solution of Subacetate of Lead (Dilute). *Syn.* GOULARD, GOULARD'S LOTION, G.'S WATER; LIQUOR PLUMBI DIACETATIS DILUTUS (Ph. L.), PLUMBI SUBACETATIS LIQUOR COMPOSITUS (Ph. D.), L. *Prep.* 1. (Ph. L.) Liquor of diacetate of lead, 1½ fl. dr.; proof spirit, 2 fl. drs.; distilled water, 1 pint; mix.

2. (Ph. D.) Solution of subacetate of lead and proof spirit, of each, 2 fl. oz.; distilled water, ½ gal.; mix, filter, and preserve it in a well-stopped bottle.

Obs. Both the above preparations were formerly made with common vinegar, and hence were coloured, but those of the Pharm. are white. If wanted coloured, a little spirit colouring may be added. The stronger liquor is only used diluted; and the dilute solution is now seldom prepared by the wholesale druggist. The last (diluted solution) is employed as a sedative, refrigerant, and astringent wash, in various affections. Both are poisonous. For the antidotes, see LEAD.

Solution of Sul'phate of Mor'phia. *Syn.* LIQUOR MORPHIÆ SULPHATIS, L. *Prep.* From sulphate of morphia, as the solution of the acetate or hydrochlorate. The uses, doses, &c., are the same.

Solution of Sul'phate of Zinc (Compound). See COMPOUND SOLUTION OF ALUM.

Solution of Sul'phuret of Potassium. *Syn.* SOLUTION OF HYDROSULPHATE OF POTASSA, SOLUTIO POTASSII SULPHURETI, LIQUOR POTASSÆ HYDROSULPHATIS, AQUA POTASSÆ SULPHURETI (Ph. D.), L. *Prep.* Take of washed sublimed sulphur, 1 part; water of caustic potassa, 11 parts; mix, boil for 10 minutes, filter, and keep the solution in well-closed bottles. Sp. gr. 1·117. The product is a mixed solution of hydrosulphate and hyposulphite of potassa.—*Dose.* 10 to 60 drops, diluted in water; and, externally, made into a lotion in itch, and several other eruptive diseases.

SOL'VENT. *Syn.* MENSTRUUM, L. The liquid in which any substance is dissolved. The substance dissolved is, occasionally, called the 'solvend.' (Kirwan.)

Solvent, Glazier's. *Syn.* GLAZIER'S PICKLE. From soft soap dissolved in thrice its weight of strong soaper's lye; or, from freshly slaked lime made into a thin paste or cream with twice its weight of pearlash dissolved in a little water. Very caustic. *Used* to soften old putty, and to remove old paint.

SOOT. *Syn.* FULIGO. Wood soot was formerly officinal, and reputed vermifuge and antiseptic. The soot from pit-coal contains, besides empyreumatic matter, sulphate of ammonia; hence, it is valuable as a manure, when not too freely applied. It is also employed by gardeners to kill insects.

SOPORIFICS. Hypnotics (which *see*).

SOU'JEE. *Syn.* SOOJEE. A species of semolina. Semoletta (*semola rarita*) is a still smaller variety of pearled wheat, separated from the others by means of a sieve. 'Baster's soojee' is said to be a mixture of ordinary wheat flour and sugar.

SOUR KROUT. See SAUER-KROUT.

SOUP. A strong decoction of flesh, properly seasoned with salts, spices, &c., for the table. The different tastes of people require more or less of the flavour of spices, salt, garlic, butter, &c., which can, therefore, never be ordered by general rules. If the cook has not a good taste, and attention to that of his or her employers, not all the ingredients which nature and art can furnish will give an exquisite flavour to the dishes. The proper articles should be always at hand, and must be proportioned until the true zest be obtained. A variety of flavours may be given to different dishes served at the same time, or even to the same soup, by varying the condiments and spices. At a Parisian restaurant one cauldron is made to produce almost every imaginable variety of soup.

Soup, Portable. *Syn.* GLAZE. From skin of beef, or other like part; the soup being gently simmered until reduced to the consistence of a thin syrup, and then poured into small upright jelly-pots, with covers, or, upon flat dishes, to lie about ¼ inch deep. The latter, when set, is divided into pieces, which are dried. *Used* to make extemporaneous soup and glazes. A similar article, prepared on the

large scale, now generally forms part of every ship's stores.

SOUR'ING. See MALT LIQUORS and WINES.

SOY. Genuine soy is a species of thick black sauce, imported from China. *Prep.* Take of the seeds of *Soja hispida* (white haricots or kidney beans may be used for them), 1 gal.; boil them in water, q. s., until soft, add of bruised wheat, 1 gal., and keep the mixture in a warm place for 24 hours; then add of common salt, 1 gal.; water, 2 galls.; put the whole into a stone jar, and bung it up loosely for two or three months, shaking it very frequently during the whole time; lastly press out the liquor and bottle it; the residuum may be treated afresh with water and salt, for soy of an inferior quality.

Obs. The soy of the shops is, in nine cases out of ten, a spurious article made in this country, by simply saturating molasses or treacle with common salt. A better and a really wholesome imitation is made as follows:—Malt syrup, 1 gall. (or, 13½ lbs.); treacle, 5 lbs.; salt, 4¼ lbs.; mushroom juice, 1 quart; mix, with a gentle heat, and stir until the union is complete; in a fortnight decant the clear portion.

SPAN'ISH FLIES. See CANTHARIDES.

SPAR'ADRAP. *Syn.* SPARADRAPUM, L. Originally, a cerecloth; now, applied to spread plasters; as, SPARADRAPUM COMMUNE, common strapping or adhesive plaster; S. VESICATORIUM, blistering plaster or tissue, &c.

SPARTE'INE. *Syn.* SPARTEINA, L. A volatile oily liquid, possessing basic properties, obtained from *Spartium scoparium*, or broom. It is highly poisonous, and resembles conine and nicotine in its general properties.

SPASMS. *Syn.* CRAMP; SPASMUS, L. An involuntary contraction of the muscles, generally of the extremities, accompanied with pain, more or less severe. Spasms are distinguished into clonic spasms or convulsions, in which the contractions and relaxations are alternate, as in epilepsy; and into tonic spasms, in which there is continued rigidity, as in locked-jaw. That form which commonly attacks the muscles of the legs and feet, especially after great exertion or exposure to cold, is commonly called cramp. The best treatment for this is immediately to stand upright, and to well rub the part with the hand. The application of strong stimulants, as spirits of ammonia, or of anodynes, as opiate liniments, has been recommended. When spasm or cramp occurs in the stomach, a teaspoonful of sal volatile in water, or a tablespoonful of good brandy, may be swallowed immediately. When cramp comes or during cold bathing, the limb should be thrown out as suddenly and violently as possible, which will generally remove it, care being also taken not to become flurried or frightened, as presence of mind is very essential to personal safety on such an occasion. A common cause of spasm is indigestion, and the use of acescent liquors; these should, therefore, be avoided, and bitters and absorbents had recourse to. See ANTISPASMODICS, and the names of the principal spasmodic diseases.

SPEAR'MINT. See MINT.

SPE'CIES. (In pharmacy.) Mixtures of dried plants, or parts of plants, in a divided state, which, for convenience, are kept mixed for use. The dry ingredients of pills, conserves, electuaries, mixtures, &c., that do not keep well when made up, or which are in little demand, may be economically and conveniently preserved in this state. The word, thus applied, is obsolete out of the pharmaceutical laboratory.

Species, Anthelmin'tic. *Syn.* SPECIES ANTHELMINTICÆ, L. The dried flowering tops of tansy and wormwood, and the flowers of chamomile, equal parts; mix, and keep them in a close vessel. (P. Cod.)

Species, Aper'itive. See DIURETIC SPECIES (*below*).

Species, Aromat'ic. *Syn.* AROMATIC POWDER; SPECIES AROMATICÆ, L. *Prep.* (Ph. Bor.) Leaves of balm and curled-leaf mint (*Mentha crispa*), of each, 4 oz.; lavender flowers, 2 oz.; cloves, 1 oz.; dry them by a gentle heat, and then powder them.

Species, Astrin'gent. *Syn.* SPECIES ASTRINGENTES, L. The roots of bistort and tormentil, and bark of pomegranate, equal parts. (P. Cod.)

Species, Bitter. *Syn.* THREE BITTER HERBS; SPECIES AMARÆ, HERBÆ AMARÆ, L. The leaves of germander, and dried tops of lesser centaury and wormwood, equal parts. (P. Cod.)

Species, Capil'lary. *Syn.* FIVE CAPILLARY HERBS; HERBÆ QUINQUE CAPILLARES, L. Hart's tongue, black maiden-hair, white do., golden do., and spleenwort, equal parts. (Ph. L. 1720.)

Species, Cor'dial. *Syn.* FOUR CORDIAL FLOWERS; SPECIES CORDIALES, L. The flowers of borage, bugloss, roses, and violets, equal parts. (Ph. L. 1720.)

Species, Diuret'ic. *Syn.* APERIENT ROOTS, APERITIVE SPECIES; SPECIES DIURETICÆ, L. 1. (FIVE GREATER APERITIVE ROOTS—P. Cod., & Ph. E. 1744.) The dried roots of asparagus, butcher's-broom, parsley, smallage, and sweet fennel, equal parts.

2. (FIVE LESSER APERITIVE ROOTS.) Those of caper, dog-grass, eryngo, madder, and rest-harrow.

Species, Emol'lient. *Syn.* SPECIES EMOLLIENTES, L. 1. (THREE EMOLLIENT MEALS; FARINÆ EMOLLIENTES.) The meal of barley, linseed, and rye, equal parts. (P. Cod.)

2. (FIVE EMOLLIENT HERBS; HERBÆ QUINQUE EMOLLIENTES.)—*a.* The dried leaves of groundsel, common mallow, marsh-mallow, great mullein, and wall pellitory, equal parts, (P. Cod.)

b. The leaves of mallow, marsh-mallow,

French mercury, pellitory of the wall, and violet. (Ph. E. 1744.)

Species for Ene'mas. *Syn.* HERBS FOR CLYSTERS; HERBÆ PRO ENEMATE, L. Mallow leaves, 2 parts; chamomile flowers, 1 part.

Species for Fomenta'tions. *Syn.* SPECIES PRO FOTU, HERBÆ PRO FOTU, L. Leaves of southernwood, tops of sea-wormwood, and flowers of chamomile, of each, 2 parts; bay leaves, 1 part.

Species, Hot. 1. (FOUR GREATER HOT SEEDS.) The seeds of anise, caraway, cumin, and fennel.

2. (FOUR LESSER HOT SEEDS.) The seeds of bishop's weed, smallage, stone parsley, and wild carrot.

Species, Lax'ative. *Syn.* ST. GERMAIN LAXATIVE POWDER; SPECIES LAXANTES ST. GERMAIN, L. *Prep.* (Ph. Bor.) Senna leaves (exhausted with spirit), 4 oz.; elder flowers, 2½ oz.; aniseed and fennel seed, of each, 1½ oz.; reduce them to coarse powder, and, when dispensing, add of powdered cream of tartar, 1 dr., to each 1½ oz. of the mixture.

Species, Narcotic. *Syn.* FOUR NARCOTIC HERBS; SPECIES NARCOTICÆ, L. Dried leaves of belladonna, black nightshade, henbane, and thorn-apple, equal parts.

Species, Pec'toral. *Syn.* SPECIES BECHICÆ, SPECIES AD INFUSUM PECTORALES, L. 1. Mallow root, 4 oz.; coltsfoot leaves, 2 oz.; liquorice root, 1½ oz.; aniseed, great-mullein flowers and red-poppy flowers, of each, 1 oz.; orris root, ½ oz. (Ph. Bor.)

Species, Refri"gerant.—1. (FOUR COLD SEEDS.) The seeds of cucumber, gourd, melon, and water-melon.

2. (FOUR LESSER COLD SEEDS.) The seeds of endive, lettuce, purslane, and succory.

Species, Resol'vent. *Syn.* FARINÆ RESOLVENTES, L. The meal of the seeds of barley, bean, tare, and white lupin.

SPECIF'IC GRAVITY is the comparative weights of equal bulks of different substances, the assumed standard being 1 and sometimes 1000. This standard is pure distilled water for liquids and solids, and atmospheric air for gaseous bodies and vapours.[1] In England the sp. gr., unless when otherwise expressed, is always taken at 60° Fahr.; but in France it is taken at 32° Fahr. (0° C.), or the temperature of melting ice. In the 'British Pharmacopœia,' whenever specific gravity is mentioned, the substance spoken of is supposed to be of the temperature of 60° Fahr. In most cases, however, it is sufficient merely to note the temperature, and to apply a correction, depending on the known density of water, or air, at the different degrees of the thermometric scale.

To determine the specific gravity of a solid, we weigh it, first in the air, and then in water. In the latter case it loses, of its weight, a quantity precisely equal to the weight of its own bulk of water; and hence, by comparing this weight with its total weight, we find its specific gravity. The rule is—Divide the total weight by the loss of weight in water; the quotient is the specific gravity.

The specific gravity of a substance lighter than water may be determined by attaching it to some substance, as a piece of lead, the sp. gr., &c., of which are known. In this way, by deducting the loss in weight of the two substances, when weighed in water, from the loss sustained by the lead alone, when so weighed, we obtain a difference (*a*) which, added to the weight of the substance taken in air (*b*), gives the respective densities. From these the sp. gr. is found by the rule of three :—

$$(a + b) : 1 :: b : sp.\,gr.$$

The specific gravity of substances soluble in water are taken in pure oil of turpentine, rectified spirit, olive oil, or some other liquid, the density of which is exactly known. Sometimes, for rough purposes, the article is covered with a coating of mastic varnish. This last method answers for mercurial pill.

The specific gravity of a substance in fragments, or in powder, may be found by putting a portion (say 100 grs.) into a sp. gr. bottle, filling the latter with distilled water, and then weighing it. The weight of water which it is found to contain, deducted from 1000 (the weight of the bottle when filled with distilled water), gives a difference (*a*) which bears the same relation to the sp. gr. of water (1·000) as the weight of the powder (*b*) put into the bottle does to the required sp. gr. Or—

$$a : 1{\cdot}000 :: b : sp.\,gr.$$

The specific gravity of alloys and mixtures, when no condensation has occurred, is equal to the sum of the weights divided by the sum of the volumes, compared to water reckoned as unity; and is not merely the arithmetical mean between the two numbers denoting the two sp. gr., as is frequently taught. See BEADS (Lovi's), HYDROMETER, MIXTURES (Arithmetic of), &c. For the mode of determining the specific gravity of gases, the reader is referred to the works on chemistry of Miller and Fownes.

The specific gravity of a liquid is found by weighing it in a sp. gr. bottle, glass flask, or other vessel of known capacity, and dividing that weight by the weight of the same bulk of water; the quotient is, as before, the specific gravity. A bottle of the capacity of 1000 water-grains (specific gravity bottle) gives the density of a liquid at once, by simply filling it to the given mark, and then accurately weighing it.

SPEC'TACLES. See EYE, VISION, &c.

SPECTROSCOPE. An instrument devised for examining the spectra of flames. (See *below*.)

SPEC'TRUM ANAL'YSIS. A method of

[1] By many modern chemists *hydrogen*, the lightest substance in nature, is taken as the standard for the specific gravity of gases and vapours.

determining the chemical constituents of substances, devised by Kirchhoff and Bunsen. It consists in letting the rays of a flame, coloured by the substance under examination, pass first through a narrow slit, then through a prism, and observing them, when thus refracted, through a telescope. A distinct spectrum is obtained for every flame-colouring metal; thus, sodium, which gives a yellow colour to the flame, has a spectrum consisting of a double yellow line; potassium, which burns with a purple light, gives red and blue lines; lithium also gives red and blue lines, but they are of a different tint and in a different part of the spectrum; calcium gives red, yellow, green, and blue lines; barium a great number of green lines, and so on. To produce a suitable flame, of great heating power but small luminosity, a Bunsen's gas-lamp is usually employed; in this flame the substance to be examined is burned on a loop of fine platinum wire. The instrument employed for producing and viewing the spectra is called a spectroscope. This method of analysis is so delicate, that a quantity of sodium but little exceeding the millionth part of a grain may be detected by it. Since its introduction, four new metals have been discovered by it, namely, cæsium, rubidium, thallium, and indium.[1] See FLAME COLOURS, &c.

SPEC'ULUM MET'AL. *Prep.* 1. Take of copper, 64 parts; pure tin, 29 parts; melt them separately under a little black flux; next incorporate them thoroughly by stirring with a wooden spatula, and run the metal into the moulds, so that the face of the intended mirror may be downwards; lastly, allow the whole to cool very slowly.

2. Pure copper, 2 parts; pure tin, 1 part. *Used* to make the mirrors of reflecting telescopes. The addition of a little metallic arsenic renders it whiter.

SPEL'TER. See ZINC.

SPERMACE'TI. *Syn.* CETACEUM (B. P., Ph. L. E. & D.), L. A concretion prepared from the oily matter of the head of the *Physeter macrocephalus*, or spermaceti whale. It is demulcent and emollient; chiefly used in ointments and cerates.

SPHEROID'AL STATE. It is found that water, or any other volatile liquid, thrown on a metallic plate heated to dull redness, is not resolved into vapour, but, assuming a somewhat globular form, remains intact, until the temperature becomes sufficiently lowered to allow of contact between the liquid and the heated surface. It is then immediately volatilised. M. Boutigny, who fully investigated this subject, has also shown that the same thing happens when a solid body containing water is substituted for the liquid in the above and similar experiments. Thus, the finger or hand, under certain restrictions, may be thrust, with perfect impunity, into a stream of molten metal, and ice may be produced by throwing water into a red-hot crucible. This last experiment, as performed by MM. Boutigny and Prevostaye, is essentially as follows:—A thick platinum crucible, of the capacity of 1 fl. oz., is heated to redness over a powerful spirit lamp, and some liquid anhydrous sulphurous acid (a very volatile substance) poured into it by means of a pipette; the acid assumes a spheroidal form, and does not evaporate; a few drops of water are now introduced into the sulphurous acid in the same way; the diluted and slightly cooled acid instantly flashes off in vapour, and, robbing the water of its caloric, leaves the latter in a frozen state; and, if the operator seizes the right moment, a solid lump of ice may be thrown out of the red-hot crucible.

SPICE. A general name for vegetable substances possessing aromatic and pungent properties, and employed for seasoning or flavouring food.

Spice, Horse. *Syn.* COW SPICE; SPECIES EQUINUS, L. *Prep.* 1. Aniseed, allspice, cumin seed, ginger, liquorice, and turmeric, equal parts.

2. Turmeric and cumin seed, of each, 5 lbs.; ginger, 2½ lbs. Used by farriers.

Spice, Kit'chen. *Syn.* MIXED SPICE, KITCHEN PEPPER, &c. *Prep.* From black pepper, 2 lbs.; ginger, 1 lb.; cinnamon, allspice, and nutmegs, of each, 8 oz.; cloves, 1 oz.; dry salt, 6 lbs.; well ground together. Useful to flavour gravies, soups, &c.

Spice, Mixed. As the last, omitting half the salt.

Spice, Pease. See POWDER.

Spice, Ragout. *Prep.* From dry salt, 1 lb.; flour of mustard, black pepper, and grated lemon peel, of each, ½ lb.; cayenne pepper, 2 oz.; allspice and ginger, of each, 1 oz.; nutmeg, ½ oz.; all separately powdered.

Spice, Sausage (French). *Syn.* EPICE FINES, Fr. *Prep.* From black pepper, 5 lbs.; ginger 2½ lbs.; cloves and nutmegs, of each 1 lb.; aniseed and coriander seeds, of each, ½ lb.; powder and mix them.

Spice, Sa"voury. *Prep.* 1. (Kidder's.) From cloves, mace, nutmegs, pepper, and salt, equal parts. Used by cooks.

2. (Dr. Kitchener's.) See RAGOUT SPICE (*above*).

Spice, Soup. *Syn.* KITCHENER'S SOUP-HERB POWDER, KITCHENER'S VEGETABLE RELISH, &c. *Prep.* From parsley, lemon thyme, sweet marjoram, and winter savoury, of each, dried, 2 oz.; sweet bazil and yellow peel of lemon, of each, dried, 1 oz.; mix, and powder.

Spice, Sweet (Kidder's). *Prep.* From cinnamon, cloves, mace, nutmegs, and sugar, equal parts. Used in pastry.

SPIGE'LIA. *Syn.* CAROLINA PINK ROOT; SPIGELIA (Ph. E.), L. The root of *Spigelia Marilandica*, or worm grass. It is purgative, narcotic, and vermifuge.—*Dose.* 10 to 40 grs., in powder or infusion, night and morning,

[1] See the last edition of Fownes's "*Manual of Chemistry*, and Watts's "*Dic. of Chemistry*."

until the worms are expelled. Rhubarb or calomel is commonly added to it.

SPIRIT. *Syn.* SPIRITUS, L. Under this term are included all the inflammable and intoxicating liquors obtained by distillation, and used as beverages, as BRANDY, GIN, RUM, &c., each of which is noticed in its alphabetical order. Spirit may also be obtained by fermentation and distillation from all vegetable juices or solutions that contain sugar.

The spirit used in pharmacy and chemistry is distinguished by names which have reference to its richness in alcohol. (See TABLES.)

I. TABLE *of the Pharmacopœial Spirits.*

	Sp. gr.
Alcohol, Ph. B. (absolute)	0·795 } nearly
„ Ph. E.	0·796 } pure
„ Ph. D. 1826	0·810 or 70% o. p. } Alcohol.
„ Ph. L. 1836	0·815 „ 68% „
Stronger Spirit (Spiritus Fortior), Ph. D.	0·818 „ 66% „
**Rectified Spirit* (Spirit of Wine; Spiritus Rectificatus), B. P.	0·838 „ 56% „
Rectified Spirit, Ph. D.	0·840 or 54$\frac{10}{40}$ o. p.
Proof Spirit (Spiritus Tenuior), Ph. B.	0·920 „ —
Alcohol (absolu), P. Cod.	0·797 „ —
„ (at 40°) „	0·810 „ 70% „
„ (du commerce), P. Cod.	0·863 „ 41% „
„ (faible) „	0·923 „ 21$\frac{10}{40}$ u. p.

* "This spirit can be reduced to the standard of the weaker (or proof) spirit, by adding, to every 5 pints of it, 3 pints of distilled water, at 62° Fahr." (Ph. L.)

II. TABLE *of the principal Spirituous Liquors sold in England, with their usual Strengths, &c.*

Denomination.	Revenue Mark.	Import Strength.	Legal Limits of Strength.	Usual Selling Strength. By *Permit.*	Usual Selling Strength. Contains Alcohol of 0·825.	Usual Selling Strength. Contains Absolute Alcohol.	Specific Gravity at 60° Fahr.
*Gin (*strongest*)	X (17 u. p.)	.....	Not stronger than 25 o. p.	17 u. p.	.....	40%	0·9395
*Do. (*best ordinary*)	X (22 u. p.)	.....	do.	22 u. p.	.....	37·4%	0·9445
†Do. (*cordial*)	X (22 u. p.)	.....	do.	22 u. p.	.....	do.	‖0·
†Do.	X (24 u. p.)	.....	do.	24 u. p.	.....	36·5%	‖0·
‡Peppermint	X mint.	.....	do.	60 u. p.	.....	21%	‖0·
‡Do.	do.	.....	do.	64 u. p.	.....	18%	‖0·
‡Cloves, ‡Bitters, ‡Raspberry, ‡Noyau, ‡Cinnamon, ‡Tent, ‡Aniseed, ‡Caraway, ‡Lovenge, ‡Usquebaugh, ‡Orange Cordial, ‡Citron	X (64 u. p.)	.....	do.	64 u. p.	.....	do.	‖1·065 to 1·080
Rum	R.	About 10 o. p. to 43 o. p.	No limit.	11 u. p.	.....	43%	0·9329 to 0·8597
* ‡Rum Shrub	R. Sh.	.....	do.	64 u. p.	.....	18%	‖0·
‡Do.	do.	.....	do.	60 u. p.	.....	21%	‖0·
French Brandy	F.	About 5 o. p. to 8 or 10 u. p.	do.	10 u. p.	.....	44%	0·9318
§Spirit of Wine	S. W.	.....	Not less than 43 o. p.	54 to 64 o. p.	.....	.....	0·8415 to 0·8221
Malt, grain, or molasses spirit (*sent out by British distillers*)	P. S.	.....	Not stronger than 25 o. p.	.....	.....	.....	0·8669 to 0·9318
Hollands	Geneva.	.....	No limit.	.....	51·60%	40·5%	0·9358
Whiskey (*Irish*)	P. S.	.....	Not stronger than 25 o. p.	.....	54%	50%	
Do. (*Scotch*)	P. S.	.....		.....	54·32%	50·22%	

* Frequently retailed at 25 to 35 u. p.

† Though 'permitted' at 22 to 24, are generally from 5 to 35 u. p., or even weaker.

‡ These, though 'permitted' at 60 or 64 u. p., are generally 75 or 80 u. p.

§ Usual strength 54 to 60 o. p.

‖ The specific gravity is no guide when sugar is present, as in compounds.

Spirituous liquors, like all other fluids at common temperatures, expand when they are heated, and diminish in volume when they are cooled. It is found that 1000 galls. of proof spirit, measured at the temperature of 50° Fahr., will, if re-measured at 59°, be found to have increased in bulk to fully 1004¼ galls.; whilst 1000 galls. of the same spirit, measured at 77° Fahr., will be only equal to 991½ galls. at 59°. These changes are still more marked at higher strengths, and at extreme temperatures, and, from not being recognisable by the hydrometer, often lead to serious losses in trade, and to serious fluctuations in 'stock,' which, to those unaware of the action of temperature, are perfectly unaccountable. A gallon of proof spirit only weighs 9⅛ lbs. at 60° Fahr. At a higher temperature it will weigh less—at a lower one, more; but as this weight constitutes the standard gallon at the temperature the proof is calculated for, it is manifest that any variations from it must result in loss either to the buyer or seller. Hence the equity of buying and selling liquors by weight, instead of by measure. The stock-keeper in every wholesale house should be aware of this fact, and on 'taking stock' should as regularly enter the temperature of his liquors in his stock-book as he does the 'dip' or 'wet inches.' See ALCOHOL, ALCOHOLOMETRY, SPECIFIC GRAVITY, SPIRITS (Medicinal), SPIRITS (Perfumed), &c.

Spirit, Amyl'ic. See FUSEL OIL.

Spirit, Dyer's. See TIN MORDANTS.

Spirit, Meth'ylated. Spirit of wine to which one tenth of its volume of wood naphtha (strength not less than 60° o. p.) has been added, the object of such addition being that of rendering the mixture unpotable through its offensive odour and taste. The purification of this mixed spirit, or the separation of the two alcohols, though often attempted, has always proved a failure. It might be supposed that, owing to the low boiling-point of methylic alcohol, simple distillation would effect this; but experience has shown that both spirits distil over simultaneously. This is, no doubt, due to the difference of their vapour densities. Methylated spirit, being sold duty free, can be employed by the chemical manufacturer as a solvent in many processes for which, from its greater cost duty-paid spirit would be commercially inapplicable. But in the preparation of medicines, containing spirit, as the vehicle or menstruum by which more active substances are administered, the employment of methylated spirit is highly improper. The Council of the Pharmaceutical Society obtained from the Pharmacopœia Committee of the Medical Council, the decided opinion that "the substitution of 'methylated' for 'rectified' spirit in any of the processes of the Pharmacopœia should be strictly prohibited."

The use of methylated spirit in the preparation of tinctures, sweet spirit of nitre, common ether, or any medicine to be used internally, is now prohibited by law.

Spirit, Proof. See *above*.

Spirit, Pyroace'tic. *Syn.* ACETONE; SPIRITUS PYROACETICUS, L.; ACÉTONE, ESPRIT PYROACÉTIQUE, Fr. An inflammable volatile liquid obtained with carbonic acid and other products when the metallic acetates in an anhydrous state are subjected to destructive distillation. The acetate of lead is the most eligible salt for this purpose.

Prep. 1. Dried acetate of lead is carefully distilled in a large earthen or coated-glass retort, by a heat gradually raised to redness, the volatile products being passed through a condenser well supplied with cold water. The distillation is continued until nothing but finely divided lead (lead pyrophorus) remains in the retort. The receiver contains crude acetone, which is to be saturated with carbonate of potassa, and afterwards rectified in a water bath from chloride of calcium.

2. By passing the vapour of strong acetic acid through an iron tube heated to dull redness, and condensing the acetone thus formed.

Obs. In both of the above processes carbonic acid and other permanent gases are produced, consequently the receiver must not fit too closely to the tube of the condenser.

Prop. Colourless, limpid, of peculiar odour, and very inflammable, giving a brilliant flame, without smoke; boiling-point 132° Fahr.; sp. gr. ·792. It dissolves resins and essential oils. See MESITILOL, MESITYL, METACETONE, &c.

Spirit, Pyroxyl'ic. *Syn.* PYROLIGNEOUS SPIRIT, WOOD S., MEDICINAL NAPHTHA, WOOD N., HYDRATED OXIDE OF METHYL; SPIRITUS PYROXYLICUS (Ph. D.), L. A light volatile liquid, discovered by P. Taylor, in 1812, among the limpid products of the distillation of dry wood. It has been shown by Dumas and Peligot to be "really a second alcohol, forming an ether, and a series of compounds (MYTHYL-SERIES) exactly corresponding with those of vinous spirit, and, in some points, even more complete than the latter."

Prep. Crude pyroligneous acid (which contains about 1% of the spirit) is subjected to distillation, and the first or more volatile portion which passes over is neutralised with hydrate of lime. After repose, the clear liquid is separated from the oil which floats on the surface, and from the sediment at the bottom of the vessel; this, when redistilled, forms the wood spirit of commerce. It may be strengthened in the same manner as ordinary alcohol, by rectification, and ultimately rendered pure by careful distillation from quicklime by the heat of a water bath. Berzelius recommends the crude spirit to be agitated with a fatty oil, to remove empyreumatic matter, and then to rectify it, first, from recently burnt charcoal, and next with chloride of calcium.

Prop., &c. Pure pyroxylic spirit is a transparent colourless liquid, having a penetrating ethereal smell, and a hot disagreeable taste; it is very inflammable, burning with a pale blue flame. It is neutral to test paper; mixes with water, alcohol, and ether, in all proportion; and boils at 152° Fahr.; sp. gr. ·798 at 68° Fahr. (Regnault and Liebig.) Dr. Ure states the sp. gr. to be ·824 at 60°; the Dublin College makes it ·846. That of the latter must therefore have contained a little water. It does not dissolve India rubber and gutta percha, like mineral or true naphtha.

Pyroxylic spirit is distinguished from acetone or pyroacetic spirit by the character of its flame, and by freely dissolving chloride of calcium, which is quite insoluble in the latter. In a mixture of these two liquids two distinct strata are formed when this substance, either in powder or concentrated solution, is added.

Pyroxylic spirit is distinguished from vinous spirit by Nessler's test (which *see*), by its forming a solid crystalline salt (methylic oxalate) when distilled with an oxalate and sulphuric acid, and by its lower boiling-point. The presence of alcohol, in a mixture of the two, is readily detected by distilling the suspected sample with sulphuric acid. The formation of common ether indicates ethylic alcohol, and from the amount formed the proportion of alcohol may be determined.

Uses, &c. Chiefly to dissolve resins and volatile oils, especially shell-lac, and as a substitute for alcohol in spirit lamps. As a medicine, it is anodyne and sedative; and has been beneficially employed by Drs. Christison, Hastings, and Neligan, to allay the harassing cough, troublesome vomiting, and excessive expectoration, in phthisis and some other affections.—*Dose.* 5 to 30 drops, thrice a day, in water.

Spirit, Rai'sin. *Prep.* From raisins fermented along with water, and the wash distilled by a quick fire. *Used* to give a brandy flavour to malt spirit. 1 gal. added to 150 galls. of plain spirit, along with some colouring, and a little catechu, either with or without a little acetic ether, makes a very decent 'British Brandy.'

Spirit, Rec'tified. See ALCOHOL, and TABLE I, under SPIRIT.

Spirit of Salt†. Hydrochloric acid.

Spirit of Soup-herbs. As essence of soup-herbs, but substituting 1 quart of brandy or proof spirit for the rectified spirit.

Spirit of Wine. See ALCOHOL, and TABLE I, under SPIRIT.

SPIRITS (Medic'inal). *Syn.* SPIRITUS MEDICINALES, L. The spirits of pharmacy are either prepared by macerating the bruised seeds, flowers, herbs, &c., in the spirit, for 2 or 3 days before distillation, and then drawing it off by a gentle heat; or extemporaneously, by adding a proper proportion of essential oil to pure spirit of the prescribed strength. This latter plan is very generally adopted in the Ph. D. In the first method, when a naked fire is employed, a little water is put into the still along with the spirit, to prevent empyreuma. These spirits are principally employed as aromatics and stimulants, or as adjuvants in draughts and mixtures.

The following are the principal medicinal spirits:—

Spirit of Ammo"nia. *Syn.* SPIRITUS AMMONIÆ (Ph. E.). *Prep.* 1. (Ph. E.) Take of quicklime, 12 oz.; slake it with water, 6½ fl. oz.; add of finely powdered chloride of ammonium, 3 oz.; and distil in a glass retort furnished with a tube reaching nearly to the bottom of a bottle containing rectified spirit, 2 pints, and kept well cooled. A sand heat is to be employed, and the distillation continued as long as anything passes over. The product has a sp. gr. about ·845, and should not effervesce with acids. The alkali is here in the caustic state, and in this respect it resembles the spirit of ammonia, Ph. U. S., and Dzond's caustic spirit of ammonia, Ph. Bor.

2. (Ph. L. 1836.) Chloride of ammonium, 10 oz.; carbonate of potassa, 16 oz.; rectified spirit and water, of each, 3 pints; mix, and let 3 pints distil.

3. (Ph. D. 1826.) Dissolve 3½ oz. of carbonate of ammonia, in rectified spirit, 3 wine pints.

Obs. The ammonia in the last two preparations exists in the carbonated state. They are chiefly employed to make other preparations.

4. (ANISATED SPIRIT OF AMMONIA; LIQUOR AMMONIÆ ANISATUS, SPIRITUS A. A.—Ph. Bor.) Rectified spirit, 12 oz.; oil of aniseed, 3 drs.; dissolve, and add of caustic solution of ammonia (·960), 3 oz.

5. (AROMATIC SPIRIT OF AMMONIA, SPIRIT OF SAL VOLATILE; SPIRITUS AMMONIÆ AROMATICUS—B. P., Ph. L. E. & D.)—*a.* (Ph. L.) Take of hydrochlorate of ammonia, 6 oz.; carbonate of potassa, 10 oz.; cinnamon and cloves, of each, bruised, 2½ drs.; fresh lemon peel, 5 oz.; rectified spirit and water, of each, 2 quarts; mix, and distil 3 quarts. Sp. gr. ·918.

b. (Ph. E.) Spirit of ammonia, 8 fl. oz.; oil of rosemary, 1½ fl. dr.; oil of lemon peel, 1 fl. dr.; mix,

c. (Ph. D.) Rectified spirit, 3 pints; oil of lemon, ½ fl. oz.; oil of nutmeg, 2 fl. drs.; oil of cinnamon, ½ fl. dr.; dissolve, and add of stronger solution of ammonia, 6 fl. oz. Sp. gr. ·852.

d. (B. P.) Carbonate of ammonia, 8 oz.; strong solution of ammonia, 4 oz.; volatile oil of nutmeg, 4 drs.; oil of lemon, 6 drs.; rectified spirit, 6 pints; water, 3 pints; distil 7 pints.—*Dose.* 20 to 60 minims in camphor water.

Obs. The ammonia exists in the state of neutral carbonate in the product of the *a* formula, but in the caustic state in those of the others.—*Dose.* ½ to 1 fl. dr., in water, or any bland liquid; as a diffusible stimulant and

antacid, in debility, low spirits, dyspepsia, heartburn, flatulent colic, hysteria, &c. The spirit of sal volatile of the shops is generally a spurious compound of little more than half the above strength.

6. (FETID SPIRIT OF AMMONIA; SPIRITUS AMMONIÆ FŒTIDUS—B. P., Ph. L. E. & D.), L.—*a.* (Ph. E.) Hydrochlorate of ammonia, 10 oz.; carbonate of potassa, 16 oz.; assafœtida, 5 oz.; rectified spirit and water, of each, 3 pints; mix well, then slowly distil 3 pints. Sp. gr. ·861.

b. (Ph. E.) Spirit of ammonia, 10½ fl. oz.; assafœtida (broken small), ½ oz.; digest for 12 hours, then distil 10½ fl. oz., by the heat of a vapour (water) bath.

c. (Ph. D.) Assafœtida, 1½ oz.; rectified spirit, 1½ pint; digest for 24 hours, then distil off the whole of the spirit, and mix the product with stronger solution of ammonia, 3 fl. oz. Sp. gr. ·849.

d. (B. P.) Strong solution of ammonia, 2; assafœtida, in small pieces, 1½; rectified spirit, sufficient; macerate the assafœtida in 15 of the spirit for 24 hours, distil, add the distillate to the ammonia, and make up with spirit to 20. —*Dose.* ½ to 1 dr.

Obs. The dose, &c., are the same as those of the last, but it is preferred for hysterical and spasmodic affections.

Spirit, Amyl'ic. *Syn.* ALCOHOL AMYLICUM (Ph. D.), L. See FUSEL OIL.

Spirit of An'iseed. *Syn.* SPIRITUS ANISI (Ph. L.), L. *Prep.* 1. (Ph. L.) Oil of aniseed, 3 fl. drs.; proof spirit, 1 gal.; dissolve. Carminative.—*Dose.* ½ fl. dr. to 4 fl. drs.

2. (ESSENTIA ANISI—Ph. D.) Oil of aniseed, 1 fl. oz.; rectified spirit, 9 fl. oz.; mix with agitation. Chiefly used to make aniseed water.

3. (COMPOUND SPIRIT OF ANISEED; SPIRITUS ANISI COMPOSITUS—Ph. D. 1826.) Aniseed and angelica seed, of each, ½ lb.; proof spirit, 1 gal.; water, q. s.; distil 1 gallon. When coloured with saffron, or sap green, it closely resembles the Irish usquebaugh. (Montgomery.)—*Dose.* 1 to 4 fl. drs.

Spirit, Arquebusade'. See VULNERARY SPIRIT (*below*).

Spirit of Balm (Compound). *Syn.* BALM WATER, CARMELITE W.; AQUA MELISSÆ COMPOSITA, SPIRITUS M. COMPOSITUS, L.; EAU DES CARMES, EAU DE MELISSE DES CARMES, a. *Prep.* 1. (P. Cod.) Fresh flowering tops of balm, 24 oz.; fresh lemon peel, 4 oz.; cinnamon, cloves, and nutmegs, of each, 2 oz.; coriander seed and dried angelica root, of each, ½ oz.; rectified spirit, 8 lbs.; macerate for 8 days and distil in a water bath to dryness. The spirit is much esteemed in France as a cosmachic, a cosmetic, and a stimulant.

Spirit, Bath'ing. Soap liniment.

Spirit of Cam'phor. *Syn.* CAMPHORATED SPIRIT; SPIRITUS CAMPHORÆ (B. P., Ph. L.), TURA CAMPHORÆ, SPIRITUS CAMPHORATUS, L. *Prep.* 1. (Ph. L.) Camphor, 5 oz.; rectified spirit, 1 quart; dissolve.

2. (B. P.) Camphor, 1; rectified spirit, 9; dissolve.—*Dose.* 10 to 30 minims, in milk or on sugar. *Used* as an application to chilblains, and in chronic rheumatism, cholera, &c. See DROPS, ESSENCE, and TINCTURE.

Spirit of Car'away. *Syn.* SPIRITUS CARUI (Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Oil of caraway, 2 fl. drs.; proof spirit, 1 gal.; dissolve.

2. (Ph. E.) Caraway seeds (bruised), ½ lb.; proof spirit, 7 pints; macerate for 2 days in a covered vessel, then add of water, 1½ pint, and distil 7 pints. Aromatic and carminative.—*Dose.* 1 to 4 fl. drs. A similar spirit, "sweetened with sugar, is drunk in Germany as a dram (KÜMELLIQUEUR; KÜMELBRANDTWEIN).

3. (ESSENTIA CARUI—Ph. D.) Oil of caraway, 1 fl. oz.; rectified spirit, 9 fl. oz. *Used* to make caraway water.

Spirit of Cas'sia. *Syn.* SPIRITUS CASSIÆ (Ph. E.), L. *Prep.* From coarsely powdered cassia, 1 lb.; proof spirit, 7 pints; water, 1½ pint, or q. s.; draw off 7 pints.—*Dose*, &c., as the last. It is almost universally substituted for spirit of cinnamon.

Spirit of Cin'namon. *Syn.* SPIRITUS CINNAMOMI (Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Oil of cinnamon, 2 fl. drs.; proof spirit, 1 gal.; dissolve.

2. (Ph. E.) From cinnamon, as spirit of cassia.—*Dose.* 1 to 4 fl. drs.

3. (ESSENTIA CINNAMOMI—Ph. D.) Oil of cinnamon, 1 fl. oz.; rectified spirit, 9 fl. oz. *Used* to make cinnamon water, &c.

Spirit of E'ther. *Syn.* SPIRIT OF SULPHURIC ÆTHER, SWEET SPIRIT OF VITRIOL†; SPIRITUS ÆTHERIS (B. P.), SPIRITUS ÆTHERIS SULPHURICI (Ph. E.), L. *Prep.* 1.—*a.* (Ph. E.) Sulphuric ether, 1 part; rectified spirit, 2 parts. Sp. gr. ·809. *Obs.* This preparation should be neutral to test paper, mix (clear) with water, and, when shaken with twice its volume of concentrated solution of chloride of calcium, 28% of ether should separate.—*Dose.* ½ to 2 or 3 fl. drs.; as a stimulant and anodyne.

b. (B. P.) Ether, 1; rectified spirit, 2; mix. —*Dose.* 30 to 60 minims.

2. (COMPOUND SPIRIT OF ETHER, HOFFMANN'S ANODYNE LIQUOR; SPIRITUS ÆTHERIS COMPOSITUS (Ph. L.), S. ÆTHERIS OLEOSUS (Ph. D.), L.—*a.* (Ph. L.) Ether, 8 fl. oz.; rectified spirit, 16 fl. oz.; ethereal oil, 3 fl. drs.; mix.

b. (Ph. D.) Mix in a glass matrass, oil of vitriol, 1½ pint, with rectified spirit, 1 pint; connect this with a Liebig's condenser, apply heat, and distil until a black froth begins to rise; then separate the upper stratum of the distilled liquid, and, having exposed it to the air for 24 hours, let the oil be transferred to a moist paper filter, and washed with a little cold water; lastly, dissolve it in a mixture of, rectified spirit, ½ pint; sulphuric ether, 5 fl. oz.

Obs. This compound is anodyne and antispasmodic, and was once held in very great repute.—*Dose.* ½ to 2 fl. drs.

3. (AROMATIC SPIRIT OF ETHER, A. S. OF SULPHURIC E., SWEET ELIXIR OF VITRIOL†; SPIRITUS ÆTHERIS AROMATICUS, L. *Prep.* (Ph. L. 1824.) Bruised cinnamon, 3 drs.; cardamoms, 1½ dr.; long pepper and ginger, of each, 1 dr.; rectified spirit, 10 fl. oz.; sulphuric ether, 5 fl. oz.; mix, and digest 14 days. The last two preparations are also frequently called 'sweet elixir of vitriol.'

Spirit of Harts'horn. *Syn.* LIQUOR or SPIRITUS VOLATILIS CORNU CERVI, L. Originally distilled from hartshorn. Dilute liquor of ammonia is now generally sold for spirit of hartshorn.

Spirit of Horserad'ish (Compound). *Syn.* SPIRITUS ARMORACIÆ COMPOSITUS (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) Sliced horseradish and dried orange peel, of each, 20 oz.; bruised nutmegs, 5 drs.; proof spirit, 1 gal.; water, 1 quart, or q. s.; distil 1 gal. Stimulant and diuretic.—*Dose.* 1 to 4 fl. drs.; in dropsies, when there is much debility. It is usually combined with infusion of juniper berries or foxglove.

2. (B. P.) Fresh root, sliced, 20; dried orange peel, 20; nutmeg, bruised, ½; proof spirit, 160; water, 40; mix, and distil over 160.—*Dose.* 1 to 3 drs.

Spirit of Hydrochlo"ric Ether. *Syn.* SPIRIT OF MURIATIC ETHER, CLUTTON'S FEBRIFUGE SPIRIT; ÆTHER HYDROCHLORICUS ALCOHOLICUS, SPIRITUS ÆTHERIS MURIATICI, L. *Prep.* 1. From hydrochloric ether and rectified spirit, equal parts; mixed together.

2. (Ph. E. 1744.) Hydrochloric acid, 1 part; rectified spirit, 3 parts; digest some days, and distil in a sand bath.—*Dose.* ½ to 3 fl. drs.; in dyspepsia, liver complaints, hectic fever, &c.

Spirit of Juni"per. *Syn.* SPIRITUS JUNIPERI (B. P.). *Prep.* English oil of juniper, 1; rectified spirit, 49; dissolve.—*Dose.* 30 to 60 minims.

Spirit of Juniper (Compound). *Syn.* SPIRITUS JUNIPERI COMPOSITUS (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Oil of juniper, 1½ fl. dr.; oils of caraway and fennel, of each, 12 drops; proof spirit, 1 gal.; dissolve.

2. (Ph. L. 1836.) Juniper berries, bruised, 15 oz.; caraway and fennel seed, of each, bruised, 2 oz.; proof spirit, 1 gal.; water, 1 quart, or q. s.; distil 1 gallon.

Obs. This spirit is stimulant and diuretic. —*Dose.* 2 to 4 fl. drs. Mixed with twice or thrice its weight of proof spirit, and sweetened with a little sugar, it makes no bad substitute for Hollands gin.

Spirit of Lav'ender. *Syn.* SPIRITUS LAVANDULÆ (B. P., Ph. E.), L. *Prep.* From fresh lavender, 2½ lbs.; rectified spirit, 1 gal.; water, 1 quart, or q. s.; distil 1 gallon (7 pints—Ph. E.).

2. (Wholesale.) From Mitcham oil of lavender, 3 oz.; rectified spirit, 1 gal.; dissolve. Cordial and fragrant.

3. (B. P.) English oil of lavender, 1; rectified spirit, 49; dissolve.—*Dose.* 30 to 60 minims. See SPIRITS (Perfumed), TINCTURE, &c.

Spirit of Ni'tric Ether. *Syn.* SPIRIT OF NITROUS ETHER, SWEET SPIRIT OF NITRE, NITROUS ETHEREAL SPIRIT, NITRE DROPS; SPIRITUS ÆTHERIS NITRICI (B. P., [illegible] E.), SPIRITUS ÆTHEREUS NITROSUS (Ph. D.), L. *Prep.* 1. (Ph. L.) Take of rectified spirit, 1 quart; nitric acid, 3½ fl. oz.; add the acid, by degrees, to the spirit; then mix them, and let 28 fl. oz. distil over. An earthenware still and condensing worm should be employed. Sp. gr. ·834.

2. (Ph. E.) Pure hyponitrous ether (Ph. E.), 1 part; rectified spirit, 4 parts; (both by volume;) mix. Sp. gr. ·847.

3. (Ph. D.) Nitrous or hyponitrous ether (which has been washed with half of its volume of liquor of ammonia), 4 fl. oz.; rectified spirit, "in 42 fl. oz.; mix, and preserve the compound in small, strong, and accurately stopped bottles."

4. (B. P.) Nitric acid (sp. gr. 1·42), 3; sulphuric acid, 2; copper, in fine powder (No. 25), 2; rectified spirit, a sufficiency; to 20 of the spirit add gradually the sulphuric acid, stirring them together; then add to this, also gradually, 2½ of the nitric acid. Put the mixture into a retort or other suitable apparatus into which the copper has been introduced, and to which a thermometer is fitted. Attach no an efficient condenser, and, applying a gentl heat, let the spirit distil at a temperature com mencing at 170° and rising to 175°, but no exceeding 180°, until 12 have passed over an been collected in a bottle kept cool, if nece sary, with ice-cold water; then withdraw t heat, and, having allowed the contents of t retort to cool, introduce the remaining ½ nitric acid, and resume the distillation a before, until the increased product has bee increased to 15. Mix this with 40 of th rectified spirit, or as much as will make th product correspond to the tests of specifi gravity and per-centage of ether separated b chloride of calcium. Preserve it in well-close vessels.

Char. and Tests. Transparent, and nearl colourless, with a very slight tinge of yellow mobile, inflammable, of a peculiar penetratin apple-like odour, and sweetish, cooling, shar taste. It effervesces feebly, or not at all, whe shaken with a little bicarbonate of soda. Whe agitated with solution of sulphate of iron an a few drops of sulphuric acid, it becomes dee olive-brown or black. If it be agitated wit twice its volume of a saturated solution chloride of calcium in a closed tube, 2⅔ of i original volume will separate in the form nitrous ether, and rise to the surface of th mixture. Sp. gr. ·845.—*Dose.* 1 to 2 fl. dr

Pur., &c. Pure spirit of nitric ether boi at about 160° Fahr., scarcely reddens litmu paper, and "gives off no bubbles of carbon acid gas on the addition of carbonate of soda (Ph. L.) "When agitated with twice i volume of concentrated solution of chloride calcium, 12⅔ of ether slowly separates." (P E.)—*Dose.* ½ to 3 fl. drs., as a febrifuge, adi

phoretic, diuretic, antispasmodic, &c.; in various affections.

Obs. The mass of the sweet spirits of nitre of the shops is of very inferior quality, and is scarcely, if ever, made directly from spirit that has paid the duty. One, and a very large portion, is obtained from Scotland; another, from the manufacturers of fulminating mercury; and a third, and, in fact, the principal part, from certain persons in the neighbourhood of the metropolis who employ contraband spirit for its preparation, as this article is not under the excise. Recently methylated spirit has been employed for the purpose.

Sweet spirits of nitre, sp. gr. ·850, is now commonly and publicly sold, in quantity, at a price which is only about 2-3rds that of the spirit in it, if the latter had paid duty. The spirit obtained from the manufacturers of fulminating mercury frequently contains no inconsiderable quantity of hydrocyanic acid.

The mere admixture of nitric or hyponitrous ether with alcohol does not afford an officinal SPIR. ÆTHER. NITR., as this always contains aldehyde, which, according to Prof. Liebig, is an essential constituent of the officinal compound.

Spirit of Nitrous Ether. *Syn.* SPIRITUS ÆTHERIS NITROSI (B. P.). See SPIRIT OF NITRIC ETHER.

Spirit of Nut'meg. *Syn.* SPIRITUS MYRISTICÆ (B. P., Ph. L. & E.), S. NUCIS MOSCHATÆ, L. *Prep.* 1. (Ph. L. & E.) Bruised nutmegs, 2½ oz.; proof spirit, 1 gal.; water, 1 pint, or q. s.; distil a gallon. Cordial and carminative.—*Dose.* 1 to 4 fl. drs.; chiefly used to flavour mixtures and draughts.

2. (ESSENTIA MYRISTICÆ MOSCHATÆ—Ph. D.) Oil of nutmegs, 1 fl. oz.; rectified spirit, 9 fl. oz. *Used* in dispensing.

3. (B. P.) Volatile oil of nutmeg, 1; rectified spirit, 49; dissolve.—*Dose.* 30 to 60 minims.

Spirit of Pennyroy'al. *Syn.* SPIRITUS PULEGII (Ph. L.), S. MENTHÆ PULEGII, L. *Prep.* 1. (Ph. L.) Oil of pennyroyal, 3 fl. drs.; proof spirit, 1 gall.; dissolve. Stimulant, antispasmodic, and carminative.—*Dose.* ½ to 2 fl. drs.

2. (ESSENTIA MENTHÆ PULEGII—Ph. D.) Oil of pennyroyal, 1 fl. oz.; rectified spirit, 9 fl. oz. *Used* chiefly in dispensing.

Spirit of Pep'permint. *Syn.* SPIRITUS MENTHÆ PIPERITÆ (B. P., Ph. L.), S. MENTHÆ (Ph. E.), L. *Prep.* 1. (Ph. L.) Oil of peppermint, 3 fl. drs.; proof spirit, 1 gal.; dissolve.

2. (Ph. E.) Green peppermint, 1½ lb.; proof spirit, 7 pints; macerate 2 days; add of water, q. s., and distil 7 pints.—*Dose.* ½ to 2 drs.

3. (ESSENTIA MENTHÆ PIPERITÆ—Ph. D.) Oil of peppermint, 1 fl. oz.; rectified spirit, 9 fl. oz. See ESSENCE OF PEPPERMINT.

4. (B. P.) English oil of peppermint, 1; rectified spirit, 49; dissolve.—*Dose.* 30 to 60 minims, or, for children under five years, 1 to 3 minims.

Spirit of Pimen'to. *Syn.* SPIRIT OF ALLSPICE; SPIRITUS PIMENTÆ—Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Oil of pimento, 2 fl. drs.; proof spirit, 1 gal.; dissolve.

2. (Ph. E.) From pimento, bruised, ½ lb., and proof spirit, 7 pints; as spirit of caraway. Carmative and stomachic.—*Dose.* 1 to 4 fl. drs.; in flatulent colic, dyspepsia, &c.

3. (ESSENTIÆ PIMENTÆ—Ph. D.) Oil of pimento, 1 fl. oz.; rectified spirit, 9 fl. oz. *Used* to make pimento water, and in dispensing.

Spirit of Pine-tops. *Syn.* SPIRITUS TURIONUM PINI, L. See RIGA BALSAM.

Spirit of Rose'mary. *Syn.* SPIRITUS ROSMARINI (B. P., Ph. L. & E.), L. *Prep.* 1. (Ph. L.) As SPIRIT OF PIMENTO.

2. (Ph. E.) Rosemary tops, 2½ lbs.; rectified spirit, 1 gall.; as SPIRIT OF LAVENDER. Fragrant and stimulant.

3. (ESSENTIA ROSMARINI—Ph. D.) As ESSENCE OF PIMENTO.

4. (B. P.) Oil of rosemary, 1; rectified spirit, 49; dissolve.—*Dose.* 10 to 30 minims.

Spirit of Spear'mint. *Syn.* SPIRITUS MENTHÆ VIRIDIS (Ph. L.), S. MENTHÆ SATIVÆ, L. *Prep.* 1. (Ph. L.) As SPIRIT OF PEPPERMINT—Ph. L.

2. (ESSENTIA MENTHÆ VIRIDIS—Ph. D.) As ESSENCE OF PEPPERMINT—Ph. D. The uses and doses are also the same.

Spirit of Sulphu'ric E'ther. See *page* 1072.

Spirit of Vitriol (Sweet). See AROMATIC SPIRIT OF ETHER (*above*).

Vul'nerary Spirit. *Syn.* VULNERARY WATER, ARQUEBUSADE; SPIRITUS VULNERARIUS, L.; EAU D'ARQUEBUSADE, Fr. *Prep.* 1. Dried tops of sage, wormwood, fennel, hyssop, marjoram, savory, thyme, rosemary, calamint, balm, peppermint, and scordium, fresh leaves of angelica and basil, and lavender flowers, of each, 4 oz.; proof spirit, 2 galls.; digest for 14 days, and distil over 1½ gal.

2. Rosemary leaves, 1½ lb.; leaves of thyme and summits of millefoil, of each, ½ lb.; juniper berries, 3 oz.; proof spirit, 2 galls.; distil over 5 quarts.

Obs. This preparation is stimulant and vulnerary, and is in great repute on the Continent as a cosmetic and cordial.

SPIRITS (Perfumed). *Syn.* SPIRITUS ODORIFERI, ODORES SPIRITUOSI, L. The odoriferous spirits of the perfumer are, for the most part, prepared from various aromatic and odorous substances, by a similar process to that described under ESSENCES and SPIRITS (Medicinal); but in this case a perfectly pure, flavourless, and scentless spirit must be employed. The distillation should also be preferably conducted by steam, or the heat of a water bath, and the distilled spirit should be kept for some time in a cellar, or other cold situation, previously to being used. When simple solution of an essential oil in the spirit is adopted,

care should be taken that the oil is pale and new; or, at least, has not been much exposed to the air; as in that case it would contain resin, which would make the perfumed spirit, or essence, liable to stain delicate articles of clothing to which it may be applied. Most of the 'eaux' and 'esprits' of the perfumers are prepared by one or other of the above methods. It is found, however, that the perfumed spirits of some of the more delicate flowers cannot be well obtained by either infusion or distillation, or by the simple solution of their essential oils in spirit; or, at least, they are not usually so prepared by the foreign perfumers. The spirits of orange flowers, jasmin, tuberose, jonquille, roses, and of some other flowers, and of cassia, vanilla, &c., are commonly prepared by digesting pure rectified spirit for 3 or 4 days on half its weight of the respective pommades or oils, obtained by infusion or contact. The operation is performed in a closed vessel placed in a water bath, and frequent agitation is employed for 3 or 4 days, when the perfumed spirit is decanted into a second digester, containing a like quantity of oil to the first. The whole process is repeated a second and a third time, after which the spirit is allowed to settle and is then decanted. It now forms the most fragrant and perfect odoriferous spirit (extrait) of the Continental perfumer. The product is called 'esprit' or 'extrait of the first infusion.' The three portions of oil are then treated again with fresh spirit in the same manner, and thus spirits or essences of inferior quality are obtained, which are distinguished by the perfumers as No. 2, 3, 4, &c., or 'esprits' or 'extraits of the first, second, third, &c.,' operation or infusion. In some, though only a very few cases, the spirits are afterwards distilled.

The strength of the spirit for the concentrated essences should not be less than 56 o. p. (sp. gr. ·8376); that for eaux, esprits, and extraits, not less than 35 o. p. (sp. gr. ·8723). The strength of the second quality of the last three must be fully proof (sp. gr. ·920). See ALCOHOL, DISTILLATION, ESSENCE, OILS, POMMADE, &c. and *below*.

Eau d'Ambre Royale. [Fr.] From essences of ambergris and musk, of each, 1 fl. oz.; spirit of ambrette and orange-flower water, of each, 1 pint; rectified spirit, 1 quart; mix.

Eau d'Ange. [Fr.] From flowering tops of myrtle (bruised), 1½ lb.; rectified spirit, 7 pints; water, 3 pints; digest a week, add of common salt, 2 lbs., and distil 1 gal.

Eau d'Arquebusade. [Fr.] See *page* 1071.

Eau de Bouquet. [Fr.] From spirits of rosemary and essence of violets, of each, 1 fl. oz.; essences of bergamot and jasmin, of each 1 fl. dr.; oils of verbena and lavender, of each, ½ fl. dr.; orange-flower water, 1 fl. oz.; eau de rose, ½ pint; rectified spirit, 1 quart; mix.

Eau de Bouquet de Flore. [Fr.] From spirits of rosemary and roses and essence of violets, of each, ½ fl. oz.; oil of cedra and essence of ambergris, of each, 1 fl. dr.; orange-flower water, 5 fl. oz.; rectified spirit, 1 pint.

Eau des Carmes. [Fr.] See SPIRIT OF BALM.

Eau de Cologne. [Fr.] *Syn.* COLOGNE WATER; AQUA COLONIENSIS, A. C. SPIRITUOSA, SPIRITUS COLONIENSIS, L. For the production of good eau de Cologne it is absolutely essential that the spirit be of the purest description, both tasteless and scentless, and that the oils be not only genuine, but recently distilled, as old oils are less odorous, and contain a considerable quantity of resin and camphor, which prove injurious. When flowers and the flowering tops of plants are ordered, it is also necessary that they be either fresh gathered or well preserved, without drying them. To produce an article of the finest quality, distillation should be had recourse to. A very excellent eau de Cologne may, however, be produced by simple solution of the oils or essences in the spirit, provided they be new, pale coloured, and pure. The mass of the eau de Cologne prepared in England, some of which possess the most delicate fragrance, and is nearly equal to the best imported, is made without distillation. In the shops two kinds of this article are generally kept—French and German. That prepared by Farina of Cologne is esteemed the best, and is preferred in the fashionable world.

Prep. 1. From essences of bergamot and lemon, of each, 1 fl. dr.; oil of orange, ½ dr.; oil of neroli, 20 drops; oil of rosemary, 10 drops; essence of ambergris and musk, of each, 1 drop; rectified spirit, ½ pint; mix.

2. Essence of bergamot, 3 fl. oz.; essence of lemon, 3 fl. drs.; essence of cedrat, 2 fl. drs.; oils of neroli and rosemary, of each, 1½ fl. dr.; oil of balm, ½ fl. dr.; rectified spirit, 1½ gal.; mix.

3. (Cadet Gassincourt.) Take of pure neroli, essences (oils) of cedrat, orange, lemon, bergamot, and rosemary, of each, 24 drops; lesser cardamom seeds, ¼ oz.; spirit at 32° Beaumé (sp. gr. ·869), 1 quart; digest a few days, and then distil 1½ pint.

4. (Farina.) Take of rectified spirit, 5 galls.; calamus aromaticus, sage, and thyme, of each, ½ dr.; balm-mint and spearmint, of each, 1 oz.; angelica root, 10 grs.; camphor, 15 grs.; petals of roses and violets, of each, 3 drs.; lavender flowers, 1½ dr.; orange flowers, 1 dr.; wormwood, nutmeg, cloves, cassia lignea, and mace, of each, 20 grs.; oranges and lemons, sliced, of each, 2 in no.; bruise or slice the solids, macerate, with agitation, for 48 hours, then distil off 2-3rds, and add to the product—essences of lemon, cedrat, balm-mint, and lavender, of each, 1 fl. dr.; pure neroli and essence of the seeds of anthos, of each, 20 drops; essences of jasmine and bergamot, of each, 1 fl. oz.; mix well and filter, if necessary.

5. (P. Cod.) Oils of bergamot, lemon, and cedrat, of each, 3 oz.; oils of rosemary, laven-

der, and neroli, of each, 1½ oz.; oil of cinnamon, ¾ oz.; spirit of rosemary, 1 quart; compound spirit of balm (eau de melisse des Carmes), 3 pints; rectified spirit, 3 galls.; digest for 8 days, then distil 3 galls.

6. (Dr. A. T. Thomson.) Oils of bergamot, orange, and rosemary, of each, 1 fl. dr.; cardamom seeds, 1 dr.; rectified spirit and orange-flower water, of each, 1 pint; mix, digest for a day, and then distil a pint.

7. (Trommsdorff.) Oils of neroli, citron, bergamot, orange, and rosemary, of each, 12 drops; Malabar cardamoms, bruised, 1 dr.; rectified spirit of wine, 1 quart; mix, and, after standing 2 or 3 days, distil a quart.

Obs. Eau de Cologne is principally *used* as a perfume, but a very large quantity is consumed by fashionable ladies, as a cordial and stimulant. For this purpose it is dulcified with sugar. A piece of linen dipped in Cologne water, and laid across the forehead, is a fashionable remedy for headache.

Eau d'Elegance. [Fr.] From spirit of jessamine, 1 pint; rectified spirit and spirits of hyacinth and storax, of each, ½ pint; tinctures of star-anise and tolu, of each, 2 fl. oz.; tincture of vanilla, 1 fl. oz.; essence of ambergris, ½ dr.; mix, and in a week decant the clear portion.

Eau de Framboises. [Fr.] From strawberries, bruised, 16 lbs.; rectified spirit, 1 gal.; digest, and distil to dryness in a salt-water or steam bath.

Eau d'Heliotrope. [Fr.] From essence of ambergris, ½ fl. dr.; vanilla, ½ oz.; orange-flower water, ½ pint; rectified spirit, 1 quart; digest a week, and filter.

Eau d'Hongrie. [Fr.] *Syn.* HUNGARY WATER; AQUA HUNGARICA, SPIRITUS ROSMARINI COMPOSITUS, L.; EAU DE LA REINE D'HONGRIE, Fr. A fragrant stimulant and cosmetic. Sweetened with sugar, it is also *used* as a liqueur.

Prep. 1. Rosemary tops, in blossom, 4 lbs.; fresh sage, ½ lb.; bruised ginger, 2 oz.; rectified spirit, 1½ gal.; water, ½ gal.; macerate for 10 days, add of common salt, 3 lbs., and then distil 11 pints.

2. From oil of rosemary (genuine), 1½ fl. dr.; oil of lavender, ½ dr.; orange-flower water, ½ pint; rectified spirit, 1½ pint; mix. SPIRIT OF ROSEMARY (see *above*) is now commonly sold for it.

Eau d'Ispahan. [Fr.] From oil of the bitter orange, 2 fl. oz.; oil of rosemary, 2 drs.; oils of cloves and neroli, of each, 1 fl. dr.; oil of spearmint, ½ fl. dr.; eau de rose, 1 pint; rectified spirit, 7 pints; mix. It is better for distillation. *Used* as Eau de Cologne.

Eau de Jasmin. [Fr.] See ESPRIT DE JASMIN (*below*).

Eau de Lavande. [Fr.] *Syn.* LAVENDER WATER, DOUBLE DISTILLED L. W.; AQUA LAVANDULÆ, A. L. ODORIFERA, SPIRITUS L., L. *Prep.* 1. From the flowering tops of lavender (freshly and carefully picked), 7 lbs.; rectified spirit, 2 galls.; macerate for a week, add of water, ½ gal.; (holding in solution) common salt, 3 lbs., and distil 2 gallons.

2. From Mitcham oil of lavender, 8 oz.; essence of musk, 4 oz.; essence of ambergris and oil of bergamot, of each, 1½ oz.; rectified spirit, 2 gallons; mix well. Very fine.

3. (Brande.) Oil of lavender, 20 oz.; oil of bergamot, 5 oz.; essence of ambergris (finest), ½ oz.; rectified spirit, 5 galls.; mix.

Obs. The products of the last two formulæ are better for distillation; but in that case the essences of ambergris and musk should be added to the distilled spirit. The oils should be of the best quality, and newly distilled, and the spirit should be perfectly scentless.

It may be useful to observe here, that the common lavender water, double distilled lavender water, or spirit of lavender of the shops, is made with spirit at proof, or even weaker; hence its inferior quality to that of the more celebrated perfumers. 1 oz. of true English oil of lavender is all that will properly combine with 1 gal. of proof spirit, without rendering it muddy or cloudy.

Eau de lavande is a most agreeable and fashionable perfume. The article produced by the second formula, has received the commendation of her Majesty and many of the nobility.

Eau de Lavange (Ammoniacal). 1. To lavender water, 1 pint, add of liquor of ammonia, ½ fl. oz.

2. (P. Cod.) English oil of lavender, 1 oz.; spirit of ammonia, 2 lbs.; dissolve. *Used* as a stimulating scent in fainting. See PERFUMES (Ammoniated).

Eau de Lavande de Millefleurs. To each quart of the ordinary eau de lavender (Nos. 2 or 3), add of oil of cloves, 1½ fl. dr.; essence of ambergris, ½ fl. dr.

Eau de Luce. [Fr.] See TINCTURE OF AMMONIA.

Eau de Maréchale. [Fr.] *Syn.* EXTRAIT DE MARÉCHALE, Fr. 1. From ambergris and grain musk, of each, 20 grs.; oils of bergamot, lavender, and cloves, of each, 1 oz.; oils of sassafras and origanum, of each, ½ fl. dr.; rectified spirit, 2 quarts; macerate with agitation for a week.

2. Rectified spirit, 1 pint; essence of violets, 1 oz.; essences of bergamot and œillets, of each, ¼ oz.; orange-flower water, ½ pint; mix.

Eau de Melisse. [Fr.] See SPIRIT OF BALM.

Eau de Miel. [Fr.] *Syn.* HONEY WATER, SWEET-SCENTED H. W.; AQUA MELLIS, A. M. ODORIFERA, L. *Prep.* 1. Take of spirit of roses (No. 3—see *above*), 2 quarts; spirit of jasmin and rectified spirit, of each, 1 quart; essence of Portugal, 1 fl. oz.; essences of vanilla and musk, of each (No. 3), 4 fl. oz.; flowers of benzoin, 1½ dr.; mix, agitate, and add of eau de fleurs d'oranges, 1 quart. Delightfully fragrant.

2. Honey (finest), ¼ lb.; essence of bergamot,

½ oz.; essence of lemon, ¼ oz.; oil of cloves, 12 drops; musk, 12 grs.; ambergris, 6 grs.; orange-flower and rose water, of each, 1 quart; rectified spirit, 1 gal.; macerate for 14 days, with frequent agitation, and filter.

Obs. The last is often coloured with 20 or 30 grs. of saffron, and made into a ratafia with sugar. HONEY WATER FOR THE HAIR is a different article to the above. It is obtained by the dry distillation of honey, mixed with an equal weight of clean sand, a gentle heat only being employed. The product is yellowish, and acidulous, from the presence of acetic acid. This last is used to promote the growth of the hair.

Eau de Millefleurs. [Fr.] *Syn.* EXTRAIT DE MILLEFLEURS, Fr. *Prep.* 1. From grain musk, 12 grs.; ambergris, 20 grs.; essence of lemon, 1½ oz.; oils of cloves and lavender (English), of each, 1 oz.; neroli and oil of verbena, of each, ½ dr.; rectified spirits, 2 quarts; macerate in a closed vessel, and a warm situation, for a fortnight.

2. Balsam of Peru (genuine) and essence of cloves, of each, 1 oz.; essences of bergamot and musk, of each, 2 oz.; essences of neroli and thyme, of each, ¼ oz.; eau de fleurs d'oranges, 1 quart; rectified spirit, 9 pints; mix well. Very fine.

3. Essence of bergamot, ½ oz.; eau de lavande and essence of jasmin, of each, 1 oz.; orange-flower water, 8 fl. oz.; rectified spirit, 1 pint; mix.

Eau de Mousselline. [Fr.] From eau de fleurs d'oranges and spirit of clove-gillyflower, of each, 1 quart; spirit of roses (No. 3—see *above*), spirit of jasmin (No. 4), and spirit of orange flowers (No. 4), of each, 2 quarts; essences of vanilla and musk, of each (No. 3), 2 fl. oz.; sanders wood, ½ oz. Very fine.

Eau de Naphe. [Fr.] See WATERS (Perfumed).

Eau Romain. [Fr.] From essence of ambergris, 1 fl. oz.; tincture of benzoin, 4 fl. oz.; spirit of tuberose, ½ pint; spirit of acacia flowers and tincture of vanilla, of each, 1 pint; spirit of jasmin, 3 pints; mix.

Eau de Rosieres. [Fr.] From spirit of roses, 1 pint; spirits of cucumber, angelica root, and celery seeds, of each, ½ pint; spirits of jasmin and orange flowers, of each, ½ pint; tincture of benzoin, 2 fl. oz.; mix.

Eau sans Pareille. [Fr.] 1. From essence of bergamot, 5 drs.; essence of lemon, 8 drs.; essence of citron, 4 drs.; Hungary water, 1 pint; rectified spirit, 6 quarts; mix, and distil.

2. Grain musk, 20 grs.; ambergris, 25 grs.; oils of lavender and cloves, of each, 1 oz.; essence of bergamot, ½ oz.; oils of sassafras and origanum, of each, 20 drops; rectified spirit, 1 gal.; macerate for 14 days.

Eau de Violette. [Fr.] See ESPRIT DE VIOLETTES *(below)*.

Esprit d'Ambrette. [Fr.] See ESSENCE (*page* 456).

Esprit de Bergamotte. [Fr.] From essence (oil) of bergamot (best), 5 oz.; essence of ambergris (pale), 2 fl. oz.; essence of musk, ½ fl. oz.; oil of verbena, 2 fl. drs.; rectified spirit, 1 gal.; mix.

Esprit de Bouquet [Fr.] From Mitcham oil of lavender, 1 oz.; oils of cloves and bergamot, of each, 3 fl. drs.; essence of musk, 1 fl. dr.; otto of roses, 10 drops; rectified spirit, 1 quart.

Esprit de Fleurs. [Fr.] See SPIRIT OF THE FLOWERS OF ITALY *(below)*.

Esprit de Jasmin. [Fr.] *Syn.* EAU DE JASMIN, Fr. See *page* 1073.

Esprit de Jasmin Odorante. [Fr.] From spirit of jasmin and rectified spirit, of each, 1 pint; essence of ambergris, 1 fl. dr.

Esprit de Jonquille. [Fr.]

Esprit de la Reine. [Fr.] From oil of bergamot, 1 fl. oz.; essence of ambergris, 2 fl. drs.; otto of roses, 1 fl. dr.; rectified spirit, 1 quart.

Esprit de Rondeletia. [Fr.] *Syn.* EXTRAIT DE RONDELETIA, Fr. From Mitcham oil of lavender, 3 oz.; oil of cloves, 1¼ oz.; oil of bergamot, 1 oz.; essences of musk and ambergris, of each, 2 fl. drs.; rectified spirit, 3 pints.

Esprit de Rose. [Fr.] 1. From spirit of roses (see general directions, *page* 1073), 1 pint; essence of ambergris and oil of rose-geranium, of each, ½ fl. dr.

2. From otto of roses, 2 drs.; neroli, ½ dr.; rectified spirit, 1 gal.; dissolve, add of chloride of calcium (well dried and in powder), 1½ lb.; agitate well, and distil 7 pints. Very fine.

Esprit de Suave. [Fr.] From the essences of cloves and bergamot, of each, 1½ fl. dr.; neroli, ½ fl. dr.; essence of musk, 1 fl. oz.; spirit of tuberose and rectified spirit, of each, 1 pint; spirits of jasmin and cassia, of each, 1 quart; dissolve, then add of eau de rose, 1 pint, and mix well.

Esprit de Tain. [Fr.] *Syn.* SPIRIT OF LEMON THYME; SPIRITUS THYMI, L. From tops of lemon thyme, 2 lbs.; proof spirit, 1 gal.; distil 7 pints.

Esprit de Violettes. [Fr.] *Syn.* SPIRIT OF VIOLETS, ESSENCE OF V., E. OF ORRIS. From Florentine orris root, reduced to coarse powder, ½ lb.; rectified spirit, 1 pint; by simple maceration for a fortnight. A stronger and finer article (ESSENCE OF VIOLETS) is prepared from orris root, 5 lbs., to rectified spirit, 1 gal.; by percolation,

Extrait de Bouquet. [Fr.] Extract of nosegay.

Extrait de Maréchale. [Fr.] See *page* 1075.

Extrait de Millefleurs. [Fr.] See *above*.

Extrait de Rondeletia. [Fr.] See *above*.

Odeur Délectable. [Fr.] From oils of lavender, bergamot, rose-geranium, and cloves, of each 1 fl. dr.; eaux de rose and fleurs d'orange, of each, ½ pint; rectified spirit, 1½ pint.

Odeur Suave. [Fr.] See ESPRIT (*above*).

Spirit of Cytherea. From the spirits of violets, tuberose, clove-gillyflower, jasmin (No. 2—see *above*), roses (No. 2), and Portugal, of each, 1 pint; orange-flower water, 1 quart; mix.

Spirit of the Flowers of Italy. *Syn.* ESPRIT DE FLEURS, Fr. From the spirits of roses (No. 1—see *above*), jasmin (No. 2), oranges (No. 3), and cassia (No. 2), of each, 4 pints; orange-flower water, 3 pints; mix.

Victoria Perfume. See ESPRIT DE LA REINE (*above*).

SPIT'TING OF BLOOD. See HÆMOPTYSIS.

SPONGE. *Syn.* SPONGIA, S. OFFICINALIS, L. Sponge is a cellular fibrous structure, produced by marine animals of the humblest type, belonging to the sub-kingdom Protozoa. The finest quality is imported from Smyrna, and is known as TURKEY SPONGE; another, called WEST INDIAN or BAHAMA SPONGE, is much less esteemed, being coarse, dark coloured, and very rotten.

Sponge, as collected, and also as generally imported, contains many impurities, more especially sand, most of which may be removed by beating it, and by washing it in water. Amusing disputes often arise between the smaller importers and the wholesale purchasers, on this subject—the privilege of beating it before weighing it, the number of minutes so employed, and even the size of the stick, being often made important matters in the 'haggling.'

BLEACHED SPONGE (WHITE SPONGE; SPONGIA DEALBATA) is prepared by soaking ordinary sponge in very dilute hydrochloric acid, to remove calcareous matter, then in cold water, changing it frequently, and squeezing the sponge out each time, and next, in water holding a little sulphuric or sulphurous acid, or, still better, a very little chlorine, in solution; the sponge is, lastly, repeatedly washed and soaked in clean water, scented with rose or orange-flower water, and dried.

BURNT SPONGE (SPONGIA USTA—Ph. D.) is prepared by heating the cuttings and unsaleable pieces in a closed iron crucible until they become black and friable, avoiding too much heat, and allowing the whole to cool before exposing it to the air. It was formerly in great repute in bronchocele and scrofulous complaints.—*Dose.* 1 to 3 drs., in water, or made into an electuary or lozenges.—When good, burnt sponge evolves violet fumes of iodine on being heated in a flask along with sulphuric acid.

COMPRESSED or WAXED SPONGE (SPONGIA CERATA, S. COMPRESSA) is sponge which has been dipped into melted wax, and then compressed between two iron plates until cold. When cut into pieces it forms 'SPONGE TENTS,' which are used by surgeons to dilate wounds.

SPOTS and STAINS.—1. OIL and GREASE SPOTS on boards, marble, &c., when recent, may be removed by covering them with a paste made of fuller's earth and hot water, and the next day, when the mixture has become perfectly dry, scouring it off with hot soap-and-water. For old spots, a mixture of fuller's earth and soft soap, or a paste made of fresh-slaked lime and pearlash, will be better; observing not to touch the last with the fingers.

2. RECENT SPOTS of OIL, GREASE, or WAX, on woollen cloth or silk, may be removed with a little clean oil of turpentine or benzol; or with a little fuller's earth or scraped French chalk, made into a paste with water, and allowed to dry on them. They may also be generally removed by means of a rather hot flat-iron and blotting-paper or spongy brown paper, more especially if the cloth, or one of the pieces of paper, be first slightly damped. OLD OIL and GREASE SPOTS require to be treated with ox-gall or yolk of egg, made into a paste with fuller's earth or soap. PAINT SPOTS, when recent, generally yield to the last treatment. Old ones, however, are more obstinate, and require some fuller's earth and soft soap made into a paste with either ox-gall or spirit of turpentine.

FRUIT and WINE STAINS, on linen, commonly yield easily to hot soap-and-water. If not, they must be treated as those below.

INK SPOTS and RECENT IRON MOULDS on washable fabrics may be removed by dropping on the part a little melted tallow from a common candle, before washing the articles; or, by the application of a little lemon juice, or of a little powdered cream of tartar made into a paste with hot water. Old ink spots and iron moulds will be found to yield almost immediately to a very little powdered oxalic acid, which must be well rubbed upon the spot previously moistened with boiling water, and kept hot over a basin filled with the same.

STAINS arising from ALKALIES and ALKALINE LIQUORS, when the colours are not destroyed, give way before the application of a little lemon juice; whilst those arising from the weaker acids and acidulous liquids yield to the fumes of ammonia, or the application of a little spirit of hartshorn or sal volatile.

STAINS OF MARKING INK may be removed by soaking the part in a solution of chloride of lime, and afterwards rinsing it in a little solution of ammonia or of hyposulphate of soda; or they may be rubbed with the tincture of iodine, and then rinsed as before. See BALLS, CLOTHES, HANDS, SCOURING, STAINS, &c.

SPRAIN. *Syn.* SUBLUXATIO, L. An injury of a joint, in which it has been strained or twisted in an unnatural manner, without actual dislocation. Pain, swelling, and inflammation, are the common consequences, which must be combated by purgatives, repose, and a low diet, with refrigerant lotions, or

warm fomentations, according to circumstances. In extreme cases, blood should be taken. Where there is simple stiffness and weakness, exercise is often serviceable.

SPRAT. The *Clupea Sprattus* (Linn.), a small fish of the herring family, abounding on our coasts. Gutted, coloured, and pickled, it is sold for anchovies, or as British anchovies, and much used to make the sauce of that name.

SPRUCE. See BEER, ESSENCE, and POWDERS.

SPUNK. See AMADOU.

SQUILL. *Syn.* SCILLA (B. P., Ph. L. E. & D.), L. The bulb of "*Urginea Scilla*," sliced and dried. In small doses, squill acts as a stimulating expectorant and diuretic; in larger ones, as an emetic and purgative. With the first intention it is generally given in substance (powder), in doses of 1 to 3 or 4 grs.; with the latter, either made into vinegar or oxymel (which *see*). It is an excellent remedy in coughs, &c., after the inflammatory symptoms have subsided.

STAINED GLASS. The art of painting or staining glass resembles enamel painting, in the effect being produced by fluxing certain metallic substances, as oxides or chlorides, on its surface, by means of heat applied in a suitable furnace. The operations it embraces are difficult, and require great promptitude and experience to prove successful. The colours or compounds employed are, for the most part, similar to those noticed under ENAMEL and PASTE.

STAINS. Discolourations from foreign matters. Liquid dyes are also frequently termed 'stains.' See SPOTS, &c., and *below*.

Stains, Blood. Spots of dried blood on wood, linen, &c., however old, are easily recognised by the microscope; but simple stains or marks of blood of a slight character, especially those occurring on iron or steel, are recognised with greater difficulty. To obviate this, H. Zollikofer adopts the following plan:—The spot is removed, by scraping, from the surface of the metal, and the resulting powder is digested in tepid water, when a liquid is obtained which exhibits the following reactions:—

1. The liquid is neutralised with acid, and heated to ebullition, when opalisation occurs, or a dirty red coagulum forms.

2. The coagulum is dissolved in hot liquor of potassa; the solution, if blood (hæmatin) be present, is diachromatic, or appears green by transmitted light and red by reflected light.

3. By the addition of concentrated chlorine water, in excess, to either solution, white flocks of albumen and chlorhæmatin separate, which are free from iron, as tested by sulphocyanide of potassium.

Obs. The last two reactions are said to be characteristic. Very old spots must be boiled in water containing a little liquor of potassa. See Dr. Taylor's 'Medical Jurisprudence.'

Stains, Bookbinder's. See LEATHER, MARBLING, &c.

Stains, Confectioner's. These are similar to those noticed under LIQUEUR. Mineral colours, especially mineral blues, greens, and yellows, must on no account be used, as they are nearly all dangerous poisons; nor is there any inducement to use them, since the vegetable substances referred to afford, by proper management, every shade that can be possibly required. These stains are also used for cakes and pastry.

Stains, Liqueur. See LIQUEUR.

Stains, Map. See MAPS, VELVET COLOURS, &c.

STAM'MERING. *Syn.* BLÆSITAS, L. Occasionally, this depends on some organic affection, or slight malformation of the parts of the mouth or throat immediately connected with the utterance of vocal sounds; but, much more frequently, it is a habit resulting from carelessness, or acquired from example or imitation. When the latter is the case, it may be generally removed by perseveringly adopting the plan of never speaking without having the chest moderately filled with air, and then only slowly and deliberately. Hasty and rapid speaking must not be attempted until the habit of stammering is completely subdued. Nervous excitement and confusion must be avoided as much as possible, and the general health attended to, as circumstances may direct. This variety of stammering is commonly distinguished by the person being able to sing without hesitation. Stammering depending on elongation of the uvula, and other like causes, may be generally removed by a simple surgical operation.

STAN'NIC ACID. Peroxide of tin.

STARCH. $C_6H_{10}O_5$. *Syn.* AMYLACEOUS FECULA; AMYLUM, L. One of the most important and widely diffused of the proximate principles of vegetables, being found, in greater or less quantity, in every plant. The mealy and farinaceous seeds, fruits, roots, and the stem-pith of certain trees, consist chiefly of starch in a nearly pure state. Wheat contains about 75% and potatoes about 15% of this substance. From these sources the fecula is obtained by rasping or grinding to pulp the vegetable structure, and washing the mass upon a sieve, by which the torn cellular tissue is retained, whilst the starch passes through with the liquid, and eventually settles down from the latter as a soft, white, insoluble powder, which, after being thoroughly washed with cold water, is dried in the air, or with a very gentle heat.

WHEAT STARCH (AMYLUM, B. P., Ph. L. E. & D.) is commonly prepared by steeping the flour in water for a week, or a fortnight, during which time the saccharine portion ferments and the starch-granules become freed, for the most part, from the glutinous matter which

envelopes them, by the disintegrating and solvent action of the lactic acid generated by the fermentation. The sour liquor is then drawn off, and the feculous residue washed on a sieve; what passes through is allowed to settle, when the liquid is again drawn off, and the starch thoroughly washed from the slimy matter; it is then drained in perforated boxes, cut up into square lumps, placed on porous bricks to absorb the moisture, and, lastly, air or stove dried.

In the preparation of starch from potatoes (potato starch) and other like vegetable substances, the roots or tubers, after being washed and peeled, either by hand-labour or by machinery, are rasped by a revolving grater, and the pulp washed on hair sieves until freed from feculous matter. Successive portions of the pulp are thus treated until the vessel over which the sieves are placed, or into which the washings run, is sufficiently full. The starch held in suspension in the water having subsided to the bottom, the water is drawn off, and the starch stirred up with fresh water, and again allowed to subside. This operation is repeated several times, with fresh water, until the starch is rendered sufficiently pure for commercial purposes, when it is washed and dried as before. The waste fibres and the washing waters are used as manure. (See ARROW-ROOT.)

In the manufacture of starch from rice and Indian corn (rice starch, maize starch), a very dilute solution of caustic soda, containing about 200 grs. of alkali to each gallon of liquid, is employed to facilitate the disintegration and separation of the gluten and other nitrogenised matters. A weak solution of ammonia, or sesquicarbonate of ammonia, is also similarly employed with advantage. The gluten may be recovered by saturating the alkali with dilute sulphuric acid. Such starch does not require boiling, and is less apt than wheat starch to attract moisture from the atmosphere. Most of the so-called 'wheaten starch' of commerce used by laundresses is now prepared from rice.

To whiten the starches made from damaged roots and grains, and the coarser portions of those from sound ones, a little solution of chloride of lime is occasionally added to the water, followed by another water containing a very little dilute sulphuric acid; every trace of the last being afterwards removed by the copious use of pure soft or spring water.

The bluish-white starch used by laundresses is coloured with a mixture of smalts and alum in water, and is regarded as unfit for medicinal purposes.

Prop., &c. Starch is insoluble in cold water, and in alcohol and most other liquids, but it readily forms a gelatinous compound (amidin) with water at about 175° Fahr.; alcohol and most of the astringent salts precipitate it from its solutions; infusion of galls throws down a copious yellowish precipitate, containing tannic acid, which is redissolved by heating the liquid; heat and dilute acids convert it into dextrin and grape sugar; strong alkaline lyes dissolve it, and ultimately decompose it. Sp. gr. 1·53.

To the naked eye it presents the appearance of a soft, white, and often glistening powder; under the microscope it is seen to be altogether destitute of crystalline structure, but to possess, on the contrary, a kind of organisation, being made of multitudes of little rounded transparent bodies, upon each of which a series of depressed parallel rings, surrounding a central spot or hilum, may be traced. The starch-granules from different plants vary both in magnitude and form. Those of potato-starch and canna starch (tous les mois) are the largest, and those of rice and millet starch the smallest, the dimensions raging from $\frac{1}{250}$ to the $\frac{1}{1000}$ of an inch. The granules of arrow-root and tous les mois are ovoid, those of potato starch both oblong and circular, those of tapioca muller-shaped, and those of wheat starch circular.

Identif. One of the commonest frauds practised upon the profession and the public is the admixture of the cheaper kinds of starch, chiefly potato farina, with arrow-root, and vending manufactured for genuine tapioca, sago, and other articles of diet, used for invalids and children. These sophistications are most easily detected with a good microscope.[1]

Starch, Iodide of. *Syn.* AMYLI IODIDUM, AMYLI IODATUM, L. *Prep.* (Ph. Castr. Ruthena.) Iodine, 24 grs.; rectified spirit, a few drops; rub them to a powder; then add of starch, 1 oz., and again triturate, until the mass assumes a uniform colour. Recommended by Dr. A. Buchanan, of Glasgow, as possessing the alterative effects of iodine, without the usual irritant action of that medicine. *Dose.* A teaspoonful, or more, in water-gruel, or any bland liquid, twice or thrice a day.

STARCHING (Clear). Muslins, &c., are 'clear-starched' or 'got-up' by laundresses in the following manner:—Rinse the articles in three waters, dry them, and dip them into thick made-starch, which has been previously strained through a piece of muslin; squeeze them, shake them gently, and again hang them up to dry; when they are dry, dip them twice or thrice into clear water, squeeze them, spread them on a linen cloth, roll them up in it, and let them lie an hour before ironing them. Some persons put a morsel of sugar into the starch, to prevent its sticking whilst ironing, and others stir the starch with a candle to effect the same end; both these practices are as injurious as unnecessary. The best plan to prevent sticking is simply to use the best starch, and to make it well, and to have

[1] The measurements and microscopical appearances of all the commercial starches will be found accurately described and figured in Royle's "*Manual of Materia Medica.*"

the irons quite clean and highly polished. Mr. W. B. Tegetmeier recommends the addition of a small piece of paraffin (a piece of paraffin candle-end) to the starch, to increase the glossiness of the ironed fabric.

STAVES'ACRE. *Syn.* STAVESACRE SEEDS; STAPHISAGRIÆ SEMINA, STAPHISAGRIA (Ph. L. & D.), L. "The seed of *Delphinium Staphisagria*, Linn." (Ph. L.) This article is powerfully emetic and cathartic, but is now scarcely ever used internally. Mixed with hair powder, it is used to kill lice. An infusion, or ointment, made with it is said to be infallible in itch, but its use requires some caution.

STARS. (In pyrotechny.) *Prop.* 1. (Brilliant—Marsh.) Nitrate, 52½ parts; sulphur and black antimony, of each, 13 parts; reduce them to powder, make them into a stiff paste with isinglass, 1½ part, dissolved in a mixture of vinegar, 6½ parts, and spirits of wine, 13 parts; lastly, form this into small pieces, and, whilst moist, roll them in meal gunpowder.

2. (WHITE—Ruggieri.) Nitre, 16 parts; sulphur, 7 parts; gunpowder, 4 parts; as the last.

3. (GOLDEN RAIN.)—*a.* (Ruggieri.) Nitre and gunpowder, of each, 16 parts; sulphur, 10 parts; charcoal, 4 parts; lampblack, 2 parts; mix, and pack it into small paper tubes.

b. (Ruggieri.) Nitre, 16 parts; sulphur and gunpowder, of each, 8 parts; charcoal and lampblack, of each, 2 parts; as the last.

c. (Marsh.) Mealed gunpowder, 66¾ parts; sulphur, 11 parts; charcoal, 22¼ parts; as before. *Used* for the 'garniture' of rockets, &c.

STAYS. *Syn.* CORSET. Stays, "before womanhood, are instruments of barbarity and torture, and then they are needed only to give beauty to the chest. It is the duty of every mother, and every guardian of children, to inquire the purpose for which stays were introduced into female attire. Was it for warmth? If so, they certainly fulfil the intention very badly, and are much inferior to an elastic woollen habit, or one of silk quilted with wool. Was it to force the ribs, while yet soft and pliable, into the place of the liver and stomach, and the two latter into the space allotted for other parts, to engender disease and deformity to the sufferer and her children for generations? Truly, if this were the object, the device is most successful, and the intention most ingeniously fulfilled." (Eras. Wilson.)

"Only observe," exclaimed Dr. John Hunter, "only observe, if the statue of the Medicean Venus were to be dressed in stays, and her beautiful feet compressed into a pair of execrably tight shoes, it would extort a smile from an Heraclitus, and a horse-laugh from a Cynic."

"The Turkish ladies express horror at seeing Englishwomen so tightly laced." (Lady M. W. Montague.)

The practice of tight-lacing has happily gone out of fashion since the remarks above quoted were made.

STEAM. The application of steam of the laboratory, as a source of heat, is commonly effected by means of double pans, to the space between which steam, at a moderate pressure, is introduced, the arrangements being such as to permit of the condensed steam, or distilled water, being removed, by means of a cock, nearly as soon as formed, or as may be desirable. Another plan is to place coils of metal pipe along the bottom of cisterns, vats, &c., formed either of wood or metal, and to keep them supplied with high-pressure steam.

"It is quite susceptible of positive proof that by no arrangement yet discovered, can more than two thirds of the heat generated by a given quantity of coal, during combustion, be fairly absorbed and utilised in any of our manufactories; and, moreover, there are undeniable facts, which demonstrate that seldom, in the burning of coal, are more than three fourths of the total heat, which might be eliminated, actually obtained; thus justifying the supposition that one half of all the coal now consumed is virtually wasted, and lost to society." To lessen, as much as possible, this loss, various improvements have been made, which, "for the most part, have consisted in lengthening the flues, and exposing a larger surface of the boiler to the action of the heated air passing from the furnace to the chimney." "Remembering that air is an extremely bad conductor of heat, and that water about to be converted into steam is also a bad conductor, it is evident that time must form an important element in the perfect transmission of heat from one of these to the other; and hence, with a great velocity of current existing in the flues, very little heat would pass from air, however high its temperature, to water contained in a boiler, and so circumstanced with respect to its all but gaseous condition." The results of the experiments on fuel made at the Museum of Practical Geology by Sir H. de la Beche and Dr. Lyon Playfair, go clearly to show that, "to open the damper of a steam-boiler furnace is pretty generally to diminish the effective power of the fuel." "Great waste of coal now arises from this simple circumstance; and much of the heat of the fire, which ought to go to the boiler, is lost by its (too) hasty transmission up the chimney. If, however, there be thus far room for improvement in the direction just indicated, still wider is the vacant space, caused by imperfect combustion, or, in technical phrase, 'bad stoking,' merely because the stoker, to economise his labour, and to avoid trouble, throws on to the bars of his furnace a thick layer of fuel, by which loss is caused in two or three directions." These are, principally, imperfect combustion, and the volatili-

sation of fuel, as smoke, &c., from an insufficient supply of air, and from a mass of mere red-hot coke or cinder, two or three inches thick, lying between the boiler and the hottest part of the furnace; which last, according, to Dr. Kennedy, is about one inch above the fire-bars. Besides which, "in passing over this red-hot coke, the carbonic acid would be converted into carbonic oxide, and thus not only remove a quantity of carbon equal to its own, without yielding any additional heat, but actually with the production of cold, or, in other words, the absorption of heat." ('Dict. Arts, Manuf., and Mines.') This points to the evident policy of using a smoke-consuming furnace, as noticed elsewhere.

Another matter worthy of remark, is the constant waste of heat, and, consequently, of fuel, in laboratories and manufactories in which steam is employed, owing to the exposed condition of the pipes, boilers, and pans. All of these should be well 'clothed' or covered by some non-conducting medium, to prevent loss of heat by radiation, and by contact with the atmosphere. Not only does economy dictate such a course, but the health and comfort of the workpeople demand that the atmosphere in which they labour should be as little heated and poisoned as possible.

TABLE *of corresponding Pressure and Temperatures of Steam.* By ARAGO and DULONG.

Pressure in Atmospheres.[1]	Temperature, Fahr.	Pressure in Atmospheres [1]	Temperature, Fahr.
	Degrees.		Degrees.
1	212·	13	380·66
1½	234·	14	386·94
2	250·5	15	392·86
2½	263·8	16	398·48
3	275·2	17	403·83
3½	285·	18	408·92
4	293·7	19	413·78
4½	300·3	20	418·46
5	307·5	21	422·96
5½	314·24	22	427·28
6	320·36	23	431·42
6½	326·26	24	435·56
7	331·7	25	439·34
7½	336·86	30	457·16
8	341·78	35	472·73
9	350·78	40	486·59
10	358·88	45	499·14
11	366·85	50	510·6
12	374·		

A cubic inch of water, during its conversion into steam, under the ordinary pressure of the atmosphere, expands into 1696 cubic inches, or nearly a cubic foot.

One part, by weight, of steam, at 212° Fahr., when condensed into cold water, is found to be capable of raising 5·6 parts of the latter from the freezing- to the boiling-point. See FUEL, PIT-COAL, SMOKE, &c.

[1] Estimating 14·6 lbs. = 1 atmosphere.

STEAR'IC ACID. $HC_{18}H_{35}O_2$. *Syn.* STEARIN (Commercial). This is obtained from stearin (see *below*), by saponification.

Prep. 1. Repeatedly dissolve and crystallise commercial stearic acid in hot alcohol, until its melting-point becomes constant at not less than 158° Fahr. Pure.

2. (Chevreul.) Saponify mutton suet with caustic potassa, and dissolve the newly formed soap in 6 times its weight of hot water; to the solution add 40 or 50 parts of cold water, and set the mixture aside in a temperature of about 52° Fahr.; after a time separate the pearly matter (stearate and margarate of potassa) which falls, drain and wash it on a filter, and dissolve it in 24 parts of hot alcohol of sp. gr. ·820; collect the stearate of potassa which falls as the liquid cools, recrystallise it in alcohol, and decompose it, in boiling water, with hydrochloric acid; lastly, wash the disengaged stearic acid in hot water, and dry it.

3. (Commercial.) Ordinary tallow is boiled in large wooden vessels, by means of high-pressure steam, with about 16% of hydrate of lime (equiv. to 11% of pure lime), for 3 or 4 hours, or until the combination is complete, and an earthy soap is formed, when the whole is allowed to cool; the product (stearate of lime) is then transferred to another wooden vessel, and decomposed by adding to it 4 parts of oil of vitriol (diluted with water) for every 3 parts of slaked lime previously employed, the action being promoted by steam heat and brisk agitation; after repose, the liberated fat is decanted from the sediment (sulphate of lime) and water, and is then well washed with water, and by blowing steam into it; it is next allowed to cool, when it is reduced to shavings by means of a number of knives worked by machinery, and in this divided state is placed in canvas bags and submitted to the action of a powerful hydraulic press, by which a large portion of the oleic acid which it contains is expelled; the pressed cakes are then a second time exposed to the action of steam and water, again cooled, and coarsely powdered, and again submitted to the joint action of steam and pressure; they are, lastly, melted, and cast into blocks for sale.

Obs. This product is a more or less impure mixture of stearic acid and other fatty bodies, particularly the so-called margaric acid, now generally regarded as a mixture of palmitic and stearic acids. The hard fatty acids of vegetable origin (palmitic, cocinic, myristic, &c.), now so extensively used as candle materials, are obtained from the natural oils and butters by the process known as 'sulphuric acid saponification,' which consists in treating the fatty bodies with 5 or 6% of concentrated sulphuric acid at a high temperature, (about 350° Fahr., produced by superheated

steam), and distilling the resulting mass by the aid of steam heated to about 560° Fahr. Frequently the operations of hot and cold pressing are resorted to in order to free the product from the softer fats.

By a patent process employed at Price's candle works the natural vegetable fats are decomposed into their constituents (fatty acids and glycerin) by the action of superheated steam alone, without previous 'saponification,' with lime or sulphuric acid.

Prop., &c. Pure stearic acid crystallises in milk-white needles, which are soluble in ether and in cold alcohol, and form salts with the bases, called stearates. The commercial acid is made into candles. See CANDLES, FAT, OILS (Fixed), and TALLOW.

STE'ARIN. $C_{57}H_{110}O_6$. The solid portion of fats which is insoluble in cold alcohol.

Prep. Pure strained mutton suet is melted in a glass flask along with 7 or 8 times its weight of ether, and the solution allowed to cool; the soft, pasty, semi-crystalline mass is then transferred to a cloth, and is strongly pressed as rapidly as possible, in order to avoid unnecessary evaporation; the solid portion is then redissolved in ether, and the solution allowed to crystallise, as before. The product is nearly pure.

Prop., &c. White; semi-crystalline; insoluble in water and cold alcohol; soluble in 225 parts of cold ether, and freely so in boiling ether. It melts at 130° Fahr. The stearin of commerce is stearic acid.

STEAROP'TEN. The name given by Herberger to the concrete portion or camphor of volatile oils. Bizio calls it stereusin.

STEEL. This important material may be defined as iron chemically combined with sufficient carbon to give it extreme toughness and hardness without brittleness. According to one of our greatest authorities on metallurgy, steel should contain from ·833% to 1·67% of carbon, these numbers referring respectively to the softest and the hardest varieties. Within the last few years great attention has been paid to the investigation of the chemistry of steel. The researches of Despretz and Fremy tend to the conclusion that nitrogen exercises a very important influence over the phenomena of 'steeling,' and that carbon plays a less necessary part; while those of Caron and Deville still refer the formation of steel to the chemical combination of iron with carbon. The processes for converting iron into steel, and for 'tempering' steel articles, cannot be described in a work like the present.

There is no test of the value of steel beyond its elasticity and temper, and the fineness, equality, and smoothness of its grain.[1]

STE'REOTYPE METAL. See TYPE METAL.

STER'LING. The truth of the old proverb, that "all is not gold which glitters," is often painfully experienced by the purchaser of modern jewelry. The following table will, therefore, prove highly useful to the reader in determining the value of articles in gold, provided he ascertain the 'fineness' of the metal, either by examination or written warranty:—

Sterling value of Gold of different degrees of 'Fineness.'

Carats. Fine.		Value per oz. Troy. £	s.	d.
24	*carats*	4	4	11½
23	„	4	1	5
22	„ (*British standard*)	3	17	10½
21	„	3	14	4
20	„	3	10	9½
19	„	3	7	3
18	„ (*lowest Hall-mark*)	3	3	8½
17	„	3	0	2
16	„	2	16	7½
15	„	2	13	1
14	„	2	9	6½
13	„	2	6	0
12	„	2	2	5½
11	„	1	18	11
10	„	1	15	4½
9	„	1	11	10
8	„	1	8	3½
7	„	1	4	9
6	„	1	1	2½
5	„	0	17	8
4	„	0	14	2
3	„	0	10	7½
2	„	0	7	1
1	„	0	3	6½

STER'EO-METAL. A remarkable alloy recently invented by Baron de Rosthorn, of Vienna, and used in place of ordinary gun-metal. It consists of copper and spelter, with small proportions of iron and tin, and to these latter its peculiar hardness, tensile strength, and elasticity, are attributed.

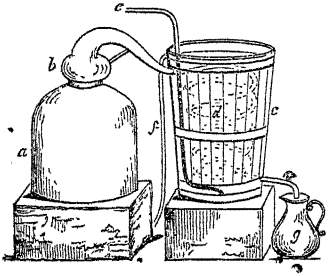
STETH'OSCOPE. An instrument employed in auscultation. It consists of a tube (usually made of wood, sometimes of gutta percha) widening considerably at one end, and but slightly at the other. The wide end is applied to the chest or other part of the patient, the physician putting his ear at the other end; and from the sounds emitted by the heart, lungs, &c., the state of these parts is ascertained.

STEW'ING. A method of cooking food intermediate to frying and boiling, performed by simmering it in a saucepan or stewpan, with merely sufficient water to prevent burning, and to effect the object in view; the whole being served up to form the 'dish.' It is undoubtedly the most simple and economical, and, when skilfully conducted, one of those best calculated to develop the flavour and nutritious qualities of animal food. The following is one of the most popular stews:—

[1] For full information respecting the manufacture of steel, refer to Dr. Percy's elaborate treatise on "*Metallurgy—Iron and Steel.*"

Stew, Irish. *Prep.* (Soyer.) Take about 2 lbs. of scrag or neck of mutton; divide it into ten or twelve pieces, and lay them in the pan; add 8 large potatoes and 4 onions cut into slices, season with 1½ teaspoonful of pepper, and 3 do. of salt; cover all with water, put it into a slow oven, or on a stove, for two hours, then stir it all up well, and serve it up in deep dishes. If a little more water is added at the commencement, you can take out, when half done, a nice cup of broth.

STILL. A vessel or apparatus employed for the distillation of liquids on the large scale. The forms of stills, and the materials of which they are made, vary according to the purposes for which they are intended, some being exceedingly simple, whilst others are equally elaborate and complicated. The *engr.* represents the most common and useful apparatus of this kind, and the one almost exclusively employed in the laboratory. It is used as follows:—After the fluid and other matters (if any) are put into the still, the head is placed on and connected with the worm-tub or refrigerator, and the joints are all securely luted. For ordinary liquids, a stiff paste made with linseed meal and water, to which a little chalk may be added, answers well for this purpose. For corrosive liquids, nothing is better than elastic bands or rings interposed between the joints, which are then 'brought home,' as it is called, with screws or clamps. Heat is next applied, and the worm tub is supplied with cold water in sufficient quantity to preserve its contents at a proper temperature; the application of the heat being so regulated that the liquid may drop from the end of the refrigerator quite cold and unaccompanied with vapour. For highly volatile liquids a closed receiver should be provided.



a. Body of still, which may be either placed in a steam jacket or in a brick furnace.
b. Still head or capital.
c. Worm tub.
d. Pewter worm, or refrigerator.
e. Cold water pipe.
f Waste pipe.
g. Receiver.

STIM'ULANTS. *Syn.* STIMULANTIA, L. Medicines or agents which possess the power of exciting vital action. They are divided into general stimulants, or those which affect the whole system, as mercury or bark; and local or topical stimulants, or those which affect a particular organ or part only, as mustard applied as a poultice. Diffusible stimulants are general stimulants the effects of which are rapid but fugacious, as ether or alcohol. "Much discrimination and caution are required in the administration of articles of this class, because, if given when inflammation is present, they are liable to create more mischief than benefit; but they are called for when, on the decline of that condition of an organ or organs, a state of relaxation or torpidity exists. In this state of things, a gentle stimulation materially assists the functions, and is productive of much benefit."

STIR-ABOUT. Thick gruel formed of oatmeal and water boiled together. When eaten with cold milk, it forms the porridge of the Scotch; and when mixed with the liquor in which meat or vegetables have been boiled, it is called beef brose, kale brose, &c.

STOCK. Among cooks, is condensed soup or jelly, *used* to make extemporaneous soup, broth, &c.

STOM'ACH AFFEC'TIONS. Those of a character to admit of being usefully noticed in a popular work are referred to under the heads APPETITE, DYSPEPSIA, SICKNESS, &c.

Dr. Budd recommends small doses of ipecacuanha as a remedy for those cases of indigestion in which digestion is slow, and the food lies heavily on the stomach, and there is an inability for mental or bodily exertion for some time after meals. He says it should be given in the morning, fasting, and in quantity barely sufficient to occasion a slight feeling of vermiculating motion in the stomach, but without causing any sensation of pain or nausea. The dose to produce this effect varies from ¼ to 2 grs. He thinks there is no other medicine which appears so effectual in removing the affections in question. Small doses of rhubarb, ginger, and cayenne pepper, have a similar kind of action, and may be given singly or together for the same purpose. "I generally prescribe from ½ to 1 gr. of ipecacuanha, in a pill, with 3 or 4 grs. of rhubarb. With many, a favourite remedy for the discomfort resulting from slow digestion is a grain of cayenne paper, with 3 or 4 grs. of rhubarb. The best time for giving these medicines is shortly" (say ½ an hour) "before any meal after which a sense of oppression is usually felt."

STOP'PERS, when obstinately immovable in bottles, are the most safely treated by patiently hitting them upwards alternately on opposite sides with a piece of wood. When this fails, the part may be dipped into hot water.

STORM-GLASS. A philosophical toy, consisting of a thin glass tube about 12 inches long and ¾ inch in diameter, about three fourths filled with the following liquid, and covered with a brass cap having an almost capillary hole through it, or else tied over with bladder.

The solution. Take of camphor, 2 drs.; nitre, 1½ dr.; sal ammoniac, 1 dr.; proof spirit, 2½ fl. oz.; dissolve, and place it in the

tube above referred to. *Used* to foretell changes of the weather.

STRABIS'MUS. *Syn.* SQUINTING. This need not be described. When one eye only is affected, an excellent plan is to blindfold the sound eye during several hours each day, until the affection be removed. When both eyes are affected, a projecting piece of pasteboard, in the line of the nose, may be worn as much as possible with the same object. In bad cases of squinting inwards, as it is called, the division of the internal rectus muscle of the eyeball, by a skilful surgeon, is said to often relieve the deformity.

STRAP'PING. Spread adhesive plaster. *Used* to dress wounds, &c.

STRASS. See ENAMEL.

STRAW'BERRY. *Syn.* FRAGARIA, L. The fruit of *Fragaria vesca* (Linn.), or strawberry plant. Strawberries are, perhaps, the mildest of all the cultivated fruits; they are cooling, and slightly laxative and diuretic; rubbed on the teeth, they dissolve the tartar, and whiten them. They were formerly in repute in gout, stone, and consumption. The root of the plant is aperient.

STRAW PLAIT, and the articles made of it, are bleached by exposing them to the fumes of burning sulphur in a close chest or box; or, by immersing them in a weak solution of chloride of lime, and afterwards well washing them in water. Water acidulated with oil of vitriol or oxalic acid is also used for the same purpose. Straw plait may be dyed with any of the simple liquid dyes.

STRON'TIUM. Sr. The metallic base of the earth strontia. It was discovered by Sir H. Davy, in 1808. It closely resembles barium, but is less lustrous. With chlorine it combines to form chloride of strontium, a somewhat deliquescent salt, soluble in 2 parts of cold and in less of boiling water, and freely soluble in alcohol. With oxygen it forms an oxide.

Test. Strontium salts are precipitated by sulphuric acid and alkaline carbonates and sulphate. They are distinguished from barium by not giving such a decided precipitate with sulphates, and by not being precipitated by bichromate of potassium. From calcium, by sulphates of calcium solution giving a precipitate, and by concentrated solutions giving a precipitate with chromate of potassium. It is distinguished from magnesium by the insolubility of its sulphate.

Strontium, Oxide of. SrO. *Syn.* PROTOXIDE OF STRONTIUM, STRONTIA. *Prep.* Quite pure crystalline nitrate of strontium. *Prop.* Grayish-white powder, uniting with water to form a white, somewhat soluble substance, the hydrate of strontium, $Sr(HO)_2$.

With acids it forms various salts, of which the carbonate is a white, insoluble powder, and the nitrate a white crystalline salt, soluble in 5 parts, of cold water, and in alcohol, communicating a brilliant red colour to flame.

STROPH'ULUS. A papular eruption peculiar to infants. There are several varieties:—In strophulus intertinctus, red gum, or red gown, the pimples rise sensibly above the level of the cuticle, possess a vivid red colour, and are usually distinct from each other; they commonly attack the cheeks, forearm, and back of the hand, and, occasionally, other parts of the body.—In strophulus albidus, or white gum, there are a number of minute whitish specks, which are, sometimes, surrounded by a slight redness. The two preceding varieties commonly occur during the first two or three months of lactation.—In strophulus confertus, rank red gum, or tooth rash, which usually appears about the fourth or fifth month, the pimples usually occur on the cheeks and sides of the nose, sometimes on the forehead and arms, and still less frequently on the loins. They are smaller, set closer together, and less vivid, but more permanent than in the common red gum.—In strophulus volaticus small circular patches or clusters of pimples, each containing from 6 to 12, appear successively on different parts of the body, accompanied with redness; and as one patch declines another springs up near it, by which the efflorescence often spreads gradually over the whole face and body.—In strophulus candidus the pimples are larger than in the preceding, and are pale, smooth, and shining; it principally attacks the upper parts of the arms, the shoulders, and the loins. The last two varieties commonly appear between the third and ninth month.

The *treatment* of the above affections consists chiefly in removing acidity and indigestion, and duly regulating the bowels by an occasional dose of magnesia or rhubarb, or both combined. Diarrhœa may be met by the warm bath and the daily use of arrow-root (genuine), to which a teaspoonful or two of pure port wine has been added; and itching and irritation may be alleviated by the use of a lotion consisting of water, to which a little milk, lemon juice, borax, or glycerin, has been added.

STRYCH'NINE. $C_{21}H_{22}N_2O_2$. *Syn.* STRYCHNINA, STRYCHNIA (B. P., Ph. L. E. & D.), L. *Prep.* 1. Dissolve hydrochlorate or sulphate of strychnine in distilled water, and throw down the alkaloid with ammonia, carefully avoiding excess; redissolve the precipitate in hot rectified spirit; and collect the crystals which form as the liquid cools.

2. (Ph. D.) Nux vomica (in powder), 1 lb., is digested for 24 hours in ½ gal. of water acidulated with 2 fl. drs. of sulphuric acid, after which it is boiled for half an hour, and the decoction decanted; the residuum is boiled a second and a third time with a fresh ½ gal. of water acidulated with 1 fl. dr. of the acid, and the undissolved matter is finally submitted to strong expression; the decoctions are next filtered and concentrated to the consistence of a syrup, which is boiled with rectified spirit, 3 pints, for about 20 minutes, hydrate of calcium,

1 oz., or q.s., being added in successive portions during the ebullition, until the solution becomes distinctly alkaline; the liquid is then filtered, the spirit distilled off, and the residuum dissolved in diluted sulphuric acid, q.s.; ammonia, in slight excess, is added to the filtered solution, and the precipitate which falls is collected upon a paper filter, and dried; it is next redissolved in a minimum of boiling rectified spirit, and digested with ½ oz. of animal charcoal for 20 minutes; the filtered liquid, as it cools, deposits strychnine, in crystals.

Prop. A white, inodorous, infusible powder; or small, but exceedingly brilliant, transparent, colourless, octahedral crystals; soluble in about 7000 parts of water at 60°, and in 2500 parts at 212° Fahr.; freely soluble in hot rectified spirit; insoluble in absolute alcohol, ether, and solutions of the caustic alkalies; imparts a distinctly bitter taste to 600,000 times its weight of water (1 part in 1,000,000 parts of water is still perceptible—Fownes); exhibits an alkaline reaction; and forms salts with the acids, which are easily prepared, are crystallisable, and well defined.

Tests.—1. Potassium hydrate and the carbonate produce, in solutions of the salts of strychnia, white precipitates, which are insoluble in excess of the precipitant, and which, when viewed through a lens magnifying 100 times, appear as aggregates of small crystalline needles. In weak solutions the precipitate only separates after some time, in the form of crystalline needles, which are, however, in this case, perfectly visible to the naked eye.—2. Ammonia gives a similar precipitate, which is soluble in excess of the precipitant.—3. Bicarbonate of sodium produces, in neutral solutions, a like white precipitate, which is insoluble in excess, but which redissolves on the addition of a single drop of acid; in acid solutions no precipitate occurs for some time, in the cold, but immediately on boiling the liquid.—4. Nitric acid dissolves pure strychnia and its salts to colourless fluids, which become yellow when heated. Commercial strychnine, from containing a little brucine, is reddened by this test.—5. A minute quantity of strychnine being mixed with a small drop of concentrated sulphuric acid, placed on a white capsule or slip of glass, forms a colourless solution, but yields, on the addition of a very small crystal of bichromate of potassium, or a very minute portion of chromic acid, a rich violet colour, which gradually changes to red and yellow, and disappears after some time. The $\frac{1}{1000}$th of a grain yields very distinct indications.—6. Pure oxide or peroxide of lead produces a similar reaction to the last, provided the sulphuric acid contain about $1\frac{1}{6}$ of nitric acid.

Pois. The characteristic symptom is the special influence exerted upon the nervous system, which is manifested by a general contraction of all the muscles of the body, with rigidity of the spinal column. A profound calm soon succeeds, which is followed by a new tetanic seizure, longer than the first, during which the respiration is suspended. These symptoms then cease, the breathing becomes easy, and there is stupor, followed by another general contraction. In fatal cases these attacks are renewed, at intervals, with increasing violence, until death ensues. One phenomenon which is only found in poisonings by substances containing strychnine is, that touching any part of the body, or even threatening to do so, instantly produces the tetanic spasm.

Treat. The stomach should be immediately cleared by means of an emetic, tickling the fauces, &c. To counteract the asphyxia from tetanus, &c., artificial respiration should be practised with diligence and care. "If the poison has been applied externally, we ought immediately to cauterise the part, and apply a ligature tightly above the wound. If the poison has been swallowed for some time, we should give a purgative clyster, and administer draughts containing sulphuric ether or oil of turpentine, which in most cases produce a salutary effect. Lastly, injections of chlorine and decoction of tannin are of value."

According to Ch. Gunther, the greatest reliance may be placed on full doses of opium, assisted by venesection, in cases of poisoning by strychnia or nux vomica. His plan is to administer this drug in the form of solution or mixture, in combination with a saline aperient.

Uses, &c. It is a most frightful poison, producing tetanus and death in very small doses. Even $\frac{1}{24}$ gr. will sometimes occasion tetanic twitchings in persons of delicate temperament. ¼ gr. blown into the throat of a small dog produced death in 6 minutes. In very minute doses it acts as a useful tonic in various nervous diseases, chronic diarrhœa, leucorrhœa, &c.; in slightly larger ones, it has been advantageously employed in certain forms of paralysis, in tic douloureux, impotence, &c.—*Dose* $\frac{1}{24}$ to $\frac{1}{16}$ gr. (dissolved in water by means of a drop of acetic or hydrochloric acid), gradually and cautiously increased until it slightly affects the muscular system. Eternally, $\frac{1}{8}$ to ¼ gr. at a time.

The Edinburgh College ordered the nux vomica to be exposed for two hours to steam, to soften it, then to chop or slice it, next to dry it by the heat of a vapour bath or hot air, and, lastly, to grind it in a coffee-mill. In the process of the Ph. L. 1836 magnesia was employed to effect the precipitation. In the last Ph. L. strychnine appears in the Materia Medica. Most of that of commerce is now obtained from St. Ignatius's bean, which, according to Geiseler, yields $1\frac{1}{2}$ % of it; whereas 3 lbs. of nux vomica produce little more than 1 dr. Commercial strychnine may be freed from brucine by digesting the powder in dilute alcohol.

The salts of strichnine, which are occasionally asked for in trade, are the acetate (strych-

niæ acetas), hydrochlorate or muriate (s. murias—Ph. D.), hydriodate (s. hydriodas), nitrate (s. nitras), phosphate (s. phosphas), and sulphate (s. sulphas). All of these may be easily formed by simply neutralising the acid previously diluted with 2 or 3 parts of water, with the alkaloid, assisting the solution with heat; crystals are deposited as the liquid cools, and more may be obtained by evaporating the mother-liquor.

STUC'CO. The name of several calcareous cements or mortars. Fine stucco is the third or last coat of three-coat plaster, and consists of a mixture of fine lime and quartzose sand, which, in application, is "twice hand-floated and well trowelled."

STUFFING. Seasoning, placed in meat, poultry, game, &c., before dressing them, to give them an increased relish. The same materials, formed into balls, are added to soups, gravies, &c., under the name of FORCE-MEAT.

Prep. 1. (For fowls, &c.) Shred a little ham or gammon, some cold veal or fowl, some beef suet, a small quantity of onion, some parsley, a very little lemon peel, salt, nutmeg, or pounded mace, and either white pepper or cayenne, and bread crumbs; pound them in a mortar, and bind it with 1 or 2 eggs.

2. (For hare, or anything in imitation of it —Mrs. Rundell.) The scalded liver, an anchovy, some fat bacon, a little suet, some parsley, thyme, knotted marjoram, a little shalot, and either onion or chives, all chopped fine; with some crumbs of bread, pepper, and nutmeg, beaten in a mortar with an egg.

3. (For goose.) From sage, onion, suet, and crumb of bread. Geese are now, however, more commonly stuffed with veal stuffing.

4. (For veal—Soyer.) Chop ½ lb. of suet, put it into a basin with ¾ lb. of bread crumbs, a teaspoonful of salt, a ¼ do. of pepper, a little thyme or lemon peel chopped, and 3 whole eggs; mix well.

Obs. 1 lb. of bread crumbs and one more egg may be used; they will make it cut firmer. This, as well as No. 1, is now commonly employed for poultry and meat. Ude, a great authority in these matters, observes that "it would not be amiss to add a piece of butter, and to pound the whole in a mortar." "Grated ham or tongue may be added to this stuffing." (Rundell.) This is also used for turkeys, and for 'forcemeat patties.'

STUFFING (Birds, &c.). The skins are commonly dusted over with a mixture of camphor, alum, and sulphur, in about equal quantities; or, they are smeared with *Bécœur's arsenical soap*, noticed at *page* 1049. According to Crace Calvert, carbolic acid, which is worth only about 2s. per. gal., is superior to all other substances for preserving the skins of birds and animals, as well as corpses.

STUR'GEON. Several species of *Acipenser* pass under this name. The common sturgeon is the *Acipenser sturio* (Linn.). The roe is made into 'caviare,' the swimming-bladder into 'isinglass.'

STY. *Syn.* STYE, STIAN; HORDEOLUM, L. A small inflamed tumour, or boil, at the edge of the eyelid, somewhat resembling a barley-corn. It is usually recommended to promote its maturation by warm applications, since "the stye, like other furunculous inflammations, forms an exception to the general rule, that the best mode in which inflammatory swellings can end in resolution."

STYP'TICS. *Syn.* STYPTICA, L. Substances which arrest local bleeding. Creasote, tannic acid, alcohol, alum, and most of the astringent salts, belong to this class.

Styptic, Brocchieri's. A nostrum consisting of the water distilled from pine tops.

Styptic, Eaton's. A solution of sulphate disguised by the addition of some unimportant substances. "Helvetius's styptic was for a long time employed under this title." (Paris.)

Styptic, Helvetius's. *Syn.* STYPTICUM HELVETII, L. Iron filings (fine), and cream of tartar, mixed to a proper consistence with French brandy. See HELVETIUS'S STYPTIC POWDER (*page* 979).

STY'RAX. *Syn.* STORAX, STORAX BALSAM; STYRAX (Ph. L. & E.), L. "The liquid balsam of an uncertain plant." (Ph. L.) The "balsamic exudation of *Styrax officinale*, Linn." (Ph. E.), or cane storax tree. Two or three varieties are known in commerce:—Liquid storax (*styrax liquida*), lump or red storax (*s. in massis*), which is generally very impure; storax in tears (s. in lachrymis), and storax in reeds (s. calamita). The last are now seldom met with in trade.

PREPARED STORAX (*styrax colata; s. præparata* (B. P., Ph. L.) is obtained by dissolving storax, 1 lb., in rectified spirit, 4 pints, by a gentle heat, straining the solution through linen, distilling off greater part of the spirit, and evaporating what is left to a proper consistence by the heat of a water bath. It is less fragrant than the raw drug.

Storax is stimulant, expectorant, and nervine. It was formerly much used in menstrual obstructions, phthisis, coughs, asthmas, and other breath diseases. It is now chiefly used as a perfume.—*Dose.* 6 to 20 or 30 grs. (10 to 20 grs. twice a day, B. P.).

A factitious strained Storax is made as follows:—1. Balsam of Peru, 1 lb.; balsam of tolu, 4 lbs.; mix.

2. Gum benzoin, 8 lbs.; liquid storax, 6 lbs.; balsam of tolu and Socotrine aloes, of each, 3 lbs.; balsam of Peru, 2 lbs.; N. S. W. yellow gum, 7 lbs.; rectified spirit, 7 galls.; digest, with frequent agitation, for a fortnight, strain and distil off the spirit (about 5½ galls.) until the residuum has a proper consistence. *Prod.* 28 lbs.

3. Liquid storax, 1 oz.; Socotrine aloes, ¼ lb.; balsam of tolu, 2 lbs.; rectified spirit, q. s.

SUB-. See NOMENCLATURE and SALTS.

SU'BERIC ACID. Obtained by boiling rasped cork for some time in nitric acid.

SUBLIMA'TION. The process by which volatile substances are reduced to the state of vapour by heat, and again condensed in the solid form. It differs from ordinary distillation in being confined to dry solid substances, and in the heat employed being, in general, much greater.

SUB'STANTIVE COLOURS. In the art of dyeing, are such as impart their tints to cloth and yarns without the intervention of a mordant; in contradistinction to adjective colours, which require to be fixed by certain 'intermedes,' or substances which have a joint affinity for the colouring matter and the material to be dyed.

SUCCIN'IC ACID. $C_4H_4O_4H_2$. *Syn.* ACIDUM SUCCINICUM. *Prep.* From amber, in coarse powder, mixed with an equal weight of sand, and distilled by a gradually increased heat; or from the impure acid obtained during the distillation of oil of amber; the product in both cases being purified by wrapping it in bibulous paper, and submitting it to strong pressure, to remove the oil, and then resubliming it.

From malic acid, by fermentation, or by digestion with hydriodic acid in sealed tubes.

Prop., &c. Colourless; inodorous (when pure); crystallises in oblique rhombic prisms; soluble in 5 parts of cold and in 2½ parts of boiling water; fusible and volatile, without decomposition. Its salts are called 'succinates,' most of which are soluble. Succinate of ammonium is used as a test for iron. Succinic acid is distinguished from benzoic acid by its greater solubility, and by giving a brownish or pale red bulky precipitate with ferric chloride in neutral solutions; whereas that with benzoic acid is paler and yellower.

Uses, &c. Succinic acid is antispasmodic, stimulant, and diuretic, but is now seldom used.—*Dose.* 5 to 15 grs.

SUC'CORY. Chicory, or wild endive. (See CHICORY.)

SUDORIF'ICS. See DIAPHORETICS.

SU'ET. *Syn.* SEVUM, SEBUM, L. This is prepared from the fat of the loins of the sheep or bullock by melting it by a gentle heat, and straining the liquid fat. In this state it forms the ADEPS OVILLUS (Ph. D.), SEVUM (Ph. L. & E.), SEVUM OVILLUM, or SEVUM PRÆPARATUM, employed in medicine and perfumery, as the basis of ointments, cerates, plasters, pommades, &c.

Suet, Mel'ilot. *Syn.* SEVUM MELILOTI, L. *Prep.* From suet, 8 lbs.; melilot leaves, 2 lbs.; boil until the leaves are crisp, strain, and allow it to cool very slowly, so that it may 'grain well.' Used by farriers, and to make melilot plaster.

SUFFOCA'TION. The treatment varies with the cause. See ASPHYXIA, CHARCOAL, DROWNING, HANGING, SULPHURETTED HYDROGEN, &c.

SUG'AR. $C_{12}H_{22}O_{11}$. *Syn.* CANE SUGAR; SACCHARUM, L.; SUCRE, Fr. This well-known and most useful substance is found in the juice of many of the canes or grasses, in the sap of several forest trees, and in the roots of various plants. In tropical climates it is extracted from the sugar-cane (*Saccharum officinarum*), in China from the sweet sorgho (*Sorghum saccharatum*), in North America from the sugar-maple (*Acer saccharinum*), and in France from white beet-root (*Beta vulgaris*, var. *alba*). The ordinary sugar used in England is extracted from the sugar-cane which is raised so abundantly in our numerous colonies.

The manufacture of sugar is exclusively conducted on the large scale. The recent canes are crushed between rollers, and the expressed juice is suffered to flow into a suitable vessel, where it is slowly heated to nearly the boiling-point, to coagulate albuminous matter. A small quantity of milk of lime is then added, to remove mechanical impurities, and the skimmed and clarified juice, after being sufficiently concentrated by rapid evaporation in open pans, is transferred to coolers, and thence into upright casks perforated at the bottom, and so placed that the syrup, or uncrystallisable portion, may drain off into a tank or cistern from the newly formed sugar. During the period of crystallisation it is frequently agitated, in order to hasten the change, and to prevent the formation of large crystals. The solid portion of the product forms moist, raw, or muscovado sugar; the uncrystallisable syrup, molasses, or treacle.[1]

Raw sugar is refined by redissolving it in water, adding to the solution albumen, under the form of serum of blood or white of egg, and, sometimes, a little lime-water, and heating the whole to the boiling-point; the impurities are then removed by careful skimming, and the syrup is decoloured by filtration through recently burnt animal charcoal; the clear decolorised syrup is next evaporated to the crystallising-point in vacuo, and at once transferred into conical earthern moulds, where it solidifies, after some time, to a confusedly crystallised mass; this, when drained, washed with a little clean syrup, and dried in a stove, constitutes ordinary loaf, lump, or refined sugar. When the crystallisation is allowed to take place quietly and slowly, the product is sugar candy. The evaporation at a low temperature in vacuum-pans has the effect of diminishing the yield of treacle.

Prop. Sugar requires for its solution only 1-3rd of its weight of cold and still less of boiling water; it is slowly dissolved by cold rectified spirit; it dissolves in 4 parts of boiling rectified spirit and in 80 parts of boiling absolute alcohol; it melts by heat, and cools to a glassy amorphous mass (barley

[1] The term 'molasses' is usually restricted to the drainings from raw sugar, and 'treacle' to the thicker syrup which has drained from refined sugar in the moulds.

sugar); at about 400° Fahr. it suffers rapid decomposition, and fuses to a brown, uncrystallisable mass (caramel); long boiling with water increases its colour, and lessens its tendency to crystallise; its aqueous solution dissolves alkalies, earths, and many metallic oxides, with facility; weak syrups take up about half as much hydrate of calcium as they contain sugar; when slowly crystallised, it assumes the form of oblique 4-sided prisms, terminated by 2-sided summits. Sp. gr. 1·60 (1·577—Ure).

*Pur.*1. Moist or muscovado sugar and crushed lump sugar are occasionally adulterated with chalk, plaster, sand, potato-flour, and other fecula; but frequently, and in certain neighbourhoods constantly, with starch sugar or potato-sugar. These frauds may be detected as follows:—

Tests.—1. Pure cane sugar dissolves freely and entirely in both water and proof spirit, forming transparent colourless solutions, which are unaffected by either sulphuretted hydrogen or dilute sulphuric acid.—2. Its solution bends the luminous rays in circumpolarisation to the right, whereas grape and fecula sugars bend it to the left.—3. (Chevallier.) Boiled for a short time in water containing 2 or 3% of caustic potassa, the liquid remains colourless; but it turns brown, which is more or less intense, according to the quantity, if starch sugar is present. Even 2 or 3% of starch sugar may be thus detected.—4. (E. Krantz.) A filtered solution of 38 grs. of cane or beet sugar in 1 fl. oz. of water, mixed with 3 grs. of pure hydrate of potassium, and then agitated with 1½ gr. of sulphate of copper in an air-tight bottle, remains clear, even after the lapse of several days; but if starch sugar be present, a red precipitate is formed after some time; and if it is present in considerable quantity, the copper will be wholly converted into oxide within 24 hours, the solution turning first blue or green, and then entirely losing its colour.—5. (Trommer's test.) A solution of cane sugar is mixed with a solution of sulphate of copper, and hydrate of potassium added in excess; a blue liquid is obtained, which, on being heated, is at first but little altered; a small quantity of red powder falls after a time, but the liquid long retains its blue tint. When grape sugar or fecula sugar is thus treated, the first application of heat throws down a copious greenish precipitate, which rapidly changes to scarlet, and eventually to dark red, leaving a nearly colourless solution. This is an excellent test for distinguishing the two varieties of sugar, or discovering an admixture of grape sugar with cane sugar. The $\frac{2}{1000}$th part of grape sugar may be thus detected. The proportion of oxide of copper produced affords a good criterion, not only of the purity of the sugar, but also of the extent of the adulteration.—6. (Ure.) Dissolve a little sulphate of copper (say 20 grs.) in a measured quantity of water, and add to it, in the cold, a solution of hydrate of potassium, until, by testing with turmeric paper, the liquid appears faintly alkaline, shown by the paper becoming slightly brown. If a small quantity of this test-liquor (previously well shaken) be added to an aqueous solution of the sugar, and the whole boiled, the solution becomes at first green, and then olive-green, if dextrin is present; but if it contain grape sugar, the salt of copper is immediately reduced into the state of orange and oxide; whilst a solution of pure sugar undergoes no change, or is scarcely altered.—7. The presence of the inspissated sweet waste liquor (crude glycerin) of the stearin manufactories, now a common adulterant, may be detected by the inferior sweetness and by the moist and 'sickly' appearance of the sugar.—8. The specific gravities and crystalline forms offer other means of distinguishing the varieties of sugar.

Concluding remarks.—Refined sugar (SACCHARUM—Ph. L., S. PURUM—Ph. E., S. PURIFICATUM—Ph. D.), raw sugar (S. COMMUNE—Ph. E.), and molasses or treacle (SACCHARI FÆX—Ph. L. & E.), were officinal.

The relative sweetening power of cane sugar is estimated at 100; that of pure grape sugar, at 60; that of fecula or starch sugar, at 30 to 40.

According to Messrs. Oxland's method (patented 1849) of defecating and bleaching the juice of beet-root, cane, &c., acetate of aluminium, formed by dissolving 4 lbs. of that earth in acetic acid, is boiled with each ton of sugar, and as soon as the acetic acid is nearly all driven off, a solution of tannin, formed from 1 lb. of bruised valonia and 2 galls. of hot water, is added to the boiling sprup; the excess of aluminium is afterwards separated by lime, and the usual method of further procedure adopted. By their second patent (1851), superphosphate of aluminium or of calcium is substituted for acetate of aluminium, in the proportion of about 6 lbs. of aluminium, dissolved in phosphoric acid, for each ton of sugar.

Sugar may be obtained from nearly all sweet vegetable substances, by a process essentially similar to that described above.

Sugar, Al'um. *Syn.* SACCHARUM ALUMINATUM, ALUMEN SACCHARINUM, L. From alum and white sugar, in fine powder, equal parts, formed into minute sugar-loaf shaped lumps with mucilage of gum arabic made with rose water. Used to make astringent lotions and eye-waters.

Sugar, Bar'ley. *Syn.* SACCHARUM HORDEATUM, PENIDIUM, SACCHARUM PENIDIUM, L. *Prep.* Take of saffron, 12 grs.; hot water, q. s.; sugar, 1 lb.; boil to a full 'candy height,' or that state called 'crack,' or 'crackled sugar,' when 2 or 3 drops of clear lemon juice or white vinegar must be added, and the pan removed from the fire and set for a single minute in cold water, to prevent its burning; the sugar must be then at once poured out on an oiled marble slab, and either cut into pieces or

rolled into cylinders, and twisted in the usual manner. 1 drop of oil of citron, orange, or lemon, will flavour a considerable quantity. White barley sugar is made with a strained decoction of barley instead of water, or starch is added to whiten it.

Sugar, Beet-root. *Syn.* SACCHARUM BETÆ, L. Sugar obtained from the white beet. (See *above*.) It is identical with cane sugar.

Diabet'ic Sugar. Grape sugar found in the urine of persons labouring under diabetes. In *diabetes insipidus* a substance having the general properties of a sugar, but destitute of a sweet taste, appears to be produced. (Thénard.)

Sugar, Gel'atin. See GLYCOCINE.

Sugar, Grape, $C_6H_{12}O_6 . H_2O$. *Syn.* GLUCOSE, FRUIT SUGAR; SACCHARUM UVÆ, S. FRUCTUS, L. This substance is found in the juice of grapes and other fruit, in the urine of diabetic patients, and in the liquid formed by acting on starch and woody fibre with dilute sulphuric acid.

Prep. 1. From the juice of ripe grapes or an infusion of the ripe fruit (raisins), by saturating the acid with chalk, decanting the clear liquid, evaporating to a syrup, clarifying with white of egg or bullock's blood, and then carefully evaporating to dryness; it may be purified for chemical purposes by solution and crystallisation in either water or boiling alcohol. Like other sugar, it may be decoloured by animal charcoal.

2. From honey, by washing with cold alcohol, which dissolves the fluid syrup and leaves the solid crystallisable portion.

Prop. It is less sweet and less soluble than cane sugar, requiring 1½ part of cold water for its solution; instead of bold crystals, it forms granular warty masses, without distinct crystalline faces; it does not easily combine with either oxide of calcium or oxide of lead; with heat, caustic alkaline solutions turn it brown or black, but it dissolves in oil of vitriol without blackening, the reverse being the case with cane sugar; with chloride of sodium it forms a soluble salt, which yields large, regular, and beautiful crystals. Sp. gr. 1·400.

Obs. Cane sugar is converted into grape sugar during the process of fermentation, and by the action of acids. See SUGAR (*page* 1087) and STARCH SUGAR (*below*).

Sugar, Maple. *Syn.* SACCHARUM ACERINUM, L. From the juice of the sugar maple. The average product from each tree is about 6 lbs. per season. It is identical with cane sugar. (See *page* 1087.)

Sugar, Milk. $C_{12}H_{22}O_{11} . H_2O$. *Syn.* SUGAR OF MILK, LACTIN; SACCHARUM LACTIS (Ph. D.), L. *Prep.* Gently evaporate clarified whey until it crystallises on cooling, and purify the crystals by digestion with animal charcoal and repeated crystallisations.

Prop, &c. White, translucent, very hard, cylindrical masses or four-sided prisms; soluble in about 6 parts of cold and in 2 parts of boiling water; it is unsusceptible of the vinous fermentation, except under the action of dilute acids, which convert it into grape sugar; in solution, it is converted into lactic or butyric acid by the action of caseine and albuminous matter. Milk contains about 5% of it. (Boussingault.)

Obs. Sugar of milk is chiefly imported from Switzerland. In this country it is chiefly used as a vehicle for more active medicines, especially among the homœopathists.

Sugar, Starch. *Syn.* POTATO SUGAR, FÆCULA S. This is grape sugar obtained by the action of diastase on starch, in the manner noticed under GUM (British), or by the action of dilute sulphuric acid on starch, or of the strong acid on lignin, or on substances containing it.

Prep. 1. Potato starch, 100 parts; water, 400 parts; sulphuric acid, 6 parts; mix, boil for 35 or 40 hours, adding water, to make up for evaporation; then saturate the acid with lime or chalk, decant or filter, and evaporate the clear liquor. Under pressure, the conversion is more rapid. *Prod.* 105%.

2. Shreds of linen or paper, 12 parts; strong sulphuric acid, 17 parts (Braconnot; 5 of acid, and 1 of water—Vogel); mix in the cold; in 24 hours dilute with water, and boil it for 10 hours; then neutralise with chalk, filter, evaporate to a syrup, and set the vessel aside to crystallise. *Prod.* 114%. Sawdust, glue, &c., also yield grape sugar by like treatment. See LIGNIN.

SUGAR-BOILING. The art or business of the confectioner or sugar-baker; the candying of sugar. The stages are as follow:—Well clarified and perfectly transparent syrup is boiled until a 'skimmer' dipped into it, and a portion 'touched' between the forefinger and thumb, on opening them, is drawn into a small thread, which crystallises and breaks. This is called a 'weak candy height.' If boiled again, it will draw into a larger string, and if bladders may be blown through the 'drippings' from the ladle, with the mouth, it has acquired the second degree, and is now called 'bloom sugar.' After still further boiling, it arrives at the state called 'feathered sugar.' To determine this re-dip the skimmer, and shake it over the pan, then give it a sudden flirt behind, and the sugar will fly off like feathers. The next degree is that of 'crackled sugar,' in which state the sugar that hangs to a stick dipped into it, and put directly into a pan of cold water, is not dissolved off, but turns hard and snaps. The last stage of refining this article reduces it to what is called 'carmel sugar,' proved by dipping a stick first into the sugar, and then into cold water, when, on the moment it touches the latter, it will, if matured, snap like glass. It has now arrived at a 'full candy height.' Care must be taken throughout that the fire is not too fierce, as, by flaming up against the sides of the pan, it will burn and discolour the sugar; hence the boiling is best conducted by steam heat.

Any flavour or colour may be given to the candy by adding the colouring matter to the syrup before boiling it, or the flavouring essences when the process is nearly complete. See STAINS, &c.

SUGAR CAN'DY. *Syn.* SACCHARUM CANDIDUM, S. CRYSTALLINUM, S. CRYSTALLIZATUM, L. Sugar crystallised by leaving the saturated syrup in a warm place (90 to 100° Fahr.), the shooting being promoted by placing sticks, or threads, at small distances from each other in the liquor; it is also deposited from compound syrups, and does not seem to retain much of the foreign substances with which they are loaded. Brown sugar candy is prepared in this way from raw sugar; white do., from refined sugar; and red do., from a syrup of refined sugar which has been coloured red by means of cochineal.

Sugar candy is chiefly used as a sweetmeat; and, being longer in dissolving than sugar, in coughs, to keep the throat moist; reduced to powder, it is also blown into the eye, as a mild escharotic in films or dimness of that organ.

SUGAR OF LEAD. Acetate of lead.

SUGAR PLUMS. *Syn.* BON-BONS, DRAGÉES, Fr. These are made by various methods, among which are those noticed under DROPS (Confectionery), LOZENGES, and PASTILS, to which may be added the following:—Take a quantity of sugar syrup, in the proportion to their size, in that state called a 'blow' (which may be known by dipping the skimmer into the sugar, shaking it, and blowing through the holes, when parts of light may be seen), and add a drop or two of any esteemed flavouring essence. If the 'bon-bons' are preferred white, when the sugar has cooled a little, stir it round the pan till it grains and shines on the surface. When all is ready, pour it through a funnel into little clean, bright, leaden moulds, which must be of various shapes, and be previously slightly moistened with oil of sweet almonds; it will then take a proper form and harden. As soon as the plums are cold, take them from the moulds; dry them for two or three days in the air, and put them upon paper. If the bon-bons are required to be coloured, add the colour just as the sugar is ready to be taken off the fire.

CRYSTALLISED BON-BONS are prepared by dusting them with powdered double-refined lump sugar before drying them.

LIQUEUR BON-BONS, now so beautifully got up by the Parisian confectioners, are obtained by pressing pieces of polished bone or metal into finely powdered sugar, filling the hollow spaces so formed with saturated solutions of sugar in the respective liqueurs, and then spreading over the whole an ample layer of powdered sugar. In the course of three or four days the bon-bons may be removed, and tinted by the artist at will. Instead of white powdered sugar ordered above, coloured sugar may be used. These bon-bons are found to be hollow spheres, containing a small quantity of the spirit or liqueur employed, and will bear keeping for many months. See SWEETMEATS, &c.

SUGARS (Medicated). *Syn.* SACCHARIDES; SACCHARA MEDICATA, L.; SACCHAROLÉS, SACCHARURES, Fr. Some of these are prepared by moistening white sugar with the medicinal substance, then gently drying it, and rubbing it to powder; in other cases they are obtained in the manner noticed under PULVERULENT EXTRACTS, or OLEOSACCHARUM. The most valuable preparation of this class in British pharmacy is the saccharated carbonate of iron (FERRI CARBONAS CUM SACCHARO—Ph. L.).

SUL'PHATE. *Syn.* SULPHAS, L. A salt of sulphuric acid.

SUL'PHIDE. A salt consisting of sulphur and a metal or other basic radical.

SULPHINDYL'IC ACID. *Syn.* SULPHINDIGOTIC ACID. An intensely blue pasty mass, formed by dissolving 1 part of indigo in about 15 parts of concentrated sulphuric acid. See SULPHATE OF INDIGO.

SUL'PHITE. A salt of sulphurous acid.

SULPHOCARBOLIC ACID. (SULPHOCARBOLATES.) Carbolic acid, when acted upon by bases, yields a class of salts termed carbolates. These compounds are very unstable; they readily absorb water from the air, which sets free carbolic acid; they usually have the powerful odour of the latter. When, however, equivalent weights of carbolic and sulphuric acids are mixed, union takes place, a definite double acid (sulphocarbolic) results, and the salts formed by this double acid with the various bases are entirely different from the simple salts of carbolic acid. They are very stable, very soluble, possess neither odour nor taste of carbolic acid, and are singularly beautiful in crystalline form.

Sulphocarbolic Acid [$HC_6H_5SO_4$] is obtained by the crystallisation in long colourless needles; unlike carbolic acid, it is soluble in water, alcohol, and ether, in any proportions.

Sulphocarbolate of Sodium [$Na(C_6H_5)SO_4.Aq$] is in brilliant, clear, rhombic prisms. The salt is very soluble in water. This salt can be administered as a medicine in doses of 20 to 60 grs.; it is slowly decomposed in the textures, carbolic acid being evolved. It thus becomes a very simple means of obtaining the beneficial effects of the administration of this antiseptic without the difficulties and dangers which attend it in its uncombined irritant and caustic form. It has proved of great service in the treatment of infectious diseases. Administered in the severest cases of diphtheria, malignant scarlet fever, typhoid, erysipelas, &c., the remedy has proved of extreme value.

The Sulphocarbolates of Potassium [$KC_6H_5SO_4$] **and Ammonium** [$NH_4C_6H_5SO_4$] are also brilliant crystals; they are freely soluble, administered with the greatest ease,

and have been used with success as remedial agents.

Sulphocarbolate of Calcium [$Ca(C_6H_5SO_4)_2 + Aq.$] is obtained in very long, fine, densely interlacing crystals, which form in bulk, by their interlacement, a porous mass. Unlike the usual lime-salts, this is exceedingly soluble. This fact overcomes the great difficulty of treatment when in disease there is a deficiency of lime in the body, especially in rickets, in which disease the want of lime in the bones gives rise to distortions. The sulphocarbolate of magnesium crystallises in large, clear, rhombic prisms, easily soluble in water.

Sulphocarbolate of Iron [$Fe(C_6H_5SO_4)_2$] is in colourless or pale green rhombic plates. It is readily administered, and seems in some instances to be preferred to other salts of iron. It seems to have been of especial use in the skin diseases of children, wherein there is much formation of matter.

Sulphocarbolate of Zinc [$Zn(C_6H_5SO_4)_2$] is chiefly employed in solution as a lotion. By high surgical authorities it is considered to answer all the purposes of the antiseptic dressing of carbolic acid. It is inodorous, and has very slight irritating action.

Sulphocarbolate of Copper [$Cu(C_6H_5SO_4)_2$] forms fine prismatic crystals of a blue colour. It is used as the zinc sulphocarbolate, chiefly as a lotion and dressing, in the proportion of 3 to 10 grains to the ounce of distilled water.

SULPHOCYAN'OGEN. A well-defined salt-radical, containing sulphur united to the elements of cyanogen. Its compounds are the sulphocyanides, most of which may be formed by directly saturating hydrosulphocyanic acid with the oxide or hydrate of the base; or, from the sulphocyanide of potassium and a soluble salt of the base, by double decomposition.

SULPHOPHE'NIC ACID. A synonym of sulphocarbolic acid. See SULPHOCARBOLATES.

SULPHOVIN'IC ACID. $C_2H_5HSO_4$. *Syn.* SULPHETHYLIC ACID; ACIDUM SULPHOVINICUM, L. This substance is formed by the action of heat on a mixture of alcohol and sulphuric acid; it is the intermediate product which is developed in the preparation of ether. The salts are called sulphovinates or sulphothylates.

SUL'PHUR. [Eng., L.] *Syn.* BRIMSTONE; SOUFRE, Fr. An elementary substance. That of commerce is chiefly imported from Sicily and Italy, and is a volcanic production.

Var. The principal of these are—

AMORPHOUS SULPHUR, BROWN S.; SULPHUR AMORPHUM, S. FUSCUM, S. INFORME, S. BRUM, L. Prepared from sublimed sulphur, by melting it, increasing the heat to from 320° to 350° Fahr., and continuing it at that temperature for about half an hour, or until it becomes brown and viscid, and then pouring it into water. In this state it is ductile, like wax, may be easily moulded in any form, is much heavier than usual, and when it has cooled does not again become fluid until heated to above 600° Fahr. The same effect is produced more rapidly by at once raising the temperature of the melted mass to from 430° to 480° Fahr.

PRECIPITATED SULPHUR, HYDRATE OF SULPHUR, MILK OF S.; SULPHURIS HYDRAS, LAC SULPHURIS, SULPHUR PRÆCIPITATUM (B. P., Ph.L.), L. *Prep.* From sublimed sulphur, 1 part; dry and recently slaked lime, 2 parts; water, 25 parts, or q. s.; boil for 2 or 3 hours, dilute with 25 parts more of water, filter, and precipitate with dilute hydrochloric acid; drain, and well wash the precipitate, and dry it by a gentle heat. Resembles sublimed sulphur in its general properties, but is much paler, and in a finer state of division. "A grayish-yellow powder, free from grittiness, and with no smell of sulphuretted hydrogen." (B. P.)

ROLL SULPHUR, CANE S., STICK S.; SULPHUR IN BACCULIS, S. IN ROTULIS, S. ROTUNDUM, L. This is crude sulphur, purified by melting and skimming it, and then pouring it into moulds. That obtained during the roasting of copper pyrites, and which forms the common roll sulphur of England, frequently contains from 3 to 7% of yellow arsenic.

SUBLIMED SULPHUR, FLOWERS OF SULPHUR; FLORES SULPHURIS, SULPHUR (Ph. L.), SULPHUR SUBLIMATUM (B. P., Ph. E. & D.), L. Prepared by subliming sulphur in iron vessels. For medical purposes, it is ordered to be well washed with water, and dried by a gentle heat. "A slightly gritty powder, of a fine greenish-yellow colour, without taste and without odour till heated." (B. P.)

SULPHUR VIVUM, BLACK SULPHUR, CRUDE S., HORSE BRIMSTONE; SULPHUR NIGRUM, S. CABALLINUM, S. GRISEUM, L. This is crude native sulphur. It is a gray or mouse-coloured powder. The residuum in the subliming pots from the preparation of flowers of sulphur is now commonly substituted for it. It generally contains much arsenic, and is consequently very poisonous.

Pur. The sublimed sulphur of the shops is now, in general, of respectable quality, but the precipitated sulphur frequently contains about $\frac{3}{4}$ of its weight of sulphate of lime (plaster of Paris), owing to the substitution of sulphuric acid for hydrochloric acid in its manufacture. This sophistication is readily detected by strongly heating a little of the suspected sample in an iron spoon or shovel, when the sulphur is burnt or volatilised, and leaves behind the sulphate of lime as a white ash; this, when mixed with water, and gently dried, gives the amount of the adulteration. A still simpler plan is to dissolve out the sulphur in the sample with a little hot oil of turpentine or liquor of potassa; the undissolved portion is foreign matter.

Prop. Sulphur melts to a clear thin fluid, and volatilises at about 232° Fahr., and in open vessels rapidly takes fire, burning with a bluish flame. It is insoluble in both water

and alcohol; it is soluble in oil of turpentine and the fatty oils, and freely so in bisulphide of carbon and hot liquor of potassa. With oxygen it unites to form sulphurous anhydride, and with the metals to form sulphides. Sp. gr. 1·982 to 2·015.

Estim. The determination of the quantity of sulphur, phosphorus, and chlorine, in a state of combination, especially in organic mixtures, is often rather troublesome. The proportion of sulphur is best determined by oxidising a known weight of the substances by strong nitric acid, or by fusing it in a silver vessel with 10 or 12 times its weight of pure hydrate of potassa and about half as much nitre. The sulphur is thus converted into sulphuric acid, the quantity of which can be determined by dissolving the fused mass in water, acidulating the solution with nitric acid, adding a salt of baryta, and weighing the resulting sulphate. Phosphorus is, in like manner, oxidised to phosphoric acid, the quantity of which is determined by precipitation in combination with sesquioxide of iron, or otherwise. The chlorine is correctly determined by placing a small weighed portion in a combustion-tube, which is afterwards filled with fragments of pure quicklime. The lime is then brought to a red heat, and the vapour of the liquid driven over it, when chloride of calcium is formed. The contents of the tube, when cold, are dissolved in dilute nitric acid, filtered, the chlorine precipitated by nitrate of silver, and the chlorine weighed under the form of chloride of silver. See ORGANIC SUBSTANCES.

Uses, &c. Sulphur is extensively used in the manufacture of gunpowder, in bleaching, &c. &c. When swallowed, it acts as a mild laxative and stimulating diaphoretic; and has hence been long taken in various chronic skin diseases, in pulmonary, rheumatic, and gouty affections, and as a mild purgative in piles, prolapsus ani, &c. Externally, it is extensively used in skin diseases, especially the itch, for which it appears to be a specific.—*Dose.* 20 to 60 grs., in sugar, honey, treacle, or milk.

Sulphur, Chlo'rides of. Several of these compounds exist, but the following are the most important. 1. (DICHLORIDE, S_2Cl_2.) Prepared by passing dry chlorine gas over the surface of sulphur melted in a bulbed-tube or small retort connected with a well-cooled receiver. The product is a deep orange-yellow and very mobile liquid, which possesses a disagreeable odour, and boils at 280° Fahr. It is soluble in bisulphide of carbon, and in benzol, without decomposing. It dissolves sulphur in large quantities, especially when heated. A solution of the dichloride with excess of sulphur in crude benzol is used for vulcanising caoutchouc.

2. (CHLORIDE, HYPOCHLORIDE, or HYPOCHLORITE of the shops; SULPHURIS CHLORIDUM, S. HYPOCHLORIDUM, S. HYPOCHLORITIS, L.) This is prepared by spreading washed sulphur thinly on the bottom of a wooden box, or other chamber, and passing chlorine gas slowly over until it ceases to be absorbed.

Obs. This last compound is of variable and undetermined constitution. It has been recommended for internal use, by Derksengi, in old gouty affections, combined with pains in the stomach, and in severe nervous fever.—*Dose.* ½ to 2 grs., dissolved in ether, and taken with old Hungary wine. It is also used externally in *psoriasis inveterata*, and other skin diseases.

I'odide of Sulphur. S_2I_2. *Syn.* BINIODIDE OF SULPHUR; SULPHURIS IODIDUM (Ph. L.), SULPHUR IODATUM (Ph. D.), L. *Prep.* Into a glass flask put 1 part of sublimed sulphur, and over it place 4 parts of iodine; insert the cork loosely, and place the flask in a water bath; as soon as its contents melt, stir them with a glass rod, replace the cork, remove the bath from the fire, and let the whole cool together. When cold, break the iodide into pieces, and place it in a wide-mouthed stoppered bottle. In this way a beautiful semi-crystalline, dark gray mass, resembling antimony, is obtained. The formulæ of the B. P., Ph. L. E. & D., Ph. U. S. & P. Cod., are essentially similar. The Ph. D. orders the two substances to be powdered and mixed before heating them.

Uses, &c. It is stimulant and alterative. An ointment made of it has been recommended by Biett and others in tuberculous affections of the skin, in lepra, psoriasis, lupus, porrigo, &c.

Iodide of sulphur stains the skin like iodine, and is readily decomposed by contact with organic substances.

SULPHURA'TION. The process by which silk, cotton, and woollen goods, straw plait, &c., are subjected to the fumes of burning sulphur, or sulphurous acid, for the purpose of bleaching or decolouring them. On the large scale, this is effected in closed apartments, called 'sulphuring rooms,' to which sufficient air only is admitted to keep up the slow combustion of the sulphur. On the small scale, as for straw hats, bonnets, &c., a large wooden chest is frequently employed in the same way.

SUL'PHURET. *Syn.* SULPHIDE; SULPHURETUM, SULPHIDUM, L. See SULPHIDE.

SULPHURET'TED HY'DROGEN. See HYDROGEN.

SULPHU'RIC ACID. H_2SO_4. *Syn.* OIL OF VITRIOL, BRITISH O. OF V., VITRIOLIC ACID†; ACIDUM SULPHURICUM (B. P., Ph. L. & E.), ACIDUM SULPHURICUM VENALE (Ph. D.), ACIDUM VITRIOLICUM†, L. This acid, in a concentrated form, was discovered by Basil Valentine towards the end of the 15th century. At first it was obtained by the distillation of green vitriol; but is now made by bringing sulphurous anhydride, arising from the combustion of sulphur, into contact with the vapour of nitric acid, evolved from a mix-

ture of nitrate of soda and oil of vitriol, and of steam. The process is conducted in leaden chambers, into which steam is admitted continuously by several jets, and which have about three inches of water resting on the floor, to absorb the acid. As soon as the water, or rather liquid acid, has acquired the sp. gr. of 1·35 to 1·50, it is drawn off, and concentrated by boiling in shallow leaden pans to the density of about 1·72, after which it is further concentrated in green-glass or platinum retorts, until the sp. gr. reaches 1·842 to 1·846. When cold, the clear acid is put into large globular bottles of green glass (carboys), surrounded with straw and basket-work, and is sent into the market under the name of 'oil of vitriol."

Purif. Commercial sulphuric acid frequently contains nitrous acid, arsenic, lead, and saline matter. The nitrous acid may be removed by adding a little sulphate of ammonia, and heating the acid to ebullition for a few minutes. Both nitric and nitrous acid are thus entirely decomposed into water and nitrogen gas. The arsenic may be got rid of by adding a little sulphide of barium to the acid, agitating the mixture well, and, after repose, decanting and distilling it. Lead, which exists as sulphate, may be separated as a white precipitate by simply diluting the acid with water. Saline matter may be removed by simple rectification. A good way of purifying oil of vitriol is to heat it nearly to the boiling-point, and pass a current of hydrochloric acid through it; the arsenic is thus carried over as the volatile chloride of arsenic, while the nitrous and nitric acids are expelled almost completely. To obtain a perfectly pure acid, it should be distilled after the removal of the nitrous acid and arsenic by the methods indicated above. "The distillation is most conveniently conducted, on the small scale, in a glass retort, containing a few platinum chips, and heated by a sand bath or gas-flame, rejecting the first ½ fl. oz. that comes over." (Ph. E.) In the Ph. D. the first tenth of the distillate is ordered to be rejected, and the process to be stopped when no more than about 1 fl. oz. is left in the retort. According to Dr. Ure, the capacity of the retort should be from 4 to 8 times as great as the volume of the acid, and connected with a large tubular receiver by a loosely fitting glass tube, 4 feet long and 1 to 2 inches in diameter. "The receiver should not be surrounded with cold water." We find that fragments of glass, or of rock crystals, may be advantageously substituted for platinum foil, to lessen the explosive violence of the ebullition. Sulphuric acid which has become brown by exposure may be decolorised by heating it gently, the carbon of the organic substances being thus converted into carbonic acid.

Prop. Commercial sulphuric acid (oil of vitriol) is a colourless, odourless, and highly corrosive liquid, the general properties of which are well known. Its sp. gr. at 60° should never be greater than 1·848, or less than 1·840. (Miller and Odling give the sp. gr. of the pure and concentrated acid as 1·842; Abel and Bloxam, as 1·848; Apjohn gives it as 1·846, and Hardwich about 1·845.) It is immediately coloured by contact with organic matter. It attracts water so rapidly from the atmosphere, when freely exposed to it, as to absorb 1-3rd of its weight in 24 hours, and 6 times its weight in a few months. When 3 volumes are suddenly mixed with 2 of water, the temperature of the mixture rises more than 180° Fahr. Its freezing-point appears to be about 60° below that of water (Miller and Odling give that of the rectified acid as — 30° Fahr.; Apjohn and Abel and Bloxam, — 29°). It boils at about 620° Fahr. (620·6°, Odling; 620°, Hardwich and Fownes; 617°, Apjohn; 590·6°, Abel and Bloxam). It exhibits all the properties of the acids in an exalted degree. Its salts are called sulphates.

Pur. "Free from colour and odour. Sp. gr. 1·843. 100 grs. are saturated by 285 grs. of crystallised carbonate of soda." (Ph. L.) "What remains after the acid is distilled to dryness, does not exceed $\frac{1}{400}$th part of its weight. Diluted sulphuric acid is not discoloured by sulphuretted hydrogen." (Ph. L. 1836.) "Diluted with its own volume of water, only a scanty muddiness arises, and no orange fumes escape. Sp. gr. 1·840." (Ph. E.) The rectified acid (ACIDUM SULPHURICUM PURUM—Ph. E. & D.) is colourless; dilution causes no muddiness; solution of sulphate of iron shows no reddening at the line of contact when poured over it. Sp. gr. 1·845." (Ph. E.) Sp. gr. 1·846—Ph. D.; 1·843—B. P.; 1·842—Ure.

Tests.—See SULPHATE.

Uses, &c. Sulphuric acid is much employed in the arts, and, from its superior affinity, to disengage most of the other acids from their saline combinations in chemical processes. In the diluted state it is used in medicine. When swallowed, it acts as a violent corrosive poison. The antidotes are chalk, whiting, magnesia, carbonate of soda, or carbonate of potash, mixed with water, or any bland diluent, and taken freely, an emetic being also administered.

Estim. The strength of sulphuric acid is most correctly ascertained by its power of saturating bases. In commerce, it is usually determined from its sp. gr. The quantity of sulphuric acid present in a compound may be determined by weighing it under the form of sulphate, as explained in a former part of this volume. See ACIDIMETRY.

Concluding remarks. According to most of our standard works on chemistry, British oil of vitriol, when purified and brought to its maximum strength by distillation, is a definite chemical compound, having the formula H_2SO_4, and designated normal sulphuric acid by Odling. Marignac, however, asserts that the distilled acid always contains an excess of

water, and that the true monohydrate can only be obtained by submitting fuming sulphuric acid ('Nordhausen s. a.') to congelation. According to this chemist, the true monohydrate readily freezes in cold weather, and remains solid up to 51° Fahr. Two other definite hydrates of sulphuric acid are generally recognised by chemists, viz.—Bihydrated sulphuric acid ('glacial s. a.'), having a sp. gr. of 1·78; freezing at about 40° Fahr. (47°, Miller); and boiling at about 435° (Apjohn; 401° to 410°, Odling): Terhydrated sulphuric acid, having a sp. gr. of 1·632, and the boiling-point 348° Fahr. See also NORDHAUSEN SULPHURIC ACID (*below*).

Sulphuric Acid, Al'coholised. *Syn.* ACIDUM SULPHURICUM ALCOHOLISATUM, L.; EAU DE RABEL, Fr. *Prep.* (P. Cod.) To rectified spirit, 3 parts, add, very gradually, sulphuric acid, 1 part. It is generally coloured by letting it stand over a little cochineal. Refrigerant, and, externally, escharotic.—*Dose.* ½ fl. dr. to water, 1 pint; as a cooling drink in fevers, &c.

Sulphuric Acid, Anhy'drous. SO_3. *Syn.* SULPHURIC ANHYDRIDE, DRY SULPHURIC ACID; ACIDUM SULPHURICUM SINE AQUÂ, L. *Prep.* 1. By heating Nordhausen acid to about 100° Fahr. in a glass retort connected with a well-cooled receiver.

2. By distilling anhydrous bisulphate of soda, which has previously been raised to a low red heat in an earthen retort, to which a receiver is fitted without the aid of corks.

3. (Barreswill.) 2 parts of the strongest oil of vitriol are gradually added to 3 parts of anhydrous phosphoric acid, contained in a retort surrounded by a freezing mixture; when the compound has assumed a brown colour, the retort is removed from the bath, and connected with a receiver which is set there in its place; a gentle heat is now applied to it, when white vapours pass over into the receiver, and condense there under the form of beautiful silky crystals. The product equals in weight that of the phosphorus originally employed. "If a few drops of water be added, a dangerous explosion ensues."

Prop. White, silky, asbestos-like crystals, deliquescing rapidly, and fuming in the air; put into water, it hisses like a red-hot iron; it melts at 77°, and rapidly volatilises at 86° Fahr.; it does not redden dry litmus paper; sp. gr. 1·97 at 78° Fahr.

Sulphuric Acid, Aromat'ic. *Syn.* ELIXIR OF VITRIOL, ACID E. OF V.; ACIDUM SULPHURICUM AROMATICUM (B. P., Ph. E. & D.), L. *Prep.* 1. (Ph. E. & D.) Oil of vitriol, 3½ fl. oz.; rectified spirit, 1½ pint; mix, add of powdered cinnamon, 1½ oz.; powdered ginger, 1 oz.; digest for 6 days (7 days—Ph. D.), and filter. Sp. gr. ·974—Ph. D.

2. (Wholesale.) From compound tincture of cinnamon, 1 gal.; oil of vitriol, 1 lb.; mix, and in a week filter—*Dose.* 10 to 30 drops, in the same cases as the dilute acid.

3. (B. P.) Sulphuric acid, 3; rectified spirit, 40; cinnamon, in powder, 2; ginger, in powder, 1¼; mix the acid gradually with the spirit, add the powders, macerate for 7 days, and filter. —*Dose.* 5 to 30 minims.

Sulphuric Acid, Dilute'. *Syn.* SPIRIT OF VITRIOL; ACIDUM SULPHURICUM DILUTUM (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Take of sulphuric acid, 15 fl. drs., and dilute it gradually with distilled water, q. s. to make the whole exactly measure a pint. Sp. gr. 1·103. "1 fl. oz. of this acid is exactly saturated by 216 grs. of crystallised carbonate of soda."

2. (Ph. E.) Sulphuric acid, 1 fl. oz.; water, 13 fl. oz. Sp. gr. 1·090.

3. (Ph. D.) Pure sulphuric acid, 1 fl. oz.; distilled water, 13 oz. Sp. gr. 1·084.

4. (B. P.) Sulphuric acid, 3; distilled water, q. s. to measure 35¾; mix by adding the acid gradually to the water.—*Dose.* 4 to 20 minims.

Prop, &c. Antiseptic, tonic, and refrigerant. —*Dose.* 10 to 30 drops, largely diluted with water, several times daily; in low typhoid fevers, passive hæmorrhages, profuse perspiration, in various skin diseases to relieve the itching, in dyspepsia, &c. It is also used externally.

Sulphuric Acid, Nordhausen. *Syn.* FUMING SULPHURIC ACID; ACIDUM SULPHURICUM FUMANS, L. *Prep.* By distilling calcined ferrous sulphate ('green vitriol') in an earthen retort. The product is a brown oily liquid, which fumes in the air, is intensely corrosive, and has a sp. gr. about 1·900. When heated to about 100° Fahr., the anhydrous acid is given off, and ordinary oil of vitriol is left. According to Marignac, crystals of normal sulphuric acid (H_2SO_4) are formed in this acid when it is submitted to a low temperature. Nordhausen acid is so called from the place of its manufacture in Saxony. It may be regarded as a mixture or compound of H_2SO_4 and SO_3. It is chiefly used for dissolving indigo.

SULPHURIC ANHYDRIDE. See ANHYDROUS SULPHURIC ACID.

SULPHURIC E'THER. See ETHER.

SUL'PHUROUS ACID. SO_2. *Syn.* SULPHUROUS ANHYDRIDE; ACIDUM SULPHUROSUM, B. P. This compound is freely evolved in the gaseous form when sulphur is burnt in air or oxygen, and when the metals are digested in hot sulphuric acid; and, mixed with carbonic acid, when charcoal, chips of wood, cork, and sawdust, are treated in the same way.

Prep. 1. By the action of sulphuric acid on chippings of copper or mercury at a gentle heat. Pure.

2. (Berthier.) By heating, in a glass retort, a mixture of black oxide of manganese, 100 parts, and sulphur, 12 or 14 parts. Pure. The gas evolved should be collected over mercury, or received into water.

3. (Redwood.) Pounded charcoal, ½ oz.;

oil of vitriol, 4 fl. oz.; mix in a retort, apply the heat of a spirit lamp, and conduct the evolved gases by means of a bent tube into a bottle containing water. The sulphurous acid is absorbed, whilst the carbonic acid gas passes off.

4. (B. P.) Distilled water, saturated with sulphurous anhydride. It is colourless and emits a pungent odour. *Used* as a deoxidiser, disinfectant, and antiseptic. Diluted with from 1 to 2 parts of water it is employed as a lotion for wounds, cuts, ulcers, bed-sores, scalds, and burns; with from 1 to 5 of water it is used as a gargle, also as a lotion in parasitic skin diseases; from ½ to 1 dr., in a wine-glassful of water, 3 times a day, relieves constant sickness.

Prop., &c. Water absorbs 30 times its volume of this gas. Pure liquid sulphurous acid can only be obtained by passing the pure dry gas through a glass tube surrounded by a powerful freezing mixture. Its sp. gr. is 1·45; boiling-point, 14° Fahr.; it causes intense cold by its evaporation. Sulphurous acid forms salts called sulphites.

Uses. To bleach silks, woollens, straw, &c., and to remove vegetable stains and iron-moulds from linen. For these purposes it is prepared from sawdust or any other refuse carbonaceous matter.

Sulphurous Anhydride. See SULPHUROUS ACID.

SU'MACH. This dye stuff is chiefly used as a substitute for galls. With a mordant of acetate of iron, it gives gray or black; with tin or acetate of alumina, yellow; and with sulphate of zinc, a yellowish-brown; alone, it gives a greenish-fawn colour.

SUM'BUL. *Syn.* MUSK ROOT, JATAMANSI, SUMBUL ROOT; SUMBUL RADIX (B. P.). A substance introduced to British medicine by Dr. A. B. Granville, in 1850. It occurs in circular pieces, varying from 1 to 3 or 4 inches in diameter; has a musk-like odour, and a sweet balsamic taste. It acts as a powerful stimulant, especially of the nervous system. In India and Persia it has long been used as a medicine, a perfume, and as incense.—*Dose.* 15 grs. to 1 dr., either masticated, or made into an infusion, electuary, or tincture; in cholera, hysteria, neuralgia, epilepsy, low fevers, and various other spasmodic and nervous disorders.

SUMMER DRINKS. See LEMONADE, SHERBET, &c.

SU'PER-. See NOMENCLATURE.

SUP'PER. The evening meal; the last meal of the day. Supper is generally an unnecessary meal, and, when either heavy, or taken at a period not long before that of retiring to rest, proves nearly always injurious, preventing sound and refreshing sleep, and occasioning unpleasant dreams, nightmare, biliousness, and all the worst symptoms of imperfect digestion. The last meal of the day should be taken at least three hours before bedtime. Even when it consists of some 'trifle,' as a sandwich or biscuit, an interval of at least an hour should elapse before retiring to rest. In this way restlessness and unpleasant dreams will become rare.

SUPPOS'ITORY: *Syn.* SUPPOSITORIUM, L, A medicine placed in the rectum for the purpose of affecting the lower intestine, or, by absorption, the system generally. Suppositories are rounded, usually, elongated masses, having the active medicine combined with some substance which will retain the proper shape, as soap, spermaceti cerate, or cacao-butter. The latter substance is, perhaps, the best vehicle for remedies prescribed in this form. It is, however, rather too soft to be used without admixture. According to Dorvault, the addition of one eighth part by weight of wax imparts the proper hardness. The mode of proportioning the doses of active ingredients has been noticed in the article ENEMA.

Suppository of Lead (Compound). *Syn.* SUPPOSITORIUM PLUMBI COMPOSITUM (B. P.). *Prep.* Acetate of lead, in powder, 36; opium, in powder, 12; benzoated lard, 42; white wax, 10; oil of theobroma, 80; melt the wax and oil of theobroma with a gentle heat, then add the other ingredients previously rubbed together in a mortar, and, having mixed them thoroughly, pour the mixture while it is fluid into suitable moulds of the capacity of 15 grs. The above makes 12 suppositories.

Suppository of Mercury. *Syn.* SUPPOSITORIUM HYDRARGYRI (B. P.). *Prep.* Ointment of mercury, 60 grs.; benzoated lard, 20 grs.; white wax, 20 grs.; oil of theobroma, 80 grs.; melt all but the mercurial ointment together, then add the ointment of mercury, stir till well mixed, and immediately pour into moulds of the capacity of 15 grs. The above makes 12 suppositories.

Suppository of Morphia. *Syn.* SUPPOSITORIUM MORPHIÆ (B. P.). *Prep.* Hydrochlorate of morphia, 6 grs.; oil of theobroma, 90 grs.; benzoated lard, 64 grs.; white wax, 20 grs.; melt the wax and oil of theobroma with a gentle heat, then add the hydrochlorate of morphia and benzoated lard, previously rubbed together in a mortar, and mix all the ingredients thoroughly; pour the mixture, while it is fluid, into suitable moulds of the capacity of 15 grs., or the fluid mixture may be allowed to cool, and then be divided into 12 equal parts, each of which should be made into a conical form.

Suppository for Piles. *Syn.* SUPPOSITORIUM HÆMORRHOIDALE, S. SEDATIVUM, L. *Prep.* 1. Powdered opium, 2 grs.; finely powdered galls, 10 grs.; spermaceti cerate, 1 dr.

2. (Ellis.) Powdered opium, 2 grs.; soap, 10 grs.; mix.

3. (Richard.) Extracts of opium and stramonium, of each, 1 gr.; cacao-butter, 2 drs. *Used* when the piles are very painful.

Suppository, Pur'gative. *Syn.* SUPPOSITORIUM CATHARTICUM, L. *Prep.* 1. Soap, 1 dr.;

elaterium, 1 to 2 grs.; mix. As a strong purge.

2. (Niemann.) Soap, 2 drs.; common salt, 1 dr.; honey, q. s.; mix. As a mild cathartic.

Suppository, Resol'vent. *Syn.* SUPPOSITORIUM RESOLVENS, L. *Prep.* (Stafford.) Iodide of potassium, 3 to 4 grs.; extracts of henbane and hemlock, of each, 6 grs. In enlargement or induration of the prostate gland.

Suppository, Sed'ative. See *above*.

Suppository of Tannic Acid. *Syn.* SUPPOSITORIUM ACIDI TANNICI (B. P.). *Prep.* Tannic acid, 36 grs.; benzoated lard, 44 grs.; white wax, 10 grs.; oil of theobroma, 90 grs.; melt the wax and oil with a gentle heat, then add the tannic acid and benzoated lard, previously rubbed together, and mix thoroughly. Pour the mixture, while it is fluid, into suitable moulds of the capacity of 15 grs. The above makes 12 suppositories.

Suppository, Ver'mifuge. *Syn.* SUPPOSITORIUM ANTHELMINTICUM, S. VERMIFUGUM, L. *Prep.* (Swediaur.) Aloes, 4 drs.; common salt, 3 drs.; flour, 2 drs.; honey, q. s. to make a stiff mass; divide into proper-shaped pieces, weighing about 15 grs. each. One to be used after each motion.

SWAL'LOW. Three or four species of *hirundo* (Linn.) pass under this name. It was once held in great repute in medicine. Even the excrement was included among the simples of the Ph. L. 1618. The swallow is an insectivorous bird, but, like the sparrow and rook, is much persecuted for its good services. It has been calculated that, directly and indirectly, a single swallow is the humble means of lessening the race of one kind of insect alone to the extent of 560,970,489,000,000,000 of its race in one year.

SWEET BALLS. *Prep.* Take of Florentine orris root, 3 oz.; cassia, 1 oz.; cloves, rhodium wood, and lavender flowers, of each, ½ oz.; ambergris and musk, of each, 6 grs.; oil of verbena, 10 or 12 drops; beat them to a paste, form this into balls with mucilage of gum tragacanth made with rose water, pierce them, whilst soft, with a needle, and, when they are quite dry and hard, polish them. Worn in the pocket as a perfume. Some persons varnish them, but that keeps in the smell.

SWEET BAY. *Syn.* LAUREL; LAURUS NOBILIS (Linn.), L. The fruit (LAURI BACCÆ; LAURUS—Ph. L.), as well as the leaves (LAURI FOLIA), are reputed aromatic, stimulant, and narcotic. They were formerly very popular in coughs, colic, hysteria, suppressions, &c.; and, externally, in sprains, bruises, &c.

SWEET FLAG. *Syn.* ACORUS CALAMUS, L. A plant of the natural order *Orontiaceæ*. The rhizone ('root') is an aromatic stimulant, and is regarded by some as a valuable medicine in agues, and as a useful adjunct to other stimulants and bitter tonics. It is sometimes employed by the rectifiers of gin. The volatile oil obtained from it by distillation is employed for scenting snuff, and in the preparation of aromatic vinegar.

SWEETS. Home-made wines; British wines.

SWEET'BREAD. The thymus gland of the calf. When boiled, it is light and digestible; but when highly dressed and seasoned, it is improper both for dyspeptics and invalids. (Pereira.)

SWEET'MEATS. Under this head are properly included confections, candies, and preserves, in sugar; but, as generally employed, the word embraces all the sweet compounds of the confectioner.

Sweetmeats, as well as cakes, blancmange, and jellies, are not unfrequently coloured with deleterious substances, the consequences of which are always pernicious, and, in many instances, have proved fatal. Gamboge, a drastic cathartic; chrome yellow, red lead, orpiment, emerald green, and various other pigments containing lead, arsenic, copper, or other poisons, have been thus employed. The whole of these may be readily detected by the tests and characteristics appended to their respective names.

The colours and stains which may be safely employed to increase the beauty of these articles are noticed under STAINS and LIQUEUR.

SWINE-POX. See POX.

SYDENHAM'S LEN'ITIVE. *Prep.* Take of rhubarb (recently grated or powdered), 3 drs.; tamarinds, 2 oz.; senna, ½ oz.; coriander seeds (bruised), 2 drs.; boiling water, 1 pint; macerate for 3 hours in a covered vessel, and strain. An excellent stomachic and laxative.—*Dose.* ½ to 1 wine-glassful.

SYL'VIC ACID. *Syn.* SILVIC ACID. The portion of common resin or colophony which is the least soluble in cold and somewhate dilute alcohol.

SYM'BOLS. In chemistry, are representations of one atom of each of the elementary bodies, by the capital initial letter with or without the addition of a small letter of their Latin names. As C, for *carbon*; Fe (*ferrum*), iron; O, *oxygen*, &c.

SYMPATHET'IC INK. See *page* 643.

SYN'APTASE. *Syn.* EMULSIN. The name given by Robiquet to the EMULSIN, a nitrogenised or albuminoid principle existing in both the bitter and sweet almond. It possesses the remarkable property of converting amygdalin, in the presence of water, into hydrocyanic acid and the essential oil of bitter almonds. 100 grs. of amygdalin yield, under the influence of synaptase and water, 47 grs. of raw oil, and 5·9 grs. of anhydrous hydrocyanic acid. (Liebig.)

SYN'COPE. See FAINTING.

SYR'UP. *Syn.* SIRUP, SIROP; SYRUPUS, L. A saturated, or nearly saturated, solution of sugar in water, either simple, flavoured, or medicated.

In the preparation of syrups care should be

taken to employ the best refined sugar, and either distilled water or filtered rain water; by which they will be rendered much less liable to spontaneous decomposition, and will be perfectly transparent, without the trouble of clarification. When inferior sugar is employed, clarification is always necessary. This is best done by dissolving the sugar in the water, or other aqueous menstruum, in the cold, and then beating up a little of the cold syrup with some white of egg, and an ounce or two of cold water, until the mixture froths well; this must be added to the syrup in the boiler, and the whole 'whisked up' to a good froth; heat should now be applied, and the scum which forms removed from time to time with a clean 'skimmer.' As soon as the syrup begins to slightly simmer it must be removed from the fire, and allowed to stand until it has cooled a little, when it should be again skimmed, if necessary, and then passed through clean flannel. When vegetable infusions or solutions enter into the composition of syrups, they should be rendered perfectly transparent by filtration or clarification, before being added to the sugar.

The proper quantity of sugar for syrups will, in general, be found to be 2 lbs. (avoir.) to every imperial pint of water or thin aqueous fluid. These proportions, allowing for the water that is lost by evaporation during the process, are those best calculated to produce a syrup of the proper consistence, and possessing good 'keeping qualities.' They closely correspond to those recommended by Guibourt for the production of a perfect syrup, which, he says, consists of 30 parts of sugar to 16 parts of water.

In the preparation of syrups it is of great importance to employ as little heat as possible, as a solution of sugar, even when kept at the temperature of boiling water, undergoes slow decomposition. The plan which we adopt is to pour the water (cold) over the sugar, and to allow the two to lie together for a few hours, in a covered vessel, occasionally stirring, and then to apply a gentle heat (preferably that of steam or a water bath) to finish the solution. Some persons (falsely) deem a syrup ill prepared unless it has been allowed to boil well; but if this method be adopted, the ebullition should be only of the gentlest kind ('simmering'), and should be checked after the lapse of 1 or 2 minutes.

When it is necessary to thicken a syrup by boiling, a few fragments of glass should be introduced, in order to lower the boiling-point.

To make highly transparent syrups, the sugar should be in a single lump, and, by preference, taken from the bottom or broad end of the loaf, as, when taken from the smaller end, or if it be powdered or bruised, the syrup will be more or less cloudy.

Syrups are judged, by the laboratory man, to be sufficiently boiled when some taken up in a spoon pours out like oil, or, a drop cooled on the thumb-nail gives a proper 'thread' when touched. When a thin skin appears on blowing upon the syrup, it is judged, by the same party, to be completely saturated. These rude tests often lead to errors, which might be easily prevented by employing the proper proportions, or determining the sp. gr.

A fluid ounce of SATURATED SYRUP weighs 577½ grs.; a gallon weighs 13¼ lbs. (avoir.); its sp. gr. is 1·319 to 1·321, or 35° of Baumé's aerometer; its boiling-point is 221° Fahr., and its density at the temperature of 212° is 1·260 to 1·261, or 30° Baumé. The syrups prepared with the juices of fruits, or which contain much extractive matter, as those of sarsaparilla, poppies, &c., mark about 2° or 3° more on Baumé's scale than the other syrups.

In most pharmaceutical works directions are given to completely saturate the water with sugar. Our own experience, which is extensive, leads us to disapprove of such a practice, since we find that, under all ordinary circumstances, a syrup with a very slight excess of water keeps better than one fully saturated. In the latter case a portion of sugar generally crystallises out on standing, and thus, by abstracting sugar from the remainder of the syrup, so weakens it, that it rapidly ferments and spoils. This change proceeds at a rapidity proportionate to the temperature. Saturated syrup kept in a vessel that is frequently uncorked or exposed to the air soon loses sufficient water, by evaporation from its surface, to cause the formation of minute crystals of sugar, which, falling to the bottom of the vessel, continue to increase in size at the expense of the sugar in the solution. We have seen a single 6-gallon stone bottle, in which syrup has been kept for some time, the inside of which, when broken, has been found to be entirely cased with sugar candy, amounting in weight to 16 or 18 lbs. On the other hand, syrups containing too much water also rapidly ferment, and become ascescent; but of the two, this is the less evil, and may be more easily prevented. The proportions of sugar and water given above will form an excellent syrup, provided care be taken that an undue quantity be not lost by evaporation.

The decimal part of the number denoting the sp. gr. of a syrup, multiplied by 26, gives the number of pounds of sugar it contains per gallon, very nearly. (Ure.)

In boiling syrups, if they appear likely to boil over, a little oil, or rubbing the edges of the pan with soap, will prevent it.

Syrups may be decoloured by agitation with, or filtration through, recently burnt animal charcoal. Medicated syrupsshould not, however, be treated in this way.

The preservation of syrups, as well as of all other saccharine solutions, is best promoted by keeping them in a moderately cool, but not a very cold, place. "Let syrups be kept in ves-

sels well closed, and in a situation where the temperature never rises above 55° Fahr." (Ph. L.) They are better kept in smaller rather than in large bottles, as the longer a bottle lasts the more frequently it will be opened, and, consequently, the more it will be exposed to the air. By bottling syrups whilst boiling hot, and immediately corking down and tying the bottles over with bladder perfectly air-tight, they may be preserved, even at a summer heat, for years, without fermenting or losing their transparency.

The 'candying,' or crystallisation, of syrup, unless it be oversaturated with sugar, may be prevented by the addition of a little acetic or citric acid (2 or 3 drs. per gal.).

The fermentation of syrups may be effectually prevented by the addition of a little sulphite of potassa or of lime. Chlorate of potassa has been proposed for this purpose by Dr. Macculloch, on theoretical grounds. M. Chereau recommends the addition of some (about 3 to 4%) sugar of milk, with the same intention. Dr. Durand asserts that by adding about 1 fl. dr. of 'Hoffmann's anodyne' to each pint of syrup, the accession of fermentation may not only be prevented, but arrested when it occurs. Fermenting syrups may be immediately restored by exposing the vessel containing them to the temperature of boiling water. The addition of a little spirit is ordered in the new 'London Pharmacopœia.'

In making the above additions to syrup, care must be had [illegible] incompatible substances. Thus, in general, the two methods referred to cannot be practised together.

Syrup is, perhaps, the worst possible form of medicine, owing to the difficulty of accurately saturating it with active medicinals, and its liability to change. Few persons think that "sweetness renders a nauseous drug more palatable." See also Squire's 'Companion to the British Pharmacopœia.'

The following formulæ embrace all the syrups (SYRUPI) which are officinal in these countries:—

Syrup of Ac'etate of Mor'phia. *Syn.* SYRUPUS MORPHIÆ ACETATIS, L. *Prep.* (Ph. D.) Solution of acetate of morphia, 1 fl. oz.; simple syrup, 15 fl. oz.; mix. Each fl. oz. contains ¼ gr. of acetate.—*Dose.* ½ to 2 teaspoonfuls.

Syrup of Al'mond. *Syn.* BARLEY SYRUP, ORGEAT; SYRUPUS AMYGDALÆ, L.; SIROP D'ORGEAT, Fr. *Prep.* 1. Sweet almonds, 1 lb.; bitter almonds, 1 oz.; blanch, beat them to a smooth paste, and make an emulsion with barley water, 1 quart; strain, to each pint add of sugar, 2 lbs., and a table-spoonful or two of orange-flower water; put the mixture into small bottles, and preserve it in a cool place. Some persons add a little brandy.

2. (Ph. Bor.) Sweet almonds, 8 oz.; bitter almonds, 2 oz.; blanch them, after cold maceration, then beat them in a marble mortar, with a wooden pestle, to a paste, adding, gradually, of water, 16 fl. oz.; orange-flower water, 3 fl. oz.; after straining through flannel, dissolve 3 lbs. of sugar in each pint of the emulsion. An agreeable pectoral and demulcent.

Syrup of Buck'thorn. *Syn.* SYRUPUS RHAMNI (B. P., Ph. L. & E.), S. RHAMNI CATHARTICI, L. *Prep.* 1. (Ph. L.) Juice of buckthorn, defecated by 3 days' repose, 2 quarts; ginger and allspice, of each (bruised), 6 drs.; macerate the spice in 1 pint of the juice, at a gentle heat, for 4 hours, and filter; boil the remainder of the juice to 1½ pint, mix the liquors, dissolve therein of white sugar, 6 lbs., and add to (the nearly cold) syrup 6 fl. oz. of rectified spirit. In the Ph. E. the spirit is omitted.

2. (B. P.) Buckthorn juice, 97; ginger, sliced, 1; pimento, bruised, 1; refined sugar, 97; rectified spirit, 8 oz.; evaporate the juice to nearly half (⅝); add the ginger and pimento, digest at a gentle heat for four hours, and strain; when cold add the spirit, let the mixture stand for two days, then decant off the clear liquor, and in this dissolve the sugar at a gentle heat; sp. gr. 1·32.—*Dose.* 1 dr.

3. (Wholesale.)—*a.* Take of buckthorn juice, 3 galls.; bruised pimento and ginger (sifted from the dust), of each, ½ lb.; simmer for 15 minutes, strain, and add of sugar, 44 lbs.

b. Take of buckthorn juice, 3 galls.; boil to 2 galls., add of bruised pimento and ginger gruffs (free from dust), of each ¾ lb.; boil to 1 gal., strain, add molasses, 72 lbs., and finish the boiling.

Obs. Syrup of buckthorn is a brisk but unpleasant cathartic. It is now chiefly used in veterinary practice.—*Dose.* ½ fl. oz. to 1 fl. oz. Should the colour be dull, the addition of a few grs. of citric or tartaric acid will brighten it.

Syrup of Cap'illaire *Syn.* SYRUP OF MAIDEN-HAIR; SYRUPUS ADIANTHI, SYRUPUS CAPILLORUM VENERIS, L.; CAPILLAIRE, SIROP DE CAPILLAIRE, Fr. *Prep.* (P. Cod.) Canadian maiden-hair (*Adiantum pedatum* — Linn.), 4 oz.; boiling water, 2½ pints; infuse, strain, add of white sugar, 5 lbs., and pour the boiling clarified syrup over 2 oz. more of maiden-hair; re-infuse for 2 hours, and again strain.

Obs Demulcent. Clarified syrup flavoured with orange-flower water or curaçoa is now commonly sold for CAPILLAIRE. It is usually 'put up' in small bottles of a peculiar shape, known in the trade as 'capillaires.' It is now chiefly used to sweeten and flavour grog. See CAPILLAIRE.

Syrup of Car'rageen. *Syn.* SYRUP OF ICELAND MOSS. *Prep.* Boil horehound, 1 oz., liverwort, 6 drs., in water, 4 pints, for 15 minutes; express and strain; then add carrageen (previously softened with cold water), 6 drs.; again boil for 15 minutes, strain through flannel, and add sugar, 1 lb., to each pint. An agreeable demulcent in coughs.

Syrup of Cit'ric Acid. *Syn.* SYRUPUS ACIDI

CITRICI (Ph. D.), L. *Prep.* (Ph. D.) Take of citric acid (in powder) and distilled water, of each, 2½ oz.; dissolve, add the solution, together with tincture of lemon peel, 5 fl. drs., to simple syrup, 3 pints, and mix with agitation. An agreeable refrigerant. Used for sweetening barley water, &c., and for flavouring water to be used as a beverage in fevers and other inflammatory diseases.

Syrup of Coch'ineal. *Syn.* SYRUPUS COCCINELLÆ, SYRUPUS COCCI (Ph. L.), L. *Prep.* (Ph. L.) Take of cochineal (bruised), 80 grs.; boiling distilled water, 1 pint; boil for 15 minutes in a closed vessel, strain, and add of sugar, 3 lbs., or twice that of the strained liquor; lastly, when the syrup has cooled, add of rectified spirit, 2½ fl. oz., or ½ fl. dr. to each fl. oz. of syrup. Used as a colouring syrup, and often sold for SYRUP OF CLOVE-PINKS.

Syrup of Colts'foot. *Syn.* SYRUPUS TUSSILAGINIS, L. *Prep.* (P. Cod.) Flowers of colts-foot, 1 lb.; (or dried flowers, 2 oz.); boiling water, 2 lbs.; macerate for 12 hours; strain, press, filter, and add of white sugar, 4 lbs. A popular remedy in coughs, colds, &c.—*Dose.* 1 to 2 table-spoonfuls, *ad libitum*.

Syrup of Cream. Finely powdered lump sugar mixed with an equal weight of fresh cream. It will keep for a long time if put into bottles, and closely corked and sealed over. It is commonly placed in 2-oz. wide-mouthed phials, and taken on long voyages, a fresh phial being opened at every meal.

Syrup, Empyreumat'ic. Treacle.

Syrup of E'ther. *Syn.* SYRUPUS ÆTHERIS, S. Æ. SULPHURICI, L.; SIROP D'ÆTHER, Fr. *Prep.* (P. Cod.) Sulphuric ether, 1 part; white (simple) syrup, 16 parts; place them in a glass vessel having a tap at the bottom, shake them frequently for 5 or 6 days, and then draw off the clear syrup into small bottles.—*Dose.* ½ to 3 fl. drs.

Syrup of Gin'ger. *Syn.* SYRUPUS ZINGIBERIS (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Bruised ginger, 2½ oz.; boiling water, 1 pint; macerate for 4 hours, strain, and add of white sugar, 2½ lbs., or q. s.; and rectified spirit, as directed for syrup of cochineal. The Ph. E. omits the spirit.

2. (Ph. D.) Tincture of ginger, 1 fl. oz.; simple syrup, 7 fl. oz.; mix. Stimulant and carminative. Chiefly used as an adjuvant, in mixtures.

3. (B. P.) Strong tincture of ginger, 1; syrup, 25; mix.—*Dose.* 1 to 4 drms.

Syrup of Gum. *Syn.* SYRUPUS ACACIÆ, L.; SIROP DE GOMME, Fr. *Prep.* (P. Cod.) Dissolve pale and picked gum arabic in an equal weight of water, by a gentle heat, add the solution to four times its weight of simple syrup, simmer for 2 or 3 minutes, remove the scum, and cool. A pleasant demulcent. The addition of 1 or 2 fl. oz. of orange-flower water to each pint greatly improves it.

Syrup, Hive. Compound syrup of squills.

Syrup of Horehound. *Syn.* SYRUPUS MARUBII, L.; SIROP DE PRASSIO, Fr. *Prep.* 1. (P. Cod.) Dried horehound, 1 oz.; horehound water, 2 lbs.; digest in a water bath for 2 hours, strain, and add of white sugar, 4 lbs.

2. White horehound (fresh), 1 lb.; boiling water, 1 gal.; infuse for 2 hours, press out the liquor, filter, and add of sugar, q. s.

Obs. A popular remedy in coughs and diseases of the lungs.—*Dose.* A table-spoonful, *ad libitum*. "It is sold for any syrup of herbs that is demanded, and which is not in the shop." (Gray.)

Syrup of Hydrochlo''rate of Mor'phine. *Syn.* SYRUP OF MURIATE OF MORPHINE, SYRUPUS MORPHIÆ MURIATIS (Ph. D.), L. *Prep.* (Ph. D.) Solution of muriate of morphia, 1 fl. oz.; simple syrup, 17 fl. oz.; mix. Each fl. oz. contains ¼ gr. of the muriate.—*Dose.* ½ to 2 teaspoonfuls.

Syrup of Indian Sarsaparil'la. *Syn.* SYRUPUS HEMIDESMI (B. P., Ph. D.), L. *Prep.* 1. (Ph. D.) Indian sarsaparilla (*Hemidesmus Indicus*—Brown), bruised, 4 oz.; boiling water, 1 pint; infuse for 4 hours, and to the strained and defecated infusion add twice its weight of sugar. Tonic, diuretic, &c.—*Dose.* 2 to 4 fl. drs.; in nephritic complaints, and in some others, instead of sarsaparilla.

2. (B. P.) Hemidesmus, bruised, 1; refined sugar, 7; boiling distilled water, 5; infuse 4 hours, strain, add the sugar, and dissolve. The product should weigh 10½ and measure 8. Sp. gr. 1·335.—*Dose.* 1 to 4 drs.

Syrup of I'odide of Iron. *Syn.* SYRUPUS FERRI IODIDI (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Mix iodine, 1 oz., and iron wire, 3 drs., with distilled water, 8 fl. oz., and heat the solution until it assumes a greenish colour; then strain it, evaporate it to about 4 fl. oz., and add to it of white sugar, 10 oz.; lastly, when the syrup has cooled, add as much water as may be necessary, that it may measure exactly 15 fl. oz., and keep it in a well-stoppered black glass bottle. The formulæ of the Ph. E. & D. are nearly similar, a fl. dr. of each containing about 5 grs. of the pure dry iodide. This syrup is tonic and resolvent, and hæmatinic.—*Dose.* 15 or 20 drops to 1 fl. dr.; in anæmia, debility, scrofula, &c.

2. (B. P.) Iron wire, 1; iodine, 2; refined sugar, 28; distilled water, 13. Make a syrup with the sugar and 10 of the water, and keep it hot. Put into a strong soda-water bottle, covered with a cloth, the iron wire, the iodine, and 3 of the water, shake them together until the froth of the mixture becomes white, filter whilst still hot into the syrup. The product should be made up by water to weigh 43 or to measure 31½. Sp. gr. 1385.—*Dose.* 20 to 60 minims.

Syrup of Ipecacuan'ha. *Syn.* SYRUPUS IPECACUANHÆ, L. *Prep.* (Ph. E.) Ipecacuanha (in coarse powder), 4 oz.; rectified spirit, 15 fl. oz.; digest for 24 hours at a

gentle heat, and strain; add of proof spirit, 14 fl. oz., and again digest and strain, and repeat the process with water, 14 fl. oz.; distil off the spirit from the mixed liquors, evaporate to 12 fl. oz., and filter; next add to the residuum rectified spirit, 5 fl. oz., and simple syrup, 7 pints, and mix well.—*Dose.* As an emetic for infants, ½ teaspoonful; for adults, 1 to 1½ fl. oz.; as an expectorant, 1 to 3 teaspoonfuls.

Syrup of Lem'on. *Syn.* SYRUPUS LIMONIS (B. P.), SYRUPUS LIMONUM (Ph. L. & E.), SYRUPUS CITRI MEDICÆ. *Prep.* 1. (Ph. L.) Lemon juice (strained or defecated), 1 pint; white sugar, 2½ lbs.; dissolve by a gentle heat, and set it aside; in 24 hours remove the scum, decant the clear portion, and add of rectified spirit, 2½ fl. oz. The Edinburgh College omits the spirit. A pleasant refrigerant syrup in fevers, &c.—*Dose.* 1 to 4 fl. drs., in any diluent. With water it forms an excellent extemporaneous lemonade.

2. (B. P.) Fresh lemon peel, 2; lemon juice, strained, 20; refined sugar, 36. Heat the lemon juice to the boiling-point, and having put it into a covered vessel with the lemon peel, let them stand until they are cold, then filter and dissolve the sugar in the filtered liquid with a gentle heat. The product should weigh 56 and measure 41.—*Dose.* 1 to 2 drs.

Syrup of Marsh-mal'low. *Syn.* SYRUPUS ALTHÆÆ (Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Marsh-mallow root, fresh and sliced, 1½ oz.; distilled water (cold), 1 pint; macerate for 12 hours, press out the liquor, strain it through linen, and add to the strained liquor twice its weight of white sugar (about 3 lbs.); dissolve by a gentle heat, and, when cold, add of rectified spirit, 2½ fl. oz., or q. s. See SYRUP OF COCHINEAL.

2. (Ph. L. 1836.) Take of fresh marsh-mallow root, bruised, 8 oz.; water, 4 pints; boil down to one half, and express the liquor when it is cold; set it aside for 24 hours, that the fæces may subside, then decant off the clear liquid, and, having added to it of sugar, 2½ lbs., boil the whole to a proper consistence. The formula of the Ph. E. is similar.

Obs. This is a popular demulcent and pectoral.—*Dose.* 1 to 4 fl. drs.; in coughs, &c., either alone or added to mixtures.

Syrup of Mul'berries. *Syn.* SYRUPUS MORI (B. P., Ph. L.), L. *Prep.* 1. (Ph. L.) Juice of mulberries, strained, 1 pint; sugar, 2½ lbs.; dissolve by a gentle heat, and set the solution by for 24 hours; then remove the scum, decant the clear liquid, and add of rectified spirit, 2½ fl. oz. *Used* as a colouring and flavouring, when alkalies and earths are not present. Syrup of red poppies (*rhœados*), slightly acidulated with tartaric or dilute sulphuric acid, is very generally sold for it.

2. (B. P.) Mulberry juice, 20; refined sugar, 32; rectified spirit, 2½; heat the juice to the boiling-point, and, when it has cooled, filter it; dissolve the sugar in the filtered liquid by a gentle heat, and add the spirit. The product should weigh 54. Sp. gr. 1·33.—*Dose.* 1 to 2 drs.

Syrup of Mu''riate of Morphia. See SYRUP OF HYDROCHLORATE OF MORPHINE.

Syrup of Orange Flowers. *Syn.* SYRUPUS AURANTII FLORIS (B. P.). *Prep.* Orange-flower water, 8; refined sugar, 48; distilled water, 16, or a sufficiency; heat the sugar and water together, strain, and when nearly cold add the orange-flower water. When finished should weigh 72 and measure 54. Sp. gr. 1·33.—*Dose.* 1 to 2 drs.

Syrup of Or'ange Peel. *Syn.* SYRUPUS AURANTII (B. P., Ph. L. E. & D.), S. CITRI AURANTII, S. È CORTICIBUS AURANTIORUM, L. *Prep.* 1. (Ph. L.) Dried orange peel, 2½ oz.; boiling distilled water, 1 pint; macerate for 12 hours in a covered vessel, press out the liquor, simmer it for 10 minutes, and then complete the process as directed for SYRUP OF COCHINEAL. In the Ph. E. & D., & Ph. L. 1836, no spirit is ordered.

2. (B. P.) Tincture of orange peel, 1; syrup, 7; mix.—*Dose.* 1 to 2 drs.

3. (Wholesale.)—*a.* From fresh orange peel, 18 oz. (or dried), ¾ lb.; sugar, 18 lbs.; water, q. s.

b. From tincture of orange peel, 1 fl. oz.; simple syrup, 19 fl. oz.; mix. An agreeable flavouring and stomachic.—*Dose.* ½ to 4 fl. drs.

Syrup of Pop'pies. *Syn.* SYRUP OF WHITE POPPIES; SYRUPUS PAPAVERIS (B. P., Ph. L. & E.), S. P. SOMNIFERI, L. *Prep.* 1. (B. P.) Poppy capsules, coarsely powdered, free from seeds, 36; rectified spirit, 16; refined sugar, 64; boiling distilled water, a sufficiency; macerate the poppy capsules in 80 of the water. Infuse for 24 hours, then pack in a percolator, and, adding more of the water, allow the liquor slowly to pass until 320 have been collected or the poppies are exhausted; evaporate the liquor by a water bath until it is reduced to 60; when quite cold add the spirit; let the mixture stand for 12 hours and filter. Distil off the spirit, evaporate the remaining liquor to 40, and then add the sugar. The product should weigh 104 and measure 78¾. Sp. gr. 1·32.—*Dose.* 1 dr.; 10 to 20 minims for children, increasing cautiously.

2. (Ph. L.) Poppy-heads, dried, bruised, and without the seed, 3 lbs.; boiling water, 5 galls.; boil down to 2 galls., press out the liquor, evaporate the expressed liquid to 2 quarts, strain it whilst hot, and set it aside for 12 hours; next decant the clear portion from the fæces, boil this down to 1 quart, and dissolve in it sugar, 5 lbs.; lastly, when cold, add of rectified spirit; 5 fl. oz. "Each fl. oz. is equivalent to 1 gr. of dry extract." In the Ph. E. & Ph. D. 1826 no spirit is ordered.

3. (Wholesale.) Extract of poppies, 1½ lb.; boiling water, 2½ galls.; dissolve, clarify, or filter, so that it may be perfectly transparent

when cold, then add of white sugar, 44 lbs., and dissolve.

Obs. Syrup of poppies is anodyne and soporific.—*Dose.* For an infant, ¼ to ½ teaspoonful; for an adult, 2 to 4 fl. drs. According to M. Chereau, its tendency to fermentation is prevented by the addition of 32 parts of sugar of milk to every 1000 parts of the syrup.

Syrup of Red Poppies. *Syn.* SYRUPUS RHŒADOS, (Ph. L. & E.), S. PAPAVERIS RHŒADOS, L. *Prep.* 1. (Ph. L.) Petals of the red poppy, 1 lb.; boiling water, 1 pint; mix in a water bath, remove the vessel, macerate for 12 hours, press out the liquor, and, after defecation or filtering, complete the process as directed for SYRUP OF COCHINEAL.

2. (Wholesale.) From dried red-poppy petals, 3 lbs.; boiling water, q. s.; white sugar, 44 lbs.; as the last.

Obs. Syrup of red poppies is chiefly employed for its fine red colour. A little acid brightens it. The colour is injured by contact with iron, copper, and all the common metals.

Syrup of Rhubarb. *Syn.* SYRUPUS RHEI (B. P.). *Prep.* 1. (B. P.). Rhubarb, in coarse powder, 2; coriander fruit, in powder, 2; refined sugar, 24; rectified spirit, 8; distilled water, 24; mix the rhubarb and coriander, pack them in a percolator, pass the spirit and water, previously mixed, slowly through them, evaporate the liquid that has passed until it is reduced to 13, and in this, after it has been filtered, dissolve the sugar with a gentle heat. —*Dose.* 1 to 4 drs.

2. (P. Cod.) Bruised rhubarb, 3 oz.; cold water, 16 fl. oz.; macerate for 12 hours, filter, and add of white sugar, 32 oz.

3. (Ph. U. S.) Take of rectified spirit, 8 fl. oz.; water, 24 fl. oz.; rhubarb (coarsely powdered), 2 oz.; (mixed with) sand, an equal bulk, or q. s.; make a tincture by percolation, evaporate this, over a water bath, to 13 fl. oz., and dissolve it in 2 lbs. of white sugar. An excellent formula.

4. (Wholesale.) Rhubarb (bruised), 1⅔ lb.; cold water, q. s.; sugar, 20 lbs.; as No. 1. Stomachic and purgative.—*Dose.* For an infant, ½ to 1 teaspoonful; for an adult, ½ to ¾ fl. oz., or more.

Syrup of Rhubarb (Spiced). *Syn.* SYRUPUS RHEI AROMATICUS, L. *Prep.* (Ph. U. S.) Rhubarb, 2½ oz.; cloves and cinnamon, of each, ½ oz.; nutmeg, ¼ oz.; (all bruised) proof spirit, 32 fl. oz.; macerate for 14 days (or percolate), strain, gently evaporate to 16 fl. oz., filter whilst hot, and mix the liquid with simple syrup (gently warmed), 4⅔ pints. A cordial laxative.—*Dose.* ½ to 1 teaspoonful; in infantile constipation, diarrhœa, &c.

Syrup of Roses. *Syn.* SYRUPUS ROSÆ (Ph. L.), SYRUPUS ROSÆ CENTIFOLIÆ (Ph. E.), L. *Prep.* 1. (Ph. L.) Dried petals of damask roses (*Rosa centifolia*), 7 oz.; boiling water, 3 pints; macerate for 12 hours, filter, evaporate in a water bath to 1 quart, and add of white sugar, 6 lbs.; and, when cold, rectified spirit, 5½ fl. oz.

2. (Wholesale.) From rose leaves, 1 lb.; sugar, 19 lbs.; water, q. s.; as the last. Gently laxative.—*Dose.* ½ to 1 fl. oz. It is usual to add a few drops of dilute sulphuric acid, to brighten the colour. Alkalies turn it green.

Syrup of Red Roses. *Syn.* SYRUPUS ROSÆ (B. P.), SYRUPUS ROSÆ GALLICÆ (Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Dried petals of the red rose, 2 oz.; boiling water, 1 pint; pure sugar, 20 oz.; as the last.

2. (Ph. D.) Dried petals of the gallic rose, 2 oz.; boiling water, 1 pint; boil in a glass or porcelain vessel until the colour is extracted, strain with expression, and, after defecation, add to the clear decanted liquor twice its weight of white sugar. Astringent and stomachic; chiefly used as an adjunct in mixtures, &c.

3. (B. P.) Dried rose petals, 1; refined sugar, 15; boiling distilled water, 10; infuse the petals in the water 2 hours, squeeze through calico, heat the liquor to the boiling-point, and filter; add the sugar and dissolve with heat. The product should weigh 23 and measure 17¼. Sp. gr. 1·335.—*Dose.* 1 to 2 drs.

Syrup of Rue. *Syn.* SYRUPUS RUTÆ, L. *Prep.* Take of oil of rue, 12 to 15 drops; rectified spirit, ½ fl. oz.; dissolve, and add it to simple syrup, 1 pint.—*Dose.* ½ to 1 teaspoonful; in the flatulent colic of children. An infusion of ½ oz. of the herb is sometimes substituted for the solution of the essential oil.

Syrup of Saffron. *Syn.* SYRUPUS CROCI (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Hay saffron, 5 drs. (10 drs.—Ph. E.; ½ oz.—Ph. D.); boiling water, 1 pint; macerate in a covered vessel for 12 hours, then strain the liquor, and add of white sugar, 3 lbs., or q. s., and rectified spirit, 2½ fl. oz., or q. s., in the manner directed under SYRUP OF COCHINEAL. The Ph. E. and D. omit the spirit.

2. (Wholesale.) Hay saffron, 6 oz.; boiling water, 6 quarts; white sugar, 24 lbs.; as the last. *Used* for its colour and flavour; the first is very beautiful.

Syrup of Sarsaparilla. *Syn.* SYRUPUS SARZÆ (Ph. L. & E.), SYRUPUS SARSAPARILLÆ, L. *Prep.* 1. (Ph. L.) Take of sarsaparilla (sliced), 3½ lbs.; boil it in water, 2 galls., down to one half; pour off the liquor, and strain it whilst hot; again boil the sarsaparilla in another gal. of water down to one half, and strain; evaporate the mixed liquors to 1 quart, and in these dissolve of white sugar, 8 oz.; lastly, when the syrup has cooled, add to it of rectified spirit, 2 fl. oz.

2. (Ph. E., & Ph. L. 1836.) Sarsaparilla, sliced, 15 oz.; boiling water, 1 gal.; macerate for 24 hours, boil to 2 quarts, strain, add of sugar, 15 oz., and boil to a syrup.

3. (Wholesale.) Take of extract of sarsa-

parilla, 3 lbs.; boiling water, 3 quarts; dissolve, strain, and add of white sugar, 12 lbs. Alterative and tonic.—*Dose.* 2 to 4 drs. See SARSAPARILLA.

Syrup of Sarsaparil'la (Compound). *Syn.* SYRUPUS SARZÆ COMPOSITUS, L.; SYROP DE CUSINIER, Fr. *Prep.* (Ph. U. S.) Sarsaparilla, bruised, 2 lbs.; guaiacum wood, rasped, 3 oz.; damask roses, senna, and liquorice root, bruised, of each, 2 oz.; diluted alcohol (proof spirit), 10 wine pints (1-gal. imperial); macerate for 14 days, express, filter through paper, and evaporate in a water bath to 4 wine pints (3¼ pints, imperial); then add of white sugar, 8 lbs., and, when cold, further add of oils of sassafras and aniseed, of each, 5 drops, and oil of partridge berry (*Gaultheria procumbens*), 3 drops, previously triturated with a little of the syrup.

Obs. This is an excellent preparation; but the rose leaves might be well omitted.—*Dose.* ½ fl. oz., 3 or 4 times a day, as an alterative, tonic, and restorative. The syrup of the P. Cod. is made with water instead of spirit, and is inferior as a remedy to the preceding.

Syrup of Sen'na. *Syn.* SYRUPUS SENNÆ (B. P., Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Take of senna, 3½ oz.; fennel seed (bruised), 10 drs.; boiling water, 1 pint; macerate for 6 hours, with a gentle heat; then strongly press out the liquid through linen, and dissolve in it of manna, 3 oz.; next add this solution to treacle, 3 lbs., previously evaporated over a water bath until a little of it, on being cooled, almost concretes, and stir them well together.

2. (Ph. E.) Senna, 4 oz.; boiling water, 24 fl. oz.; infuse, strain, add of treacle, 48 oz., and evaporate to a proper consistence. Aperient.—*Dose.* 1 to 4 drs.

3. (B. P.) Senna, broken small, 8 oz.; oil of coriander, 4½ minims; refined sugar, 12 oz.; distilled water, 50 oz., or a sufficiency; rectified spirit, 1 oz.; digest the senna in ¾ of the water twenty-four hours at a temperature of 120°, press, and strain; digest the marc in the remainder of the water six hours, press, and strain; evaporate the mixed liquors to 5 oz.; when cold add the rectified spirit containing the oil of coriander; filter, and wash the filter with water to make up 8 oz.; add the sugar, and dissolve with gentle heat. The product should weigh 21 oz. and measure 16 oz. Sp. gr. 1·310.—*Dose.* 1 to 2 drms.

Syrup, Simple. *Syn.* SYRUPUS (B. P. Ph., L.), SYRUPUS SIMPLEX (Ph. E. & D.), L. 1. (Ph. L.) White sugar, 3 lbs.; distilled water, 1 pint; dissolve by a gentle heat.

2. (Ph. E., & Ph. L. 1836.) Pure sugar, 10 lbs.; boiling water, 3 pints.

3. (Ph. D.) Refined sugar (in powder—crushed), 5 lbs.; distilled water, 1 quart.

4. (B. P.) Refined sugar, 6; distilled water, 3; dissolve the sugar in the water with the aid of heat, and when cool add water to make the product weigh 9 and measure very nearly 7. Sp. gr., 1·33.

5. (Wholesale.) Finest double refined sugar, 44 lbs.; distilled water, 2¾ galls.; make a syrup.

Obs. This preparation should be as white and transparent as water. *Used* as capillaire, &c., and to give cohesiveness and consistence to pulverulent substances in the preparation of electuaries, pills, &c.

Syrup of Squills. *Syn.* SYRUPUS SCILLÆ (B. P., Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Vinegar of squills, 3 pints; white sugar (in powder), 7 lbs.; dissolve by a gentle heat.

2. (Ph. D.) Vinegar of squills, 8 fl. oz.; refined sugar (in powder), 1 lb.; dissolve.

3. (B. P.) Vinegar of squills, 20; refined sugar, 40; dissolve with the aid of heat.—*Dose.* ½ to 1 dr.

4. (Wholesale.) Take of vinegar of squills (perfectly transparent), 14 lbs.; double refined sugar, 28 lbs.; dissolve in a stoneware vessel, in the cold, or at most by a very gentle heat.

Obs. This syrup, like the last, should be as clear as water, and nearly colourless.—*Dose.* 1 to 2 fl. drs., as an expectorant; in chronic coughs and asthma. In large doses it proves emetic.

Syrup of Squills (Compound). *Syn.* HIVE SYRUP; SYRUPUS SCILLÆ COMPOSITUS, L. *Prep.* (Ph. U. S.) Squills and senega, of each, bruised, 5 oz.; water, ½ gal.; boil to a quart; add of sugar, 4½ lbs.; evaporate to 3 pints, or a proper consistence, and dissolve in it, whilst hot, of potassio-tartrate of antimony (in powder), 1 dr.

Obs. This syrup is a popular expectorant in the U. S., where it is known as hive syrup.—*Dose.* As an expectorant, 20 to 30 drops, for adults; for children, 5 to 10 drops; in croup, 10 drops to ½ fl. dr., repeated until it vomits.

Syrup of Tolu'. *Syn.* BALSAMIC SYRUP; SYRUPUS TOLUTANUS (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Balsam of Tolu, 10 drs. (1 oz.—Ph. D.); boiling distilled water, 1 pint; boil in a covered vessel for ½ an hour, frequently stirring, then cool, strain, and dissolve in the liquor sugar, 2½ lbs.

2. (Ph. E.) Simple syrup (warm), 2 lbs.; tincture of Tolu, 1 oz.; mix by degrees, and agitate them briskly together in a closed vessel.

3. (B. P.) Balsam of Tolu, 1¼; sugar, 32; water, 20; boil the balsam half an hour, adding water when required; when cold make up to 16, filter, add the sugar, and dissolve. The product weighs 48 and measures 36. Sp. gr., 1·33.—*Dose.* 1 to 2 drs.

4. (Wholesale.) To warm water, 23 lbs., add tincture of Tolu, gradually, until it will bear no more without becoming opaque; then cork down the bottle, and occasionally agitate until cold; when quite cold, filter it through paper, and add of the finest double-refined sugar, 44 lbs.; lastly, promote the solution, in a closed vessel, by a gentle heat, in a water bath.

Obs. This syrup should be clear and colourless as water; but, as met with in the shops,

it is usually milky. It is strange that the London College should have omitted from their formula the usual addition of rectified spirit, although this syrup, perhaps more than any other, would be benefited by it.

Syrup of Tolu is pectoral and balsamic.

Syrup, Velno's Vegetable. According to Dr. Paris and Sir B. Brodie, this celebrated nostrum is prepared as follows:—Young and fresh burdock root, sliced, 2 oz.; dandelion root, 1 oz.; fresh spearmint, senna, coriander seed, and bruised liquorice root, of each, 1½ dr.; water, 1½ pint; boil down gently to a pint, strain, add of lump sugar, 1 lb., boil to a syrup, and, lastly, add a small quantity of corrosive sublimate, previously dissolved in a little spirit. *Used* as an alterative and purifier of the blood.

Syrup of Vin'egar. *Syn.* SYRUPUS ACETI, L. *Prep.* (Ph. E.) Take of vinegar (French, in preference), 11 fl. oz.; white sugar, 14 oz.; and make a syrup.—*Dose.* 1 dr. to 1 fl. oz.; as an expectorant, in coughs and colds, or diffused through any mild diluent, as a drink in fevers. A more agreeable preparation is that of the P. Cod., made by dissolving 30 parts of sugar in 16 parts of raspberry vinegar.

Syrup of Vi'olets. *Syn.* SYRUPUS VIOLARUM, SYRUPUS VIOLÆ (Ph. L. & E.), L. *Prep.* 1. (Ph. L.) Macerate violet flowers, 9 oz., in boiling water, 1 pint, for twelve hours, then press, strain, and set aside the liquid, that the fæces may subside; afterwards complete the process with sugar, 3 lbs., and rectified spirit, 2½ fl. oz., (or as much of each as may be necessary,) in the way which has been ordered concerning syrup of cochineal.

2. (Ph. E.) Fresh violets, 1 lb.; boiling water, 2½ pints; infuse for 24 hours in a covered vessel of glass or earthenware, strain off the liquor (with gentle pressure), filter, and dissolve in the liquid white sugar, 7½ lbs.

3. (Wholesale.) From double-refined white sugar, 66 lbs.; 'anthokyan,'[1] 11 lbs.; water, 22 lbs., or q. s.; dissolve in earthenware.

Uses. Syrup of violets is gently laxative.—*Dose.* For an infant, a teaspoonful.

Obs. Genuine syrup of violet has a lively violet-blue colour, is reddened by acids, turned green by alkalies, and both smells and tastes of the flowers. It is frequently *used* as a test. A spurious sort is met with in the shops, which is coloured with litmus, and slightly scented with orris root. The purest sugar, perfectly free from either acid or alkaline contamination, should alone be used in the manufacture of this syrup. The Ph. E. orders the infusion to be strained without pressure; and the P. Cod., and some other Ph., direct the flowers to be first washed in cold water.

Syrup of Worm'wood. *Syn.* SYRUPUS ABSINTHII, L.; SIROP D'ABSINTHE, Fr. *Prep.* (P. Cod.) Tops of wormwood (dried), 1 part; boiling water, 8 parts; infuse for 12 hours, strain, with expression, and dissolve in the liquor twice its weight of sugar. Bitter, tonic, and stomachic.—*Dose.* 1 to 3 fl. drs.

TABLETTES. [Fr.] See LOZENGES and SAVONETTES.

TAF'FETAS. Plasters on silk are occasionally so called. For TAFFETAS ANGLICUM, see COURT PLASTER; for TAFFETAS VESICANS, see VESICANTS.

TALC. *Syn.* FOLIATED TALC; UBRUC. A transparent, foliated, siliceous magnesian mineral, flexible, but not elastic, found in Scotland, the Tyrol, and elsewhere. It is used as a cosmetic, to impart a silky whiteness to the skin; also in the composition of *rouge végétal*, and to give a flesh-like polish to alabaster figures. A second and harder species of this mineral (FRENCH CHALK, SOAPSTONE, STEATITE; CRETA GALLICA) is employed as a crayon by carpenters, glaziers, and tailors, and forms the boot-powder of the boot-makers. Writing executed with it on glass, even after being apparently removed by friction, becomes again visible when breathed upon.

TAL'LOW and other fats are commonly purified by melting them along with water, passing the mixed fluids through a sieve, and letting the whole cool slowly, when a cake of cleansed fat is obtained.—Another plan is to keep the tallow melted for some time, along with about 2% of oil of vitriol, largely diluted with water, employing constant agitation, and allowing the whole to cool slowly; then to remelt the cake with a large quantity of hot water, and to wash it well.—Another method is to blow steam for some time through the melted fat. By either this or the preceding process a white hard tallow may be obtained.—Some persons add a little nitre to the melted fat, and, afterwards, a little dilute nitric or sulphuric acid, or a solution of bisulphate of potash. Others boil the fat along with water and a little dilute nitric or chromic acid, or a mixture of bichromate of potash and sulphuric acid; and afterwards wash it thoroughly with water. These methods answer well for the tallow or mixed fats of which ordinary candles are made.

Tallow converted into stearic acid by saponification is readily hardened and bleached, if moderately pure. A mixture composed of 1 part of oxalic acid and 2000 parts of water is sufficient to bleach 1000 parts of stearic acid. The mode of operating is as follows:—Throw the stearic acid, cut into small pieces, into a vessel of cold water, and turn on steam; as soon as it has melted and assumed a turbid appearance, add the solution of oxalic acid, and boil the mixture. After boiling for ¼ hour, long threads appear in the liquid; the liquid itself, which previously was of a grayish colour, becomes black, and the threads unite together. The boiling must now be discontinued, and the contents of the vessel, having been allowed to

[1] The expressed juice of violets, defecated, gently heated in earthenware to 192° Fahr., then skimmed, cooled, and filtered; a little spirit is next added, and the next day the compound is again filtered.

settle for three or four hours, must be drawn off into the coolers.

As commercial stearic acid frequently contains undecomposed tallow, as well as various foreign matters, this process is occasionally unsuccessful. To obviate the inconveniences connected with the use of this impure material, the candle may be run at two operations, as follows:—"The stearic acid, treated as above, is exposed for a month to the sun, by which means the foreign matters are oxidised, and the bleached stearic acid acquires a dirty yellow colour; the oxidised blocks are then melted in water containiug a little sulphuric acid, at about 150° Fahr.; an addition of about 10 per cent. of good white wax (or spermaceti) is next made, and the whole boiled for half an hour; the white of an egg, previously beaten up in a quart of water, is then added to each 1 cwt. of stearic acid, the temperature of the mass having been reduced to 100°, or at most 120° Fahr., after which the mixture is again well stirred and boiled, when the liquid soon becomes clear, which is seen by the dark colour it assumes.

"This mixture of stearic acid and wax or spermaceti is very suitable for forming the exterior coating of the candle; it is transparent, and of perfect whiteness, and, as it is devoid of oxalic acid, it does not injure the moulds; whilst at the same time, as it is less fusible than pure stearic acid, candles made with it do not run. This first coating may be run hot without crystallising; the interior of the candle, being protected from without against too sudden a cooling, may also be run somewhat hot; by this means the candle acquires a whiteness and a transparency which cannot be realised by other processes." ('Le Moniteur Industriel.')

The sulphuric acid saponification of inferior tallow and other solid or semi-solid fatty bodies is now carried out on a very large scale for producing the cheaper varieties of 'stearine candles.' For this purpose, the tallow or fat is mixed with 5 or 6% of concentrated sulphuric acid, and exposed to a steam heat of 350° to 360° Fahr. After cooling, the black mass thus obtained crystallises to a tolerably solid fat, which is well washed once or twice with water, or high-pressure steam, and is then submitted to distillation by the aid of steam heated to about 560° Fahr. The product of the distillation is beautifully white, and may be at once used for making candles. It is better, however, to first submit it to the processes of cold and hot pressing, whereby a much more solid fat is obtained.

According to M. Pohl, palm oil or palm tallow is most easily purified by simple exposure to a high temperature, provided it has been first well defecated. When quickly heated to about 465° Fahr., and kept at that temperature for from 5 to 15 minutes, it is completely decoloured. The product has a slight empyreumatic odour, but this disappears by age, exposure, or saponification, and the natural violet odour of the oil returns. Cast-iron pans should be employed in the process, and should be only 2-3rds filled, and well covered during the operation.

By the distillation of sulphurated palm oil in closed vessels, at a heat ranging from 570° to 600° Fahr., from 68% to 75% of a mixture of palmitic and palm-oleic acid passes over, of which 25% to 30% is colourless, hard, and crystalline, and the rest darker and softer. (Pohl.) The residuum in the still is a fine hard pitch. See CANDLES, FAT, GLYCERIN, OILS (Fixed), STEARIC ACID, &c.

TAMAR'A. A mixed spice used in Italian cookery, consisting of cinnamon, cloves, and corianders, of each, 2 parts; aniseed and fennel seed, of each 1 part.

TAM'ARIND. *Syn.* TAMARINDUS (B. P., Ph. L. E. & D.), L. The pulp or preserved fruit or pod of the *Tamarindus Indica*, or tamarind tree.

Tamarind pulp is refrigerant and gently laxative. Mixed with water, it forms a grateful acidulous drink in fevers.—*Dose.* ½ oz. and upwards.

TAN'NATE. A salt of tannic acid.

TAN'NER'S BARK. The best of this is oak. bark; but the bark of the chestnut, willow, and larch, and other trees which abound in tannin, are also used for preparing leather.

TAN'NIC ACID. $C_{27}H_{22}O_{17}$. *Syn.* TAN, TANNIN, GALLO-TANNIC ACID†; TANNINUM, ACIDUM TANNICUM (B. P., Ph. L. D. & U. S.), L. A peculiar vegetable principle, remarkable for its astringency and its power of converting the skins of animals into leather.

Prep. 1. (Pelouze.) From galls, in moderately fine powder, by percolation, in a closed vessel, with sulphuric ether that has been previously agitated with water. After some time the percolated liquid will be found divided into two distinct portions, the lower and heavier one being a watery solution of tannic acid, and the upper one an ethereal solution of gallic acid and colouring matter. Fresh ether must be passed through the powder as long as the lower stratum of liquid continues to augment. The two fluids are now carefully separated, and after the heavier one has been well washed with ether, it is gently evaporated to dryness, preferably under the receiver of an air-pump, or over sulphuric acid. The ether may be recovered unaltered from the ethereal solution, by cautious distillation in a retort connected with a Liebig's condenser supplied with ice-cold water. *Prod.* About 40%.

2. (Ph. D.) From galls, in tolerably fine powder, 8 oz., and a mixture of sulphuric ether, 3 pints, with water, 5 fl. oz.; by percolation, in successive portions, like the last; the aqueous solution of tannic acid being evaporated, and finally dried at a heat not exceeding 212° Fahr.

Prop., &c. Pure tannic acid is perfectly white, but as ordinarily met with it has a

slight yellowish colour, owing to the action of the air; it is uncrystallisable; possesses a powerful and purely astringent taste, without bitterness; is freely soluble in water, less so in alcohol, and only very slightly in ether; it reddens vegetable blues; when boiled with acids, it assimilates water and splits into gallic acid and grape sugar; when heated in the dry state, it suffers decomposition, metagallic and pyrogallic acids being formed; it unites with the bases, forming salts called tannates, which are characterised by striking a deep black with the persalts of iron (ink), and forming a white precipitate with gelatin.

Uses, &c. The value of substances containing tannin in the preparation of leather is well known. In its pure form it is used as an astringent in medicine; internally, in diarrhœa, hæmorrhages, as a tonic in dyspepsia, &c.; externally, made into a gargle, injection, or ointment.—*Dose.* 1 to 10 grs., in the form of pills or solution. See GALLIC ACID, &c.

TAN'NIN. See TANNIC ACID.

TAN'NING. When the skin of an animal, carefully deprived of hair, fat, and other impurities, is immersed in a dilute solution of tannic acid, the gelatin gradually combines with that substance as it penetrates inwards, forming a perfectly insoluble compound, which resists putrefaction completely; this is tanned leather. In practice, lime water is used for cleansing and preparing the skin, water acidulated with oil of vitriol for 'raising' or opening the pores, and an infusion of oak bark, or, sometimes, of catechu, or other astringent matter, as the source of tannic acid. The process itself is necessarily a slow one, as dilute solutions only can be safely used. Skins intended for the curriers, to be dressed for 'uppers,' commonly require about 3 weeks; and 'thick hides,' from 12 to 18 months.

Of late years various ingenious contrivances have been adopted, with more or less success, to hasten the process of tanning skins and hides. Among these may be mentioned the employment of stronger tan solutions, the application of a gentle heat, puncturing the skins to afford more ready access for the liquid to their interior parts, and maceration in the tan liquor under pressure, either at once or after the vessel containing them has been exhausted of air by means of an air-pump. On the merit of these several methods it has been remarked "that the saturated infusions of astringent barks contain much less extractive matter, in proportion to their tannin, than the weak infusions; and when the skins are quickly tanned in the former, common experience shows that it produces leather which is less durable than leather slowly formed." (Sir H. Davy.) "100 lbs. of skin, quickly tanned in a strong infusion of bark, produce 137 lbs. of leather; while 100 lbs., slowly tanned in a weak infusion, produce only 117½ lbs." "Leather thus highly (and hastily) charged with tannin is, moreover, so spongy as to allow moisture to pass readily through its pores, to the great discomfort and danger of persons wearing shoes made of it." (Ure.)

According to Mr. G. Lee, much of the original gelatin of the skin is wasted in the preliminary processes to which they are subjected, more especially the 'liming' and 'bating.' He says, that 100 lbs. of perfectly dry hide, cleaned from extraneous matter, should, on chemical principles, afford at least 180 lbs. of leather.

MOROCCO LEATHER is prepared from goat or sheep skins, which, after the action of lime water and a dung bath, are slightly tanned in a bath of sumach. They are subsequently grained, polished, &c.

RUSSIA LEATHER is generally tanned with a decoction of willow bark, after which it is dyed, and curried with the empyreumatic oil of the birch tree. It is the last substance which imparts to this leather its peculiar odour and power of resisting mould and damp. See LEATHER, TANNIC ACID, TAWING, &c.

TAN'TALUM. Ta. *Syn.* COLUMBIUM. A rare metal discovered by Mr. Hatchett, in 1801, in a mineral from Massachusetts; and by M. Ekeberg, in 1803, in tantalite, a mineral found in Sweden. It exists in most of its ores in combination with oxygen.

TAPE-WORM. See WORMS.

TAPIO'CA. *Syn.* TAPIOCA (Ph. E. & D.), L. The fecula of the root of *Janipha manihot* (*Jatropha manihot*—Linn.), which has been well washed in water, and dried on hot plates, by which it assumes the appearance of warty-looking granules.

Pure tapioca is insipid, inodorous, only slightly soluble in cold water, but entirely soluble in boiling water, forming a translucent and highly nutritious jelly. Its granules are muller-shaped, about $\frac{1}{2000}$ of an inch in diameter, and display very marked hilums. It is used in a similar manner to sago and arrow-root. See CASSAVA.

TAR. *Syn.* PIX LIQUIDA (B. P., Ph. L. E. & D.), L. A liquid bitumen prepared from the wood of *Pinus sylvestris*, and other species, by heat. The chemical constitution of tar is very complicated. Its uses in the arts are well known. As a medicine, it is stimulant, diuretic, sudorific, and vermifuge.—*Dose.* 20 to 60 minims, made into pills with flour; in ichthyosis, &c. *Externally*, in lepra, psoriasis, foul ulcers, &c. See OINTMENT and INFUSION.

Tar, Bar'badoes. *Syn.* PIX LIQUIDA BARBADENSIS, PETROLEUM BARBADENSE, PETROLEUM (Ph. L. & E.), L. "Black liquid bitumen, exuding spontaneously from the earth." (Ph. L.) Its properties for the most part resemble those of the last.—*Dose.* 10 to 30 drops; in asthma, chronic coughs, tape-worm, &c. *Externally*, in chilblains, chronic, and rheumatic pains, &c. See PETROLEUM.

Tar, Coal. Produced during the distillation of bituminous coal for gas. See NAPHTHA, &c.

TAR COLOURS. *Syn.* COAL TAR COLOURS, ANILINE COLOURS, &c. Coal tar, the source of the aniline colours, consists of the oily fluid obtained in the destructive distillation of coal, during the manufacture of ordinary illuminating gas, and collected in a tank from the hydraulic main and condensers.

The composition of coal tar is highly complex, the most important constituents being, however, a series of homologous hydrocarbons obtained by distilling coal tar, and known as "coal naphtha." Naphtha, by rectification between 180° and 250° Fahr. (82 and 121 Cent.), yields a light yellow oily liquid, of sp. gr. ·88, the benzol of commerce.

By the action of a mixture of nitric and sulphuric acids on benzol, nitro-benzol, a heavy oily liquid with an odour of oil of bitter almonds, is obtained. In commerce this substance is made in large cast iron-pots, fitted with tight covers, and provided with stirrers worked by steam power. By means of pipes the reagents are admitted and the nitrous fumes are carried off, while the nitro-benzol and the spent reagents are drawn off from the bottom. The entire charge of benzol is first placed into the vessels, and the mixed acids are, as the reation is very energetic, cautiously run in, the whole being well stirred throughout. When finished, the contents are drawn off, and the nitro-benzol collected, washed with water, and, if necessary, neutralised with a solution of soda.

Nitro-benzol is converted into aniline in a similar apparatus, only provided with means of admitting a current of superheated steam, and condensing the aniline as it distils over. Into the vessel iron borings are placed, and acetic acid and nitro-benzol cautiously run in as the reduction is violent, stirring well all the time. A current of superheated steam is passed through, and the aniline collected as it distils over, as a pale sherry coloured oily liquid boiling at 360° Fahr. (182 Cent.), and of sp. gr. 1·02.

MAUVE, the first-discovered coal tar, or aniline colour, was obtained by Mr. Perkins during some experiments directed towards the artificial formation of quinine, and was also first practically manufactured by Mr. Perkins. Commercially, mauve is made as follows:—

Aniline and sulphuric acid in proper proportions are dissolved in water in a vat by aid of heat, and when cold a solution of bichromate of potassium added, and the whole allowed to stand a day or two, when a black precipitate is obtained, which, after collecting on shallow filters, is washed and well dried. This black resinous substance is digested with dilute methylated spirit in a suitable apparatus, to dissolve out the mauve, and the major portion of the spirit distilled off. The mauve is precipitated from the aqueous solution left behind by hydrate of sodium, and after washing is either drained to a paste or dried.

The amount of mauve thus obtained is but small in comparison with the raw material, coal tar, as 100 lbs. of coal yield 10 lbs. 12 oz. of coal tar; 8½ oz. of mineral naphtha, 2¾ oz. of benzol; 4¼ oz. of nitro-benzol, 2¼ oz. of aniline, and ¼ oz. of mauve. Mauve is usually sent into the market in paste or solution, the expense of the crystals being heavy, and offering no corresponding advantages.

Other salts than the bichromate of potassium have been employed to convert aniline into mauve, as chloride of copper, permanganate of potassium, &c.; but experience has shown none to possess the same advantages as the bichromate of potassium.

MAUVEINE, the organic base of mauve or aniline purple, is a black crystalline powder, of the formula $C_{27}H_{24}N_2$, yielding a dull violet solution. The moment, however, mauveine is brought in contact with an acid, it turns a magnificent purple colour. The salts of mauveine form beautiful crystals possessing a splendid green metallic lustre, soluble very readily in alcohol, and less so in water. The commercial salt, or mauve, is the acetate, or sometimes the hydrochlorate.

MAGENTA. *Syn.* ANILINE RED, ROSEINE, FUCHSINE, &c., is prepared from commercial aniline by the action of arsenic acid; the process being carried out in cast-iron pots of proper construction, placed over a furnace. Into these pots are placed 2 parts of commercial aniline containing 25 per cent. of toluidine, and 3 parts of a saturated solution of arsenic acid; the whole is well stirred, heated for a proper period, and the excess of aniline driven off by a current of superheated steam. The crude product obtained is transferred to vats, boiled with water and filtered; common salt added to the filtrate, and the precipitated magenta collected, redissolved in boiling water, refiltered, and crystallised.

This after-recrystallisation constitutes commercial magenta. Magenta consists of brilliant large crystals, having a beautiful golden-green metallic lustre, and soluble in water to an intense purplish-red solution. It is a salt of a colourless base, rosaniline, which is prepared from magenta by boiling with hydrate of potassium, and allowing the solution to cool, when it crystallises out in colourless crystals, having the formula $C_{20}H_{19}N_3H_2O$. All the salts of rosaniline have splendid purple-red colour, and that usually met with as magenta is the hydrochlorate, although the nitrate, oxalate, and acetate are also to be obtained.

From magenta or hydrochlorate of rosaniline a large number of colouring matters are produced, the most important of which will be briefly described below.

ANILINE BLUE, or BLEU DE LYONS. This dye is prepared by heating a mixture of magenta, acetate of sodium and aniline in iron pots, provided with stirrers, &c., in an oil bath, to 374° Fahr. (190° C.), and the excess of aniline distilled over. When a good blue has been obtained, the heat is removed, and the

thick treacly fluid purified. This is effected for the commoner varieties by treating the crude product with hydrochloric acid to dissolve all the excess of aniline, and the various red and purple impurities; but for the better qualities by mixing the crude product with methylated spirit, and pouring the whole into water acidulated with hydrochloric acid, and then thoroughly washing the colouring matter that is precipitated, with water and drying.

This blue, like magenta, is a salt of a colourless base, which has been named Triphenylrosaniline, $C_{38}H_{31}N_3$, or $C_{20}H_{16}(C_6H_5)_3N_3$. Aniline blue, or Lyons blue, is sent into the market either as a coarse powder of a coppery lustre, or in alcoholic solution; as it is insoluble in water, which necessitates it being added to the dye bath in solution in spirit, a great drawback.

Mr. Nicholson, by treating Lyons blue in the same manner as indigo is converted into sulpindigotic acid, has succeeded in rendering it soluble; dissolving in alkalies to form colourless salts, and decomposed by acids into its original blue colour.

By a modification of this method, "NICHOLSON BLUE" is prepared a fine soluble blue dye. Another colouring matter called Paris blue or bleu de Paris, was obtained by heating stannic chloride with aniline for 30 hours at a temperature of 356° Fahr. (180 C.). It is a fine pure blue, soluble in water, and crystallising in large blue needles with a coppery lustre.

VIOLET IMPERIAL. If the action of the aniline and magenta in the process of manufacturing aniline blue be stopped before it is finished, and the resulting product treated with dilute acid, a colouring matter called violet imperial is obtained. It is now, however, replaced by the Hoffmann violets.

HOFFMANN VIOLETS. On a large scale these violets are produced in deep cast-iron pots, surrounded by a steam jacket, and provided with a lid, having a perforation for distilling over the excess of reagents.

These vessels are charged with a solution of magenta in methylated or wood spirit, and iodide of ethyl or methyl, in proportions according to the shade required, and the whole heated by steam for five or six hours, when the excess of alcohol and iodide of ethyl is distilled over. The resulting product is dissolved in water, filtered, precipitated with common salt, and well washed.

Like most of the other colours, Hoffmann violets are salts of colourless bases. That of a red shade has a formula of $C_{22}H_{23}N_3$, or $C_{20}H_{13}(C_2H_5)N_3$; of a true violet shade, $C_{24}H_{27}N_3$, or $C_{20}H_{17}(C_2H_5)_2N_3$; and of a blue shade of violet, of $C_{26}H_{31}N_3$, or $C_{20}H_{16}(C_2H_5)_3N_3$. They are all moderately fast on wool and silk, although less so on cotton, and, as they can be produced in nearly every shade of violet, are in great use, having replaced most of the other violets.

DAHLIA. This is prepared from mauve and iodide of ethyl, in the same manner as the Hoffmann violets, and is a purple-red violet. It is a good colour, but the expense precludes its general use.

BRITANNIA VIOLET. This is obtained in the same manner as the Hoffmann violets, by acting on an alcoholic solution of magenta, with a thick, viscid, oily fluid of the formula $C_{10}H_{15}Br_3$, obtained by cautiously acting with bromine on oil of turpentine. It is a beautiful violet, capable of being manufactured of every shade, from purple to blue, and most extensively used.

ALDEHYDE GREEN. Prepared by dissolving one part of magenta in three parts of sulphuric acid, diluted with one part of water, adding by degrees one and a half part of aldehyde, and heating the whole on a water bath until a drop put in water turns a fine blue. It is then poured into a large quantity of hot water containing three parts of hyposulphite of sodium, boiled and filtered. The filtrate contains the green, which can either be kept in solution or be precipitated by means of tannic acid or acetate of sodium. Like the other colours, this green is a salt of a colourless base, containing sulphur, the formula of which is not known, and is principally used for dyeing silk, being very brilliant in both day and artificial light.

IODIDE GREEN. Produced during the manufacture of the Hoffmann colours, and is now used for dyeing cotton and silk; its colour being bluer than that of aldehyde green, it is more useful. Iodide green, not being precipitated by carbonate of sodium, is usually sold in alcoholic solution.

PERKINS' GREEN. This is also a magenta derivative, and a salt of a powerful colourless base. It resembles the iodide green, but is precipitated by alkaline carbonates and picric acid. This colour is used chiefly for calico printing, and is quite as fast as the Hoffmann colours.

Besides the above products obtained from aniline, a series of colours have been obtained from phenol, or carbolic acid, another substance obtained from coal tar.

PICRIC ACID. This is obtained by treating in a suitable apparatus, with proper precautions, carbolic acid with nitric acid. It is a pale yellow crystalline acid, forming dark orange explosive salts, and deying silk a fine yellow.

ISOPURPURATE OF POTASSIUM. By treating picric acid with cyanide of potassium a very explosive salt is obtained, used to dye wool a dark maroon colour.

AURINE, or ROSOLIC ACID. This is obtained by heating a mixture of sulphuric, oxalic, and carbolic acids, and purifying the products. It is a beautiful reddish, resinous substance, with a pale green lustre, and yielding an orange coloured solution, changed by alkalies to a splendid crimson. Owing to the

difficulty in using it, however, it is not very extensively employed.

PEONINE, or CORALLINE. This dye is formed when rosolic acid and ammonia are heated to between 248° and 284° Fahr. (120° to 140° C.). It is a fine crimson dye, forming shades similar to safflower on silk, but, owing to the bad effects of acids, not much used.

AZULINE. Prepared by heating coralline and aniline together. A coppery coloured resinous substance, soluble in alcohol, and with difficulty in water, and dyeing silk a blue colour. The aniline blues, however, have superseded it to a great extent.

There are other substances obtained from coal tar that have been employed to form dyes, but of which we shall only refer to one—naphthaline. By treating this in exactly the same manner as benzol is converted into aniline, a solid crystalline white base, termed naphthylamine, is produced. From this substance is obtained the following dye.

DINITRONAPHTHAL, or MANCHESTER YELLOW. Naphthylamine is converted into diazynaphthol by treatment with nitrite of potassium, and the latter, when heated with nitric acid, yields the colour. It is a weak acid, and the salt employed in commerce is the beautiful yellow crystalline calcium salt which dyes silk and wool a magnificent golden-yellow colour.

TARAX'ACUM. See DANDELION.

TARPAU'LIN. *Syn.* TARPAWLING. Canvas covered with tar or any composition to render it waterproof.

TAR'RAS. *Syn.* TERRAS. A volcanic product resembling puzzolano, that imparts to mortar the property of hardening under water. Several other argillo-ferruginous minerals possess the same power, and are used under this term.

TAR'TAR. *Syn.* ARGAL, ORGOL; TARTARUM, TARTARUS, L. Impure bitartrate of potassa. Crude tartar is the concrete deposit formed upon the sides of the casks and vats during the fermentation of grape juice. That obtained from white wine is white argol; that from red wine, red argol. After purification it forms cream of tartar.

Tartar, Ammo"niated. *Syn.* AMMONIO-TARTRATE OF POTASSA, SOLUBLE TARTAR (Ammoniated); TARTARUS AMMONIATUS, TARTARUM SOLUBILE AMMONIATUM, L. *Prep.* Neutralise a solution of cream of tartar with ammonia in slight excess, then evaporate, and crystallise. Very soluble in water. A favourite laxative on the Continent.

Tartar, Bo"raxated. *Syn.* SOLUBLE CREAM OF TARTAR, BORO-TARTRATE OF POTASSA AND SODA; TARTARUM BORAXATUM, CREMOR TARTARI SOLUBILIS, POTASSÆ ET SODÆ TARTRAS BORAXATA, L. *Prep.* From borax, 2 lbs.; cream of tartar, 5 lbs.; (both in powder;) dissolved in water, evaporated, and crystallised. See BOROTARTRATE OF POTASSA.

Tartar, Chalybea'ted. Potassio-tartrate of iron.

Tartar, Cream of. Bitartrate of potassa.

Tartar, Emet'ic. Potassio-tartrate of antimony.

Tartar, Oil of. Deliquesced carbonate of potassa.

Tartar, Reduced. *Syn.* CREMOR TARTARI REDUCTUS, L. An article is sold, under the name of 'British cream of tartar,' which contains ¼ its weight or more of bisulphate of potassa.

Tartar, Salt of. Carbonate of potassa.

Tartar, Sol'uble. Neutral tartrate of potassa.

Tartar, Spirit of. Pyrotartaric acid.

TARTAR'IC ACID. $H_2C_4H_4O_6$. *Syn.* ACID OF TARTAR, ESSENTIAL SALT OF T.†; ACIDUM TARTARICUM (B. P., Ph. L. E. & D.), SAL ESSENTIALE TARTARI†, L. *Prep.* 1. (Ph. L. 1836.) Take of cream of tartar, 4 lbs.; boiling water, 2 galls.; dissolve by boiling; add, gradually, of prepared chalk, 12 oz. 7 drs. (made into a milk with water), and, when the effervescence ceases, add another like portion of prepared chalk, dissolved in hydrochloric acid, 26½ fl. oz., or q. s., diluted with water, 4 pints; collect the precipitate ('tartrate of lime'), and, after well washing it with water, boil it for 15 minutes in dilute sulphuric acid, 7 pints and 17 fl. oz.; next filter, evaporate the filtrate (to the density of 1·38), and set it aside to crystallise; redissolve the crystals in water, concentrate the solution by evaporation, and recrystallise a second and a third time. The Edinburgh formula is nearly similar. In the Ph. L. & D. tartaric acid is placed in the Materia Medica.

2. (Gatty.) The solution of argol or tartar is first neutralised with carbonate of potassa, and to every 300 galls. of the clear liquid, at 5° Twaddell, 34 galls. of milk of lime (1 lb. of lime per gall.) are added; carbonic acid gas is then forced in, with agitation; decomposition ensues, with the formation of 'bicarbonate of potassa' and 'tartrate of lime;' the last is converted into tartaric acid in the usual manner, and the former is evaporated in iron pans, and roasted in a reverberatory furnace for its potassa.

Prop. Tartaric acid forms inodorous, scarcely transparent, oblique rhombic prisms, more or less modified, which are permanent in the air; it possesses a purely sour taste, dissolves in about 2 parts of water at 60° Fahr., and in about its own weight of boiling water; it is slightly soluble in alcohol; the aqueous solution exhibits right-handed polarisation, and suffers gradual decomposition by age.

It is free from colour; is entirely, or almost entirely, dissipated by ignition; and is entirely soluble in water.

Tests. 1. Tartaric acid is known to be such by its solution giving white precipitates with solutions of caustic lime, baryta, and strontia, which dissolve in excess of the acid.—2. A solution of potassa causes a white granular precipitate of cream of tartar,

soluble by agitation in excess of the precipitant.—3. Nitrate of silver and acetate of lead give white precipitates, which, when heated, fume, and yield the pure metal.—4. If to a solution of tartaric acid, or a tartrate, solution of a ferric or aluminum salt, be added, and subsequently ammonia or potassa, no precipitate is formed.—5. At about 570° Fahr. all the tartrates are blackened, and yield a peculiar and characteristic odour.

Uses, &c. Tartaric acid is chiefly employed in calico printing, and, in medicine, as a substitute for citric acid and lemon juice in the preparation of cooling drinks and saline draughts. For the latter purpose, bicarbonate of soda is the alkaline salt commonly employed.—*Dose.* 10 to 30 grains.

Concluding remarks. On the large scale the decomposition of the tartar is usually effected in a copper boiler, and that of the tartrate of lime in a leaden cistern. This part of the process is often performed by mere digestion for a few days, without the application of heat. Leaden or stoneware vessels are used as crystallisers. Good cream of tartar requires 26% of chalk and 28·5% of dry chloride of calcium for its perfect decomposition. Dry tartrate of lime requires 75% of oil of vitriol to liberate the whole of its tartaric acid. A very slight excess of sulphuric acid may be safely, nay, advantageously, employed. Some manufacturers bleach the coloured solution of the first crystals, by treating it with animal charcoal; but for this purpose the latter substance should be first purified by digesting it in hydrochloric acid, and afterwards by edulcorating it with water, and exposing it to a dull red heat in a covered vessel. The general management of this manufacture resembles that of citric acid. To obtain a large product, care must be taken that the whole of the tartrate of lime be thoroughly decomposed, a matter not always effected by clumsy manipulators, who do not adapt their quantities or practice to the circumstances before them.

TAR'TRATE. A salt of tartaric acid.

TARTS. These may be regarded as miniature pies, consisting of fruit, either fresh or preserved, baked or spread on puff-paste.

TAU'RIN. $C_2H_7NSO_3$. Obtained when purified bile is boiled for some hours with an excess of hydrochloric acid. By filtration, evaporation, and dissolving the dry residuum in about 6 parts of boiling alcohol, nearly pure taurin crystallises out as the solution cools. It forms with crystalline needles, which are soluble in water, and sparingly soluble in alcohol. It is remarkable for containing fully 25% of sulphur.

TAUROCHOLAL'IC ACID. See CHOLEIC ACID.

TAW'ING. In the preparation of the TAWED LEATHER used for gloves, housings, &c., the skins are first soaked, scraped, and hung in a warm room until they begin to exhale an ammoniacal odour, and the wool readily comes off; they are then de-haired, and soaked in water with some quicklime for several weeks, the water being changed two or three times during that period; they are then again beamed, smoothed, and trimmed, after which they are rinsed, and resoaked in a vat of bran-and-water, where they are kept in a state of gentle fermentation for some weeks; (in this state they are called 'pelts';) the skins are next well worked about in a warm solution of alum and salt, again fermented in bran-and-water for a short time, and are then stretched on hooks, and dried in a stove-room; they are, lastly, again soaked in water and trodden or worked in a pail or tub containing some yolks of eggs beaten to a froth with water, after which they are stretched and dried in a loft, and are smoothed with a warm smoothing-iron. Sometimes the process is shortened by soaking the skins in the following mixture after the first steep with bran:—Common salt, 3½ lbs.; alum, 8 lbs.; boiling water, q. s.; dissolve, add of wheaten flour, 21 lbs.; yolks of 9 dozen eggs; make a paste. For use, a portion is to be largely diluted with water.

CHAMOIS or SHAMMY LEATHER is generally prepared from either sheep or doe-skins, which, after dressing, liming, &c., are well oiled on the grain side, then rolled into balls, and thrown into the trough of the fulling-mill, where they are beaten for 2, 3, or 4 hours. They are next aired, and again oiled and fulled, and this is repeated a third time, or oftener, as circumstances may direct. The oiled skins are then exposed to a fermenting process, or heating in a close chamber, and are afterwards freed from redundant oil by being scoured in a weak alkaline lye. They are, lastly, rinsed in clean water, wrung at the peg, dried, and 'finished' at the stretcher-iron.

TAWED LEATHER differs from TANNED LEATHER in yielding size or glue under the influence of heat and moisture, in nearly the same way as the raw skins.

TEA. *Syn.* THEA, L. The dried leaves of the Chinese tea plants (*Thea Bohea* and *Thea viridis.*)

It was formerly supposed that BLACK TEAS could only be obtained from *T. Bohea,* and GREEN TEAS from *T. viridis,* but Fortune and others have proved that both sorts may be made from either species, and that the differences in colour and flavour depend chiefly on the age of the leaves and the treatment they undergo in the drying process. Another species, named *Thea Assamica,* furnishes ASSAM TEA.

Pur. The only adulteration of tea which is extensively practised at the present day is mixing it with a certain portion of exhausted tea-leaves, which have been redried and curled. The collection and preparation of these occupy several hundred persons, chiefly women and children, in and about London. The leaves which have been found in the possession of the

manufacturers of imitation tea are those of the sloe tree, ash tree, elder bush, and white thorn. According to Mr. Warrington, a most extensive system of adulterating tea is practised in China. Many samples directly imported from that country, examined by him, did not contain a single grain of tea, being made up entirely of other leaves. The ordinary green teas he found, for the most part, spurious, being manufactured out of the cheaper black teas. These are 'faced up' or 'painted' with various colouring substances, powdered porcelain clay, &c., which are readily perceived under the microscope, and even admit of being separated, and chemically examined.

It is a general practice among the grocers in this country to impart what they call a 'bloom' to their green teas by 'rouncing' them up with a little calcined magnesia, or finely powdered talc or French chalk. The quantity that adheres to the tea is very trifling, but it greatly improves its appearance. Black teas are 'faced,' in a similar manner, with finely powdered plumbago or black-lead.

Pure China tea is not turned black by being put into water impregnated with sulphuretted hydrogen gas, nor does it tinge a solution of ammonia blue. The infusion is amber-coloured, and is not reddened by the addition of an acid. The ashes left from the combustion of genuine tea are white, and do not exceed 5 to 5½ %. If they exceed this they may be chemically examined with the usual tests for alumina, chromate of lead, copper, cyanide of potassium, gypsum, lime, magnesia, &c. Many of these substances may be detected by simply agitating the tea with a little cold water, when they will be detached from its surface, and render the water turbid, or, by their gravity, sink to the bottom.

Among domestic substitutes for tea are —the leaves of speedwell, wild germander, black currant, syringa or mock orange, purple-spiked willow herb, winter green, sweetbriar, cherry tree, sloe, &c., all of which are used for tea, either singly or mixed. The addition of a single bud of the black currant to the infusion of ordinary black tea imparts to it a flavour closely resembling that of green tea.

The brownish-coloured powder vended under the name of 'la veno beno' is a mixture of 2 parts of tea-dust with 5 parts of powdered catechu or terra japonica. A few grains of this substance thrown into the teapot are described in the advertisements as being capable of more than doubling the strength of the beverage.

The once notorious 'PARAQUAY PLANT,' sold in packets, was simply new meadow-hay that had been wetted with a strong infusion of catechu, then dried, chopped small, and strongly compressed. See THEINE and CAFFEINE.

Tea. "The tea is not a meal; when it is properly used, it should not be a meal; but it has a special purpose to fulfil, which I will now explain. Tea—and under the generic term tea I include coffee—tea is usually taken three hours after dinner. This is the moment which corresponds with the completion of digestion, when, the food having been conveyed away from the stomach, nothing remains behind but the excess of the acid juices employed in digestion; these acid juices create an uneasy sensation at the stomach, and a call is made for something to relieve the uneasiness; tea fulfils that object." "On the same principle, after the business of the dining-room, the antacid and refreshing beverage, either in the shape of tea or coffee, is prepared in the drawing-room. In taking either, the nearer they approach to the simple infusion the better; little milk or cream, and less sugar, should be the principle. But, seeing the purpose of tea, how unreasonable to make it the excuse for a meal, to conjoin with it toast, muffins, bread and butter, and *id genus omne*." "Three meals a day may be taken as the standard of habit and custom; tea and coffee having a specific place and purpose as a beverage, but none as a meal." (Eras. Wilson.) See MEALS, &c.

Tea, Beef. *Syn.* INFUSUM CARNIS BUBULÆ, JUSCULUM CUM CARNE BOVIS, L. This is merely a very concentrated soup formed of lean beef. According to the common plan, lean beef, 1 lb., is gently simmered in water, 1 quart, for about ½ an hour, when spices, salt, &c., are added, and in a few minutes the whole is strained for use. The following are other formulæ:—

1. (Dr. A. T. Thomson.) Take of good rump steak, ½ lb.; cut it into thin slices, spread these over a hollow dish, sprinkle a little salt on them, add a pint of boiling water, and place the dish (covered) near the fire for ½ an hour; then remove the whole to a saucepan, and boil it gently for 15 minutes; lastly, strain through a hair sieve.

2. (Prof. Liebig.) Beef, free from fat, 1 lb., is to be minced very small, mixed with an equal weight of cold water, and, after digestion and agitation in the cold for about ½ an hour, heated slowly to boiling; when it has boiled for a minute or two, strain it through a cloth. It may be coloured with roasted onion or burnt sugar, and spiced and salted to taste.

Obs. Similar preparations are ordered in some foreign Pharmacopœias from calves' lights, crayfish, frogs, mutton, pullets, snails, tortoise, veal, &c. In the Ph. L. 1746 a form was given for viper broth (JUSCULUM VIPERINUM). See ESSENCE OF BEEF, EXTRACT OF MEAT, &c.

TEETH (The). *Syn.* DENTES, L. An object very subservient to health, and which merits due attention, is the preservation of the teeth; the care of which, considering their importance in preparing the food for digestion, is, in general, far from being sufficiently appreciated. Comparatively very few persons wash their mouth and clean their teeth even

once a day; a feat which ought always to be practised at the conclusion of a meal, when either animal food or vegetables are eaten; for the first is apt to leave behind it a rancid acrimony, and the other an acidity, both of them hurtful to the teeth. Those who abhor a fetid breath, rotten teeth, and the tooth-ache, would do well to invariably clean their teeth before retiring to rest. With smokers, this practice is almost obligatory. Washing the mouth frequently with cold water is not only serviceable in keeping the teeth clean, but in strengthening the gums, the firm adhesion of which to the teeth, is of the greatest importance in preserving them sound and secure. Some persons think it serviceable to add a few drops of spirit or essence of camphor to the water thus employed, a plan we certainly approve of. See BREATH, DENTIFRICES, PASTES, POWDERS, TOOTH CEMENTS, WASHES, &c.

TEETH'ING. *Syn.* DENTITION. Children are sometimes born with one or more teeth; but, in general, the teeth, at birth, consist of mere pulpy rudiments buried in the gum. Their development is gradual. About the third or fourth month they begin to assume shape and hardness. At this period children become fretful, the saliva flows copiously, the gums grow turgid, and there is a fondness of biting hard cold objects. In nearly all cases there is more or less fever, frequently a cough or diarrhœa, and a rash commonly appears, which is called by nurses the 'red gum.' These symptoms generally abate after a fortnight or three weeks, and the child remains undisturbed until the seventh or eighth month. About this period the gums again become red, tender, and swollen, and often extremely sensitive, and painful. The upper part of the gum gradually becomes attenuated and pale, and, just before the tooth appears, even covered with a blister. These changes are usually attended by an increased flow of saliva, or 'driveling,' and a lax state of the bowels, both of which are regarded as favorable symptoms. Sometimes, however, the diarrhœa is excessive, when it may be cautiously restrained by a dose or two of rhubarb-and-magnesia, with a little dill or peppermint water; or, better, by the daily use of a little arrow-root, to which a few drops of pure port wine may be added. Sometimes the local irritation is considerable, or there are spasms or convulsions, in which case the practice is to lance the gums. When there is drowsiness, stupor, or oppressed respiration, one or two leeches may be applied to the temples, and a small blister to the back of the neck, or behind the ear. Sluggishness of the bowels may be removed by a little castor oil; or, when there is actual constipation, by a little calomel or mercurial powder and rhubarb. Excessive irritability, without other marked symptoms, is best combated by a drop or two of tincture of hops in sweetened water. Throughout the whole period of dentition the use of warm dry clothing, freedom from tight bandages, with thorough ventilation, good nursing, exercise, fresh air without undue exposure, abundance of crawling on the carpet, and frequent warm baths, will be found most advantageous. Indeed, the last, without other treatment, are often sufficient to subdue the most distressing convulsions and the most obstinate diarrhœa, and in no case can they do harm. See NURSING, STROPHULUS, &c.

TELLU'RIUM. A rare grayish-white elementary substance, found only in small quantities, associated with gold, silver, lead, and bismuth, in the gold mines of Transylvania. It has often been described as a metal, but is now commonly classed with the metalloids.

TEM'PERATURE. In English pharmacy it is customary to measure the degree of heat by Fahrenheit's thermometer. When a boiling heat is directed, 212° is meant. A gentle heat is that which is denoted by any degree between 90° and 100° Fahr.

Whenever specific gravity is mentioned, the substance spoken of is supposed to be of the temperature of 62° Fahr. (Ph. L.)

In the B. P., Ph. E. & D., and in chemical works in this country generally, the specific gravities of bodies are taken at, or referred to, the temperature of 60° Fahr. See THERMOMETERS.

TENT. A piece of lint, or compressed sponge, *used* to dilate openings, wounds, &c.

TERBIUM. A rare metal found by Prof. Mosander, associated with erbium and yttrium in ordinary yttria. See ERBIUM and YTTRIA.

TER'RA. [L.] Earth. TERRA JAPONICA, catechu; TERRA PONDEROSA, sulphate of baryta, &c.

TER'RA COT'TA. Literally, baked clay; a term applied to statues, architectural ornaments, &c., made of pure white clay, fine sand, and powdered potsherds, slowly dried, and baked to a strong hardness.

TEST. *Syn.* REAGENT. Any substance employed to determine the name or character of any other substance, or to detect its presence in compounds.

TET'ANUS. Spasm with rigidity. When it affects the under jaw, it is called TRISMUS, or locked-jaw; when the body is drawn backward by the contraction of the muscles, it is called OPISTHOTONOS; when the body is bent forward, EMPROSTHOTONOS; and when the body is drawn to one side, PLEUROSTHOTONOS.

The cause of tetanus, in temperate climates, is generally irritation of the nerves, arising from local injuries, especially punctured or lacerated wounds. Of these the most trivial are occasionally sufficient to produce locked-jaw. In hot climates the disease is occasionally produced by exposure to cold, or by suddenly suppressed perspiration. The last variety is curable; the former one, scarcely ever so. The proper treatment is a matter still undeter-

mined. Sedatives, antispasmodics, and powerful stimulants, have each had their advocates. Large doses of wine and spirits, in conjunction with opium, have occasionally been administered with success. Electricity and the vapour bath have also proved useful. In all cases the bowels should be moved by active aperients, either by the mouth or per anum.

TET'TERS. The popular name of several cutaneous diseases, the treatment of which can only be properly undertaken by the experienced medical man.

THAL'LIUM. Tl. [Eng., L.] A heavy metal, belonging to the mercury, silver, and lead group, discovered by Crookes in the early part of 1861, and displayed by him as "a new metallic element" at the opening of the International Exhibition, on the 1st of May, 1862. Thallium is a widely diffused metal, being found in many minerals, particularly iron- and copper-pyrites and native sulphur. It has recently been obtained in comparatively large quantities from the dust of the flues leading to sulphuric acid chambers. The spectrum of thallium consists of a single most characteristic line of a beautiful green colour. The spectrum produced when the metal is burnt in the electric arc is, however, more complicated, and consists of several green, blue, and other lines.

Thallium melts at 550° Fahr., and at a less heat may be readily welded, a property that has hitherto been regarded as peculiar to iron and platinum. Its specific gravity varies from 11·8 to 11·9, according to the mode of preparation. When freshly cut it has a dull white colour, destitute of the brilliancy of polished silver. Exposed to the air, it tarnishes rapidly, a straw-coloured oxide making its appearance on the surface. The oxide is alkaline and caustic to the taste, and much more soluble than the oxides of silver and lead. The metal is remarkable for its strongly marked diamagnetic characters, resembling bismuth in this respect. The alloys of thallium are very remarkable. Copper, alloyed with only one half per cent. of thallium, becomes quite brittle; but the alloy with tin is malleable. Mr. Crookes has prepared a great number of the salts of this interesting metal. These need not be described here, as they have not yet been applied to any use in the arts.

THEBA'INE. $C_{19}H_{21}NO_3$. *Syn.* THEBAIA, PARAMORPHIA. A crystalline substance obtained by Thibourméry from an infusion of opium that has had its morphia extracted by acting on it by an excess of lime.

THE'INE. $C_8H_{10}N_4O_2$. *Syn.* THEINA. An alkaloid extracted from tea. It is identical with caffeine, and may be obtained from tea in the same manner as that substance is from coffee. The best 'gunpowder tea' contains fully 6% of theine, about one half of which is lost in the present careless mode of making infusion of tea for the table.

THENARD'S BLUE. See ULTRAMARINE (Cobaltic).

THEOBROMÆ OLEUM. *Syn.* CACAO BUTTER. A concrete oil, obtained by expression and heat from the ground seeds of *Theobroma Cacao*. Occurs in cakes of a yellowish colour, of a pleasant cacao odour. Does not become rancid from exposure to air. Contained in all the suppositories.

Not official.—The following form good bases for suppositories:—Theobroma oil, when melted, begins to solidify at 72° Fahr.; stearine of cocoa-nut oil at 75° Fahr.; 4 of stearine and 2 of mutton fat at 77° Fahr.; 4 of stearine and 1 spermaceti at 80° Fahr. Stearine alone is, perhaps, a better substance than cacao butter for making suppositories. It begins to solidify at 78° Fahr., but there is stearine that solidifies at 120 Fahr.; this will not answer for suppositories.

THEOBRO'MINE. A peculiar principle, closely resembling caffeine or theine, found by Woskresensky in the seed of the *Theobroma Cacao*, or the nuts from which chocolate is prepared, Its form is that of a light, white, crystalline powder, which is rather less soluble than caffeine. It is obtained like caffeine. See COCOA.

THERI'ACA. A name given in ancient pharmacy to varies compound medicines, chiefly electuaries or confections, employed as antidotes to poisons or infection. The THERIACA ANDROMACHI, Ph. L. 1746, contained above 60 ingredients. Mithridate and Venice treacle are examples of this class. See TREACLE.

THERMOM'ETERS. FAHRENHEIT'S scale is the one generally employed in England, while that of CELSIUS, or the CENTIGRADE scale, is principally used on the Continent. REAUMER'S is another scale occasionally employed. DE LISLE'S thermometer was formerly used in Russia, and some other parts of the north of Europe. As references to these scales are frequently met with in books, it is useful to know their relative value, and the method of reducing the one to the other. The boiling-point of water is indicated by 212° on Fahrenheit's scale, 100° on the Centigrade scale, 80° on that of Reaumur, and 0° on that of De Lisle; the freezing-point of water marks 32° Fahrenheit, and 0°, or zero, on the Centigrade and Reaumur, and 150° on the scale of De Lisle. The 0° or zero of Fahrenheit is 32° below the freezing-point of water.

1. To reduce Centigrade degrees to those of Fahrenheit, multiply them by 9, divide the product by 5, and to the quotient add 32; that is—

$$\frac{\text{Cent.}^\circ \times 9}{5} + 32 = \text{Fahr.}^\circ$$

2. To reduce Fahrenheit's degrees to Centigrade:—

$$\frac{\text{Fahr.}^\circ - 32 \times 5}{9} = \text{Cent.}^\circ$$

3. To reduce Reaumur's to Fahrenheit's :—

$$\frac{\text{Reau.}^\circ \times 9}{4} + 32 = \text{Fahr.}^\circ$$

4. To convert Fahrenheit's to Reaumer's :—

$$\frac{\text{Fahr.}^\circ - 32 \times 4}{9} = \text{Reaumur.}^\circ$$

Thermometers intended to register extreme degrees of heat are called PYROMETERS (which *see*).

THO'RIUM. Th. *Syn.* THORINUM. A very rare element, belonging to the group of earthy metals. Metallic base of thoria. It is obtained by the action of potassium on the chloride of thorium, and washing the resulting mass in water.

THORN-APPLE. See DATURA.

THROAT AFFECTIONS. We intend here only to allude to those arising from exposure or cold. The list is, therefore, a short one. CROUP, one of the most important, has been already briefly noticed.

QUINSY, or INFLAMMATORY SORE THROAT, commonly commences with stiffness and pain on one side of the throat, and swelling of the tonsils, attended by febrile symptoms, which increase as tumefaction advances, and sometimes become extreme. There is great restlessness and anxiety, considerable difficulty in swallowing even liquids, the respiration is painful and laborious, and the speech obstructed. When the inflammation is not resolved, these symptoms rapidly increase in severity, the patient suffers the greatest misery, the tumour suppurates rapidly, the abscess bursts, and with the rupture comes almost immediate relief. It occasionally happens that the other side of the throat then becomes affected, and goes through the same stages; but in general this is not the case, and the patient rapidly recovers, a few detergent gargles and a light nutritious diet being all that is required. Sometimes, at the very commencement of the attack, the inflammation may be resolved by the patient sucking a lozenge or powder, every hour or two, containing ¼ or ½ gr. of tartarised antimony carefully triturated with about 20 grs. of lump sugar, so as to keep up a constant state of nausea or vomiting for hours.

MALIGNANT SORE THROAT is marked by the inflammation of the tonsils being more superficial; but no sooner does it occur than it passes into small ulcers of varied colours and appearance, extending to the pharynx, and spreading over the whole fauces, into the nostrils, and even around the glottis and down the œsophagus. These ulcers rapidly slough, and the febrile symptoms of a typhoid character, which are present throughout, become more or less severe. In this way the disease often hastens to a fatal termination, and, being highly contagious, often extends itself to all, or nearly all, the members of a family. The treatment must be similar to that adopted for typhus fever. Stimulating gargles, containing capsicum, the mineral acids, or port wine, are useful local remedies.

THRUSH. *Syn.* APHTHA, L. A disease of infancy, which, in its common form, is marked by small white ulcers upon the tongue, palate, and gums. In some cases it extends through the whole course of the alimentary canal, and, assuming a malignant form, proves fatal. The treatment consists of a gentle emetic of ipecacuanha wine, followed by an occasional dose of rhubarb and magnesia, to keep the bowels clear, and to arrest diarrhœa. The ulceration may be touched with a little honey of borax; and if they assume a dark colour, or there be much debility, astringents and tonics should be had recourse to. In all cases the diet should be light, but supporting, as imperfect nutrition is a common cause of the disease.

TIC DOULOUREUX'. [Fr.] According to a writer in one of the medicial periodicals, a solution of atropia, 2 grs., in water, 1 fl. dr., to which nitric acid, 1 drop (minim), has been previously added, applied as a paint, by means of a camel-hair pencil, to the part of the face over the spot affected, immediately and completely subdues the pain, or, at all events, within 3 to 5 minutes, in all accidental cases, and affords considerable relief in others. The application is to be continued until some relief is experienced. The solution, being very poieonous, must not be taken internally, nor applied to the skin when broken. See ATROPIA and NEURALGIA.

TIN. Sn. *Syn.* STANNUM (Ph. E. & D.), L. This metal has been known from the most remote antiquity, being mentioned in the books of Moses (*Numb.* xxxi, 22), and by Homer ('Iliad,' x, 25), and other early writers. The ancients obtained it principally, if not solely, from Cornwall. The Phœnicians traded with England for this metal at least 1000 years before the birth of Christ.

Tin occurs in nature in the state of oxide and, more rarely, as sulphide (TIN PYRITES). In Cornwall it is found under the form of peroxide (MINE-TIN, TIN-STONE), associated with copper ore, in the slate and granite rocks, and as an alluvial deposit (STREAM TIN) in the beds of rivers.

Prep., &c. The ore is first reduced to powder in stamping-mills, washed to remove earthy matter, and then roasted to expel arsenic and sulphur; it is next deoxidised or reduced by smelting it with about 1-6th of its weight of powdered culm, and a little slaked lime; it is, lastly, refined by 'liquation,' followed by a second smelting of the purer portion, which, after being treated in a state of fusion, for some time with billets of green wood, or 'tossed,' as the workmen call it, is allowed to settle, and is then cast into large blocks, which, after being assayed, receive the stamp of the duchy. Two varieties of commercial tin are known, called respectively grain tin and

bar tin. The first is the best, and is prepared from the stream ore.

Prop. Tin approaches silver in whiteness and lustre; in hardness it is intermediate between gold and lead; it is very malleable when pure, but the presence of a very small quantity of any other metal, particularly lead, deprives it of this property; when rubbed it evolves a peculiar odour, and when bent backwards and forwards it emits a peculiar crackling noise; it melts at 442° Fahr.; volatilises at a white heat; and when heated above its melting-point, with free access of air, is speedily converted into a yellowish-white powder, which is the peroxide, or the 'putty powder' of polishers. Sp. gr. 7·29 to 7·31.

Pur. It is almost entirely dissolved by hydrochloric acid, yielding a colourless solution; the precipitate thrown down by hydrate of potassium is white, and soluble in excess of the precipitant. If it contain arsenic, brownish-black flocks will be separated during the solution, and arseniuretted hydrogen evolved, which may be inflamed and tested in the usual manner. The presence of other metals in tin may be detected by treating the hydrochloric solution with nitric acid, sp. gr. 1·16, first in the cold, and afterwards with heat, until all the tin is thrown down in the state of insoluble stannic oxide. The decanted acid solution from pure tin leaves no residuum on evaporation. If, after all the acid has been dissipated by heat, dilution with water occasion a heavy white precipitate, the sample contained bismuth; if, after dilution, a solution of sulphate of ammonium or of sodium produce a similar white precipitate (sulphate of lead), it contained lead; if ammonia, added in excess, occasion reddish-brown flocks, or if ferricyanide of potassium give a blue precipitate, it contained iron; and, if the clear supernatant liquid leave a residuum on evaporation, copper.

Tests. The stannous salts are characterised as follows:—1. Hydrate of potassium gives a bulky white precipitate, readily soluble in excess of the precipitant; on concentrating the solution, the precipitate is changed from stannous hydrate into stannic hydrate, which remains in solution, and metallic tin, which separates in brown flakes.—2. Ammonia, and the carbonates of potassium, sodium, and ammonium, give white precipitates, insoluble in excess.—3. Sulphuretted hydrogen gives, in neutral and acid solutions, a dark brown precipitate, which is soluble in hydrate of potassium, in the alkaline sulphides (especially when they contain an excess of sulphur), and in strong hot hydrochloric acid; and insoluble in nitric acid, even when boiling.—4. Sulphide of ammonium produces a like brown precipitate, soluble in excess of the precipitant, provided the latter contains an excess of sulphur.—5. Terchloride of gold gives, in the cold, on the addition of a little nitric acid, a precipitate of the purple of Cassius.—6. Mercuric chloride gives a black precipitate, but in excess it produces a white one.

Stannous Chloride. $SnCl_2$. *Syn.* PROTOCHLORIDE OF TIN. *Prep.* (ANHYDROUS.) Distil a mixture of tin and mercuric chloride. Gray, resin like, solid, fusible, and volatile.

(HYDRATED; TIN SALT.) Boil an excess of tin in hydrochloric acid. A powerful deoxidising agent. It is somewhat extensively used as a mordant in dyeing.

Stannous Iodide. SnI_2. *Syn.* PROTIODIDE OF TIN. Heat tin and iodine together. A fusible, brownish-red, translucent substance, soluble in water.

Stannous Hydrate. $Sn(HO)_2$. *Syn.* HYDRATED OXIDE OF TIN. *Prep.* Precipitate stannous chloride with carbonate of potassium, well wash, and dry under 196°. Grayish-white powder, soluble in acids and alkaline hydrates, except ammonia.

Stannous Oxide. SnO. *Syn.* PROTOXIDE OF TIN. *Prep.* Ignite the hydrate in an atmosphere of carbonic anhydride. Black powder, inflammable in air, and insoluble in acids.

Stannous Sulphide. SnS. *Syn.* PROTOSULPHIDE OF TIN. A brittle bluish-gray substance, obtained by heating tin and sulphur.

The stannous salts behave with reagents as follows:—1. Hydrate of potassium, ammonia and alkaline carbonates, give a white precipitate, which is freely soluble in an excess of hydrate of potassium and in acids, sparingly soluble in excess of ammonia, only very slightly soluble in excess of carbonate of potassium, and insoluble in excess of carbonate of ammonium.—2. Sulphuretted hydrogen gives, in acid neutral solutions, a golden-yellow precipitate, either at once or on heating the liquid, which is readily soluble in pure hydrate of potassium, the alkaline sulphides, and boiling hydrochloric acid; less soluble in ammonia, and insoluble in nitric acid.—3. A plate of metallic zinc throws down metallic tin, under the form of gray scales or a spongy mass, from solutions free from nitric acid; and from those containing free nitric acid, white stannic hydrate.—4. Mercuric chloride gives a white precipitate.—5. Ferrocyanide of potassium gives no precipitate at first, but after a time the whole forms a thick jelly.

Assay. Each grain of stannic oxide (see *above*), after being washed and gently ignited, is equivalent to ·78365 gr. of pure tin. The loss of weight represents the impurities. Each gr. of sulphate of lead, so treated, is equiv. to ·683 gr. of metallic lead (nearly).

Uses. The uses of tin in the arts are well known. In medicine, 1 to 3 drs. of the filings or powder, made into an electuary with treacle, are sometimes given in tape-worm, for 2 or 3 successive mornings, followed by an aperient.

Stannic Chloride. $SnCl_4$. *Syn.* BICHLORIDE OF TIN, TETROCHLORIDE OF TIN, PERCHLORIDE OF TIN, PERMURIATE OF T.†; STANNI BICHLORIDUM, STANNI PERMURIAS,

L. *Prep.* 1. (Liebig.) By dissolving grain tin in a mixture of hydrochloric acid, 2 parts; nitric acid and water, of each, 1 part; (all by volume;) observing to add the tin by degrees, and to allow one portion to dissolve before adding another, as without this precaution the action is apt to become violent, and stannic oxide of tin to be deposited.

2. (ANHYDROUS; LIBAVIUS'S FUMING LIQUOR.) By heating stannous chloride in chlorine gas; or, by distilling a mixture of powdered tin, 1 part, with corrosive sublimate, 3 parts (5 parts—Fownes). A very volatile, colourless, mobile liquid, which fumes in the air, and boils at 248° Fahr.; when mixed with 1-3rd of its weight of water, it solidifies to a crystalline mass.

Obs. Solution of stannic chloride is much used by dyers, under the names of 'SPIRITS OF TIN,' 'DYER'S SPIRITS,' 'TIN MORDANT,' &c., the proportions of the ingredients and the state of dilution being various according to circumstances or the caprice of the manufacturer. A process which has been highly recommended, and which seems preferable to all others, is to prepare a simple solution of the stannous chloride, and to convert it into a solution of the stannic chloride, either by the addition of nitric acid and a gentle heat, or by passing chlorine through it. See TIN MORDANTS.

Stannic Iodide. SnI_4. By dissolving stannic hydrate in hydriodic acid. Yellow, silky crystals.

Stannic Hydrate. $Sn(HO)_4$. *Syn.* HYDRATED PEROXIDE OF TIN, STANNIC ACID. *Prep.* 1. By adding hydrate of potassium or an alkaline carbonate to a solution of stannic chloride. Soluble in acids and pure alkalies, Its compounds with the latter are sometimes called STANNATES.

Stannic Oxide. SnO_2. *Syn.* BINOXIDE OF TIN, PEROXIDE OF TIN. *Prep.* By the action of nitric acid on metallic tin, the resulting white powder being well washed with water; or, by heating metallic tin above its melting-point, in the air. Yellow; anhydrous; insoluble.

Obs. Frémy has given the name of METASTANNIC ACID to the oxide prepared by the action of nitric acid on metallic tin; the hydrate he calls STANNIC ACID. See POLISHER'S PUTTY (*page* 997).

Stannic Sulphide. SnS_2. *Syn.* BISULPHIDE OF TIN, BRONZE POWDER, MOSAIC GOLD; AURUM MUSIVUM, AURUM MOSAICUM, STANNI BISULPHURETUM, L. *Prep.* 1. To pure tin, 12 oz., melted by a gentle heat, add of mercury, 6 oz.; to the powdered mass, when cold, add of chloride of ammonium, 6 oz.; flowers of sulphur, 7 oz.; and after thorough admixture place the compound in a glass flask or matrass, and gradually heat it, imbedded in sand, to low redness, and continue the heat for several hours, or until white fumes cease to be disengaged; the 'aurum musivum' remains at the bottom of the vessel, under the form of soft and very brilliant gold-coloured flakes.

2. (Berzelius.) Stannic oxide and sulphur, of each, 2 parts; chloride of ammonium, 1 part; mix, and expose it to a low red heat in a glass or earthenware retort, until sulphurous fumes cease to be evolved.

Used as a metallic gold colour, or substitute for powdered gold, in bronzes, varnish work, sealing-wax, &c.

TIN FI'LINGS. See TIN POWDER (*below*).

TIN GLASS†. See BISMUTH.

TIN MOR'DANTS. *Syn.* DYER'S SPIRIT, SOLUTION OF TIN, SPIRIT OF T., NITROMURIATE OF T.†. These, as noticed above, vary greatly in their composition and character.

Prep. 1. Take of aquafortis, 8 parts; sal ammoniac or common salt, 1 part; dissolve, and add, very gradually, of grain tin, 1 part; and, when dissolved, preserve it in stoppered bottles from the air. This is the common 'SPIRIT OF TIN' of the dyers.

2. (Berthollet.) Nitric acid, at 30° Baumé, 8 parts; sal ammoniac, 1 part; dissolve, then add by degrees, of tin, 1 part; and, when dissolved, dilute the solution with 1-4th of its weight of water.

3. (Dambourney.) Hydrochloric acid, at 17° Baumé, 4 parts; nitric acid, at 30° Baumé, 1 part; mix, and add by degrees, of Molucca tin, 1 part.

4. (Hellot.) Nitric acid and water, of each, 1 lb.; sal ammoniac, 1 oz.; nitre, ½ oz.; dissolve, then add, by degrees, of granulated tin, 2 oz.

5. (Poerner.) Nitric acid and water, of each, 1 lb.; sal ammoniac, 1½ oz.; dissolve, then add, by very slow degrees, of pure tin beaten into ribands, 2 oz.

6. (Schoeffer.) Nitric acid and water, of each, 2 lbs.; sal ammoniac, 2 oz.; pure tin, 4½ oz.; as last. All the above are used chiefly for dyeing scarlet, more particularly with cochineal.

7. (LAC SPIRIT.) From grain tin, 1 lb., slowly dissolved in hydrochloric acid (sp. gr. 1·19), 20 lbs. Recommended as a solvent for lac dye. For use, ¾ to 1 lb. of the liquid is digested on each lb. of the dye for 5 or 6 hours, before adding it to the dye bath.

8. Hydrochloric acid, 6¾ lbs.; aquafortis, ½ lb.; grain tin, gradually added, 1 lb. Recommended for lac dye.

TIN-PLATE. Iron-plate covered with a coating of tin, by dipping it into a bath of that metal.

TIN POW'DER. *Syn.* TIN FILINGS, TIN DUST; STANNI PULVIS (Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Melt grain tin in an iron vessel, pour it into an earthenware mortar heated a little above its melting-point, and triturate briskly as the metal cools; lastly, sift the product, and repeat the process with what remains in the sieve.

2. (Ph. D.) Melt grain-tin in a black-lead crucible, and, whilst it is cooling, stir it with a rod of iron until it is reduced to powder

let the finer particles be separated by means of a sieve, and when, after having been several times in succession shaken with distilled water, the decanted liquor appears quite clear, let the product be dried for use.

Obs. Powdered tin is also prepared by filing and rasping.—*Dose.* 2 to 4 drs., as a vermifuge. POLISHER'S PUTTY, coloured with ivory black, is frequently substituted for this powder, and hence arises the ill effects that sometimes follow its use.

TIN'NING. *Proc.* 1. Plates or vessels of brass or copper, boiled with a solution of stannate of potassa, mixed with turnings of tin, become, in the course of a few minutes, covered with a firmly attached layer of pure tin.

2. A similar effect is produced by boiling the articles with tin filings and caustic alkali or cream of tartar.

Obs. By either of the above methods chemical vessels made of copper or brass may be easily and perfectly tinned.

TINCTURE. *Syn.* TINCTURA, L.; TEINTURE, Fr. Tinctures (TINCTURÆ; ALCOOLÉS, ALCOOLATURES) are solutions of the active principles of bodies, obtained by digesting them in alcohol more or less dilute. ETHEREAL TINCTURES (TINCTURÆ ÆTHEREÆ; ETHÉROLÉS, ETHÉROLATURES) are similar solutions prepared with ether.

Prep. "Tinctures are usually prepared by reducing the solid ingredients to small fragments, coarse powder, or fine powder, macerating them for 7 days, or longer, in proof spirit or rectified spirit, straining the solution through linen or calico (or paper), and finally expressing the residuum strongly, to obtain what fluid is still retained in the mass. They are also advantageously prepared by the method of displacement or percolation." (Ph. E.) "All tinctures should be prepared in closed glass (or stoneware) vessels, and be shaken frequently during the process of maceration." (Ph. L.) Cooper's patent jars are very convenient for the preparation of tinctures, as they are made with wide mouths, large enough to admit the hand, and yet may be closed in an instant, with as much ease and certainty as an ordinary stoppered bottle.

Tinctures are better clarified by repose than by filtration, as in the latter case a considerable portion is retained by the filtering medium, and lost by evaporation. The waste in this way is never less than 10% of spirit. In all ordinary cases, it is sufficient to allow the tincture to settle for a few days, and then to pour off the clear supernatant portion through a funnel loosely choked with a piece of sponge or tow; after which the remaining foul portion of the liquid may be filtered through bibulous paper in a covered funnel. The filtration should be conducted as rapidly as possible, for the double purpose of lessening the amount lost by evaporation, and the action of the air on the fluid. Tinctures which have been long exposed to the air frequently lose their transparency within a few days after being filtered, owing to the oxidisement and precipitation of some portion of the matter previously held in solution, a change which occurs even in stoppered bottles. Resinous and oily tinctures, as those of myrrh, tolu, and lavender (comp.), may be generally restored to their former brightness by the addition of a quantity of rectified spirit, equal to that which they have lost by evaporation; but many tinctures resist this mode of treatment, and require refiltering.

Ethereal tinctures are best prepared by percolation, and should be both made and kept in stoppered bottles.

Qual. The tinctures of the shops are usually very uncertain and inferior preparations, owing to their manufacture being carelessly conducted, and refuse drugs and an insufficient quantity of spirit being employed in their production. It is a general practice among the druggists to substitute a mixture of equal parts of rectified spirit and water, or a spirit of about 26 u. p., for proof spirit; and a mixture of 2 galls. of water with 5 galls. of rectified spirit, for rectified spirit. In some wholesale drug-houses all the simple tinctures (except those that are of a very active or valuable kind, as LAUDANUM, for instance) are made with 1 lb. of the dry ingredient to the gal. of spirit, irrespective of the instructions in the Pharmacopœia. Appearance is the object which is alone aimed at, without reference to quality. If the tincture be perfectly transparent, and has a good colour, the conscience of the seller and the stomach of the consumer are alike satisfied.

Assay. 1. The RICHNESS in ALCOHOL may be readily determined by Brande's method of alcoholometry; but more accurately by the method of M. Gay-Lussac (see ALCOHOLOMETRY). That of tinctures containing simple extractive, saccharine, or like organic matter, in solution, may be approximately found from the boiling-point, or from the temperature of the vapour of the boiling liquid.

2. The QUANTITY of SOLID MATTER per cent. may be ascertained by evaporating to dryness 100 grains-measure, in a weighed capsule, by the heat of boiling water.

3. The QUANTITY of the INGREDIENTS used in the preparation of tinctures may be inferred from the weight last found, reference being had to the known per-centage of extract which the substances employed yield to spirit of the strength under examination. When the ingredients contain alkaloids, or consist of saline or mineral matter, an assay may be made for them.

Uses, &c. Tinctures, from the quantity of alcohol which they contain, are necessarily administered in small doses, unless in cases where stimulants are indicated. The most important and useful of them are those that contain very active ingredients, such as the tincture of opium, foxglove, hemlock,

henbane, &c. In many instances the solvent, even in doses of a few fluid drachms, acts more powerfully on the living system than the principles it holds in solution; and, when continued for some time, produces the same deleterious effects as the habitual use of ardent spirits. When the action of a substance is the reverse of stimulant, it cannot with propriety be exhibited in this form, unless the dose be so small that the operation of the spirit cannot be taken into account, as with the narcotic tinctures. Hence, this class of remedies are in less frequent use than formerly.

The following list embraces all the formulæ of the tincturæ of the London, Edinburgh, Dublin, and British Pharmacopœias, with a few others likely to be useful to the reader. These will furnish examples for the preparation of others in less general use, care being had to proportionate the ingredients with due reference to the proper or usual dose of tinctures of that class.

Tincture of Ac'etate of I'ron. *Syn.* TINCTURA FERRI ACETATIS (B. P., Ph. D.), L. *Prep.* 1. (B. P.) Solution of persulphate of iron, 5; acetate of potash, 4; rectified spirit, q. s.; dissolve the acetate of potash in 20 of water and add 16 of spirit to the solution of iron; mix the two liquids, and shake well occasionally for an hour, then filter, and add to the filtered liquid sufficient rectified spirit to make up 40.—*Dose.* 5 to 30 minims.

2. (Ph. D.) To water, 9 fl. oz., add of pure sulphuric acid, 6 fl. drs.; and in the mixture, with the aid of a gentle heat, dissolve sulphate of iron, 8 oz.; next add of pure nitric acid, ½ fl. oz., previously diluted with water, 1 fl. oz., and evaporate the resulting solution to the consistence of a thick syrup; dissolve this in rectified spirit, 1 quart; also dissolve of acetate of potassa, 8 oz., in another quart of rectified spirit; and having thoroughly mixed the solutions, by frequent agitation in a large bottle, filter the whole, with expression, first through calico, and then through paper. Sp. gr. ·891.—*Dose.* 15 to 60 drops, in water, in the same cases as in the other chalybeates.

Tincture of Acetate of Zinc. *Syn.* TINCTURA ZINCI ACETATIS, L. *Prep.* (Ph. D. 1826.) Acetate of potassa and sulphate of zinc, of each, 1 oz.; rub them together, then add of rectified spirit, 16 fl. oz.; macerate for a week, and filter. Astringent. Diluted with water, it is used as a collyrium and injection.

Tincture of Ac'onite. *Syn.* TINCTURA ACONITI (Ph. L.), TINCT. ACONITI RADICIS (B. P., Ph. D.), L. *Prep.* 1. (B. P.) Powdered root, 1; rectified spirit to percolate, 8; macerate for 48 hours with three fourths of the spirit, agitating occasionally, pack in a percolator and let it drain, then pour on the remaining spirit; when it ceases to drop, press the marc and add spirit to make up 8.—*Dose.* 5 to 15 minims, twice or thrice a day.

2. (Ph. L.) Take of aconite root, coarsely powdered, 15 oz. (20 oz.—Ph. D.); rectified spirit, 1 quart; macerate for 7 days, press, and filter.

Obs. These tinctures differ materially in strength.—*Dose.* Of the Ph. L., 5 to 10 drops; of the Ph. D., 3 to 6 drops, two or three times daily (carefully watching its effects); in rheumatism, gout, syphilis, &c., where a narcotic sedative is indicated. Diluted with water, it forms an excellent embrocation in rheumatism, neuralgia, &c. It should be applied by means of a small sponge, tied to the end of a stick or glass rod. The Ph. D. formula is nearly the same as that for Dr. Turnbull's concentrated tincture of aconite root, and that given by Dr. Pereira. The TINCTURA ACONITI FOLIORUM of the Ph. U. S. is made with 1 oz. of the dried leaves to 8 fl. oz. of rectified spirit.

Tincture of Al'oes. *Syn.* TINCTURA ALOËS (B. P., Ph. L. & E.), L. *Prep.* 1. (B. P.) Socotrine aloes, 1; extract of liquorice, 3; proof spirit, 40; macerate seven days, press, and wash the marc with spirit to make 40.—*Dose.* 1 to 2 drs.

2. (Ph. L.) Socotrine or hepatic aloes, coarsely powdered, 1 oz.; extract of liquorice, 3 oz.; water, 1½ pint; rectified spirit, ½ pint; macerate for 7 days, and filter. The formula of the Ph. E. is nearly similar. Purgative and stomachic.—*Dose.* ½ to 1 fl. oz.

Tincture of Aloes (Compound). *Syn.* TINCTURE OF ALOES AND MYRRH; TINCTURA ALOËS COMPOSITA (Ph. L.), TINCTURA ALOËS ET MYRRHÆ (Ph. E.), ELIXIR ALOËS†, L. *Prep.* 1. (Ph. L. & E.) Socotrine or hepatic aloes, coarsely powdered, 4 oz.; hay saffron, 2 oz.; tincture of myrrh, 1 quart; macerate for 7 days, with occasional agitation, and strain. The Dublin College (1826) omits the saffron.

2. (Wholesale.) From aloes, 1 lb.; myrrh, ¾ lb.; hay saffron, 2 oz.; rectified spirit, 5 pints; water, 3 pints; as the last. Purgative, stomachic, and emmenagogue.—*Dose* ½ to 2 fl. drs.

Tincture of Ammo''nia (Compound). *Syn.* TINCTURA AMMONIÆ COMPOSITA (Ph. L.), L. *Prep.* 1. (Ph. L.) Mastic, 2 drs.; rectified spirit, 9 fl. drs.; digest until dissolved, decant, add, of oil of lavender, 14 drops; stronger solution of ammonia, 1 pint; and mix well.

2. (Ph. L. 1836; AQUA LUCIÆ; EAU DE LUCE.) As the last, but adding 4 drops of oil of amber along with the oil of lavender.

Obs. This preparation is reputed antacid, antispasmodic, and stimulant.—*Dose.* 10 to 20 drops, in water; in hysteria, low spirits, &c. In the East Indies, eau de luce is regarded almost as a specific for the bite of the cobra di capello and other venomous reptiles.

Tincture of Ammo''nia-chlo''ride of I'ron. *Syn.* AMMONIATED TINCTURE OF IRON, MYNSIGHT'S A. T. OF I., TINCTURA FERRI AMMONIO-CHLORIDI (Ph. L.), TINCTURA FERRI AMMONIATI, L. *Prep.* (Ph. L.) Ammonio-chloride of iron, 4 oz.; proof spirit and distilled

water, of each, 1 pint; dissolve.—*Dose.* 20 to 60 drops, or more; as a stimulant, chalybeate tonic. "A fl. oz. of this, on potassa being added, yields 5·8 grs. of sesquioxide of iron." (Ph. L.)

Tincture of Angustu'ra. Tincture of cusparia.

Tincture of Ar'nica. *Syn.* TINCTURA ARNICÆ, T. A. FLORUM, L. *Prep.* (Ph. Bor. and Hamb. Cod.) Flowers of *Arnica montana*, 1½ oz.; spirit, sp. gr. ·900 (15½ o. p.), 1 lb.; digest for 8 days, and strain, with expression.—*Dose.* 10 to 30 drops; in diarrhœa, dysentery, gout, rheumatism, paralysis, &c.

Tincture of Arnica Root. *Syn.* TINCTURA ARNICÆ (B. P.), TINCTURA ARNICÆ RADICIS, L. *Prep.* 1. (B. P.) Bruised root, 1; rectified spirit to percolate 20; macerate forty-eight hours with 15 of the spirit, agitating occasionally; pack in a perlocator, and, when it ceases to drop, pour on the remaining spirit, let it drain, wash the marc, press, filter, and make up to 20.—*Dose.* 1 to 2 drs.

2. From arnica root, 2 oz.; proof spirit, 1 pint; as the last.

Tincture, Aromat'ic. Compound tincture of cinnamon.

Tincture of Assafœt'ida. *Syn.* TINCTURA ASSAFŒTIDÆ (Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Assafœtida (small fragments), 1; rectified spirit, 8; macerate seven days, strain, filter, and add spirit to make 8.—*Dose.* ½ dr. to 1 dr.

2. (Ph. L.) Assafœtida (small), 5 oz.; rectified spirit, 1 quart; macerate for 7 days (14 days—Ph. D.), and filter. "It cannot be made by percolation with delay." (Ph. E.)

3. (Wholesale.) Assafœtida, 2½ lbs.; boiling water, 2 quarts; dissolve, add of rectified spirit, 1½ gal.; agitate well for 3 or 4 days, then let it settle, and decant the clear portion.—*Dose.* ½ to 2 fl. drs.; in hysteria, flatulent colic, &c.

Tincture of Assafœtida (Ammo"niated). See FETID SPIRIT OF AMMONIA.

Tincture, Asthmat'ic. Compound tincture of camphor.

Tincture of Bal'sam of Peru. *Syn.* TINCTURA BALSAMI PERUVIANI, L. *Prep.* (Ph. L. 1788.) Balsam of Peru, 4 oz.; rectified spirit, 16 fl. oz.; dissolve. Pectoral, stimulant, and fragrant.—*Dose.* 10 to 30 drops.

Tincture of Balsam of Tolu. Tincture of Tolu.

Tincture of Bark. Tincture of cinchona.

Tincture of Belladon'na. *Syn.* TINCTURA BELLADONNÆ (B. P., Ph. L. & D.), L. *Prep.* 1. (B. P.) The dried leaves in coarse powder, 1; proof spirit, 20; macerate forty-eight hours in 15 of the spirit, agitating occasionally; pack in a percolator, and when it ceases to drop, add the remaining spirit, let it drain, wash and press the marc; filter and make up 20.—*Dose.* From 5 to 20 minims.

2. (Ph. L.) Dried leaves of belladonna, 4 oz. (5 oz., in coarse powder—Ph. D.); proof spirit, 1 quart; macerate for 7 days (14—Ph. D.), press, and filter.

3. (Wholesale.) From the dried leaves, 1 lb.; proof spirit, 1 gal.; macerate 14 days.—*Dose.* 5 to 10 drops, gradually increased; also, externally, diluted with water.

Tincture of Ben'zoin (Compound). *Syn.* FRIAR'S BALSAM, TRAUMATIC B., BALSAM FOR CUTS, COMMANDER'S BALSAM, VERVAIN'S B., WOUND B., JESUITS' DROPS, WADE'S D.; TINCTURA BENZOINI COMPOSITA (B. P., Ph. L. & E.), TINCT. BENZOËS COMP., BALSAMUM TRAUMATICUM, L. *Prep.* 1. (B. P.) Benzoin, 8; prepared storax, 6; balsam of Tolu, 2; socotrine aloes, 1½; rectified spirit, 80; macerate seven days, filter, and wash the marc with spirit to make up 80.—*Dose.* ½ to 1 dr., triturated with mucilage or yolk of egg.

2. (Ph. L.) Gum benzoin, coarsely powdered, 3½ oz.; prepared storax, 2½; balsam of Tolu, 10 drs.; Socotrine or hepatic aloes, in coarse powder, 5 drs.; rectified spirit, 1 quart; macerate, with frequent agitation, for 7 days, and strain.

3. (Ph. E.) Benzoin, 4 oz.; balsam of Peru, 2½ oz.; East Indian (hepatic) aloes, ½ oz.; rectified spirit, 1 quart.

Obs. Either of the above formulæ produces a most beautiful tincture, truly balsamic. The following is, however, very generally employed by the wholesale druggists, and the product, though possessing a very rich colour, is thin and watery.

4. (Wholesale.) From gum benzoin, 4 lbs.; aloes (lively coloured), 1½ lb.; liquid storax, 1 lb.; balsam of Tolu, ½ lb.; powdered turmeric (best), 6 oz.; rectified spirit, 5½ galls.; digest with frequent agitation for 10 days, then add of hot water, 1½ gal., again digest for 4 days, and, after 24 hours' repose, decant the clear portion.

Dose. 10 drops to 2 fl. drs.; as a stimulating expectorant, in chronic coughs, and various breath affections. It is also employed to stop the bleeding from cuts, &c., and promote their healing.

Tincture, Bitter Stomach'ic. Tincture of gentian.

Tincture, Brandish's. Alkaline tincture of rhubarb.

Tincture of Bu'chu. *Syn.* TINCTURA DIOSMÆ, T. BUCKU (Ph. E.), T. BUCHU (B. P., Ph. D.), L. *Prep.* 1. (B. P.) Buchu bruised, 1; proof spirit, 8; macerate for forty-eight hours with ¾ of the spirit, pack in a percolator, and let it drain, then pour on the rest of the spirit; when it ceases to drop, press and wash the marc, filter and make up to 8.—*Dose.* 1 to 2 drs.

2. (Ph. E.) Buchu leaves, 5 oz.; proof spirit, 1 quart; macerate 7 days (14 days—Ph. D.); or proceed by the method of percolation.—*Dose.* 1 to 4 fl. drs.; as a tonic, sudorific, and diuretic. It is inferior to the fresh infusion.

Tincture of Calum'ba. *Syn.* TINCTURA CA-

LUMBÆ (B. P., Ph. L. & E.), T. COLOMBÆ (Ph. D.), L. *Prep.* 1. (B. P.) Bruised calumba, 1; proof spirit, 8; macerate forty-eight hours with 6 of the spirit, agitating occasionally; pack in a percolator, and let it drain, then pour on the remaining spirit; when it ceases to drop, press, and wash the marc with spirit to make up 8.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Calumba root, finely sliced, 3 oz.; proof spirit, 1 quart; macerate a week (14 days—Ph. D.), press, and filter. "Or, more conveniently, by percolation, allowing the calumba, in moderately fine powder, to first soak in a little of the spirit for 6 hours." (Ph. E.)

Obs. This tincture is commonly made with 1 lb. of calumba root to the gallon of a mixture of equal parts of rectified spirit and water.—*Dose.* 1 to 2 fl. drs.; as a stomachic bitter and tonic, usually joined with soda or chalybeates.

Tincture of Cam'phor. *Syn.* SPIRIT OF WINE AND CAMPHOR, CAMPHORATED SPIRIT; TINCTURA CAMPHORÆ (Ph. E. & D.), SPIRITUS CAMPHORÆ (Ph. L.), SPIRITUS CAMPHORATUS, L. *Prep.* 1. (Ph. E.) Camphor, 2½ oz.; rectified spirit, 1 quart; dissolve. This is only one half as strong as the Ph. L. preparation.

2. (Ph. D.) Camphor, 1 oz.; rectified spirit, 8 fl. oz. Stimulant and anodyne.—*Dose.* 10 to 60 drops. Also as a liniment for sprains, bruises, chronic rheumatism, &c. For the Ph. L. formula see SPIRIT.

Tincture of Camphor (Compound). *Syn.* CAMPHORATED TINCTURE OF OPIUM, ASTHMATIC ELIXIR, PARAGORIC E., ASTHMATIC TINCTURE; TINCTURA CAMPHORÆ COMPOSITA (B. P., Ph. L.), TINCTURA OPII CAMPHORATA (Ph. E. & D.), ELIXIR PAREGORICUM, L. *Prep.* 1. (B. P.) Opium, in coarse powder, 40 grs.; benzoic acid, 40 grs.; camphor, 30 grs.; oil of anise, ½ dr.; proof spirit, 20 oz.; macerate seven days, strain, wash the marc with spirit, and filter 20 oz.—*Dose.* 15 to 60 minims.

2. (Ph. L.) Camphor, 50 grs.; powdered opium, and benzoic acid, of each, 72 grs.; oil of aniseed, 1 fl. dr.; proof spirit, 1 quart; macerate for 7 days, and filter. The formulæ of the Ph. E. & D. are nearly similar. The oil of aniseed, probably one of the most useful and characteristic of the ingredients, was omitted in the Ph. L. 1824, but was restored in that of 1836.

3. (Wholesale.) From powdered opium, 3 oz.; benzoic acid, camphor, and oil of aniseed, of each, 2 oz.; rectified spirit and water, of each, 3 galls.; as before.

Obs. This tincture is a popular and excellent pectoral and anodyne, where there are no inflammatory symptoms.—*Dose.* ½ to 2 fl. drs.; in troublesome coughs, &c. ½ fl. oz. contains about 1 gr. of opium.

Tincture of Canthar'ides. *Syn.* TINCTURA CANTHARIDIS (B. P., Ph. L. E. & D.), TINCTURA LYTTÆ, L. *Prep.* 1. (B. P.) Cantharides, in coarse powder, 1; proof spirit, 80; macerate, agitating occasionally, for seven days, in a closed vessel, strain, press, filter, and add sufficient proof spirit to make up 80.—*Dose.* 5 to 20 minims.

2. (Ph. L.) Powdered cantharides, 4 drs. (½ oz.—Ph. D.), and strain, with expression.

3. (Wholesale.) From powdered cantharides, 2½ oz.; rectified spirit and water, of each, ½ gall.; as the last.—*Dose.* 10 drops, gradually raised to 1 fl. dr., in any bland liquid; in fluor albus, gleets, incontinence of urine, lepra, &c. It should be used with caution. The Ed. College recommends it to be prepared by displacement.

Tincture of Capsicum. *Syn.* TINCTURE OF CAYENNE PEPPER, TINCTURA CAPSICI (B.P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Capsicum, bruised, 1; rectified spirit, 27; macerate 48 hours with three fourths of the spirit, agitating occasionally, pack in a percolator, and let it drain, then pour on the remaining spirit; as soon as it ceases to drop, wash the marc with spirit to make up 27.—*Dose.* 10 to 20 minims.

2. (Ph. L.) Capsicum, bruised, 10 drs.; proof spirit, 1 quart; digest 14 days (or percolate—Ph. E.).—*Dose.* 10 to 60 drops; in atonic dyspepsia, scarlet fever, ulcerated sore throat, &c. It is also made into a gargle.

3. (Ph. D.) Cayenne pods, bruised, 1½ oz.; proof spirit, 1 pint; macerate for 14 days. This is of fully twice the strength of the preceding.

Tincture of Capsicum (Concentrated). See ESSENCES.

Tincture of Card'amoms. *Syn.* TINCTURA CARDAMOMI (Ph. E.), TINCT. AMOMI REPENTIS, L. *Prep.* (Ph. L. 1836.) Cardamom seeds, 3½ oz. (4½ oz.—Ph. E.); proof spirit, 1 quart; digest for 14 days (or percolate—Ph. E.).

Obs. The shells should be sifted from the seeds before maceration, and the latter are preferably ground in a pepper-mill instead of being bruised in a mortar. Aromatic and carminative.—*Dose.* 1 to 2 fl. drs., as an adjunct to purgative mixtures.

Tincture of Cardamoms (Compound). *Syn.* STOMACHIC TINCTURE; TINCTURA CARDAMOMI COMPOSITA (B. P., Ph. L. E. & D.), TINCTURA STOMACHICA, L. *Prep.* 1. (B. P.) Cardamom seeds, freed from their pericarps, bruised, 1; caraway, bruised, 1; raisins, freed from their seeds, 8; bruised cinnamon, 2; cochineal, in powder, ½; proof spirit, 80; macerate 48 hours with ¾ of the spirit, agitating occasionally, pack in a percolator, and let it drain, pour upon it the remainder of the spirit, and, when it ceases to drop, press, wash the marc with spirit to make up 80.—*Dose.* ½ to 2 drs.

2. (P. L.) Cardamoms (without the shells), caraways, and cochineal, of each, bruised, 2½ drs.; cinnamon, bruised, 5 drs.; raisins, stoned, 5 oz.; proof spirit, 1 quart; macerate 7 days, then strain, with expression.

3. (Ph. E., and Ph. L. 1836.) As the last, but using only 1 dr. of cochineal, and macerating 14 days; or, "it may be prepared by the method of displacement." (Ph. E.)

4. (Wholesale.) From cardamoms and caraway seeds, of each, 4 oz.; cochineal (s. g.), 6 oz.; cassia, 8 oz.; sultana raisins, 5 lbs.; proof spirit, 4 galls. (or rectified spirit and water, of each, 2 galls.); macerate, &c., as before.

Obs. The Dublin College omitted the cochineal and raisins in their Ph. of 1826, but have restored them in their new one. The order of the London College to stone the raisins is seldom adopted in practice; by which the tincture is rendered unfit to be employed in dispensing prescriptions containing quinine or other alkaloids. When pharmaceutists are too lazy to follow the instructions in their Pharmacopœia, they had better use sultana raisins, which have no stones.—*Dose.* 1 to 4 fl. drs.; as a cordial and stomachic, but chiefly as an adjunct, for its colour and flavour.

Tincture of Cascaril'la. *Syn.* TINCTURA CASCARILLÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Cascarilla, bruised, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally; pack in a percolator, let it drain, and pour on the remainder of the spirit, and, when it ceases to drop, wash the marc, press, filter, and make up 8.—*Dose.* ½ to 2 drms.

2. (Ph. L.) Cascarilla, bruised, 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.; or percolate—Ph. E.). An excellent tonic and stomachic; chiefly employed as an adjunct to mixtures, &c.—*Dose.* 1 to 2 fl. drs.

Tincture of Cas'sia. *Syn.* TINCTURE CASSIÆ (Ph. E.), L. *Prep.* (Ph. E.) Cassia, 3½ oz.; proof spirit, 1 quart; macerate for 7 days, or percolate. Stomachic and carminative.—*Dose.* 1 to 2 fl. drs.

Tincture of Castor. *Syn.* TINCTURA CASTOREI (B. P., Ph. L. & E.), TINCT. CASTOREI ROSSICI, L. *Prep.* 1. (B. P.) Castor, in coarse powder, 1; rectified spirit, 20; macerate seven days, strain, and wash the marc with spirit sufficient to make up to 20.—*Dose.* ½ to 1 dr.

2. (Ph. L.) Castor, bruised, 2½ oz.; rectified spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.).

Obs. The Dublin College ordered Russian castor in their Ph. of 1826; but the scarcity and high price of that variety, we fear, too often precludes its use. The tincture of the shops is usually made with only 8 oz. of castor to the gal. of proof spirit. Nervine and antispasmodic.—*Dose.* 20 drops to 2 fl. drs.; in hysteria, epilepsy, &c.

Tincture of Castor (Ammo"niated). *Syn.* ELIXIR FŒTIDUM, TINCTURA CASTOREI COMPOSITA, T. C. AMMONIATA (Ph. E.), L. *Prep.* (Ph. E.) Castor, bruised, 2½ oz.; assafœtida, in small fragments, 10 drs.; spirit of ammonia, 1 quart; digest 7 days in a well-closed vessel. Stimulant and antispasmodic.—*Dose* and *uses*, as the last. With the addition of ½ oz. of opium, it forms the Elixir Uterinum, or Elixir Castorei Thebaicum of foreign Pharmacopœias.

Tincture of Cat'echu. *Syn.* COMPOUND TINCTURE OF CATECHU; TINCTURA CATECHU COMPOSITA (Ph. L.), T. CATECHU (B. P., Ph. E. & D.), L. *Prep.* 1. (B.P.) Pale catechu, in coarse powder, 2½; cinnamon, bruised, 1; proof spirit, 20: macerate for seven days with agitation, strain, press, and filter, and add spirit to make up 20.—*Dose.* ½ to 2 drms.

2. (Ph. L.) Catechu, in powder, 3½ oz. (4 oz.—Ph. D.); cinnamon, bruised, 2½ oz. (2 oz. —Ph. D.); proof spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.).

3. (Wholesale.) From catechu, 2 lbs.; oil of cassia, 3 fl. drs.; rectified spirit and water, of each, 1 gal.; macerate for 10 days.—*Dose.* 1 to 2 fl. drs., as a warm astringent; in diarrhœa, &c., either alone, or combined with chalk.

Tincture of Chiret'ta. *Syn.* TINCTURA CHIRAYTÆ (B. P.), TINCTURA CHIRAYTÆ, T. CHIRETTÆ (Ph. D.), L. *Prep.* (B. P.) Chiretta, cut small and bruised, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator and let it drain, then pour on the remaining spirit; when it ceases to drop, press, and wash the marc with spirit to make up 8.—*Dose.* 15 to 60 minims; B. Ph. dose ½ to 2 drs.

2. (Ph. D.) Chiretta or chirayta (bruised), 5 oz.; proof spirit, 1 quart; macerate for 14 days. Tonic and stomachic.—*Dose.* ½ to 2 fl. drs.

Tincture of Cinchona. *Syn.* TINCTURE OF BARK; TINCTURA CINCHONÆ (B. P., Ph. L. E. & D.), T. CORTICIS PERUVIANI, T. C. P. SIMPLEX, L. *Prep.* 1. (B. P.) Yellow cinchona bark, in coarse powder, 4; proof spirit, 20; macerate 48 hours with 15 of the spirit, agitating occasionally, pack in a percolator and let it drain, then pour on the remaining spirit, and when it ceases to drop, press, and wash the marc with spirit to make 20.—*Dose.* 1 to 2 drms.

2. (Ph. L.) Yellow cinchona bark (bruised), 8 oz.; proof spirit, 1 quart; macerate for 14 days (or percolate—Ph. E.).

Obs. The Dublin College orders pale bark, and the Edinburgh either species, according to prescription.—*Dose.* 1 to 3 fl. drs.; as a tonic, stomachic, and febrifuge.

Tincture of Cinchona (Pale). *Syn.* TINCTURE OF PALE BARK; TINCTURA CINCHONÆ PALLIDÆ (Ph. L.), L. *Prep.* From pale bark, as the last.

Tinctura of Cinchona (Compound). *Syn.* COMPOUND TINCTURE OF BARK, HUXHAM'S T. OF B., FEVER TINCTURE; TINCTURA CINCHONÆ COMPOSITA (B. P.), TINCTURA CINCHONÆ COMPOSITÆ (Ph. L. E. & D.), TINCT. CORTICIS PERUVIANI COMPOSITA, L. *Prep.* 1. (B. P.) Pale cinchona bark, in coarse powders; bitter orange peel, cut small and bruised, 2; serpentary, bruised, 1; Saffron, ¼;

cochineal, ½; proof spirit, 40: macerate 48 hours with 30 of spirit, agitating occasionally, pack in a percolator and let it drain, then pour on the remainder of the spirit; when it ceases to drop, press, and wash the marc with spirit to make up 40.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Pale bark, bruised, 4 oz.; dried bitter orange-peel, 3 oz. (2 oz.—Ph. D.); serpentary root, bruised, 6 drs.; hay saffron, 2 drs.; cochineal, in powder, 1 dr.; macerate for 7 days (14 days—Ph. D.; or percolate—Ph. E.); press, and filter.

3. (Wholesale.) From pale bark, 3½ lbs.; dried orange peel, 2 lbs.; serpentary root, 4 oz.; hay saffron, 1 oz.; cochineal, ½ oz.; proof spirit, 4 galls, (or rectified spirit and water, of each, 2 galls.); macerate for 14 days.

Obs. In the Ph. E. yellow bark is ordered. *Dose* and *use*, as the last.

Tincture of Cinna'mon. *Syn.* TINCTURA CINNAMOMI (B. P., Ph. L. & E.), L. *Prep.* 1. (B. P.) Cinnamon, in coarse powder, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator and let it drain, then pour on the remaining spirit; when it ceases to drop, press, and wash the marc with spirit to make up 8.

2. (Ph. L.) Cinnamon, bruised, 3½ oz.; proof spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.). In the shops cassia is usually substituted for cinnamon, and spirit 26 u. p. for proof spirit.—*Dose.* 1 to 4 fl. drs.; as a cordial, aromatic, and stomachic.

Tincture of Cinnamon (Compound). *Syn.* AROMATIC TINCTURE; TINCTURA CINNAMOMI COMPOSITA (Ph. L. E. & D.), T. AROMATICA, L. *Prep.* 1. (Ph. L.) Cinnamon, bruised, 1 oz.; cardamoms (bruised, without the shells), ½ oz.; long pepper and ginger, of each, 2½ drs.; proof spirit, 1 quart; digest for 7 days (or percolate—Ph. E.). The Ph. E. omits the ginger, and uses ½ oz. more cardamoms.

2. (Ph. D.) Cinnamon, 2 oz.; cardamoms, 1 oz.; ginger, ½ oz.; proof spirit, 1 quart; macerate for 14 days. The following form is current in the wholesale houses.

3. Cassia, 1 lb.; cardamoms, 6 oz.; long pepper and ginger, of each, ¼ lb.; oil of cassia, 1½ fl. drs.; proof spirit, 4 galls. (or rectified spirit and water, of each, 2 galls.). Cordial, aromatic, stomachic.—*Dose.* 1 to 2 fl. drs.; in atonic gout, debility, flatulence, &c.

Tincture of Cochineal. *Syn.* TINCTURA COCCI CACTI (Ph. D.), L. *Prep.* 1. (B. P.) Cochineal, in powder, 1; proof spirit, 8; macerate 7 days; strain, and wash the marc with spirit to make up 8.—*Dose.* 30 to 90 minims twice a day. (*Used* chiefly for colouring medicines.)

2. (Ph. D.) Cochineal, in fine powder, 2 oz.; proof spirit, 1 pint. Antispasmodic and sedative; but chiefly employed for its colour.—*Dose.* ½ to 2 fl. drs.

Tincture of Col'chicum. *Syn.* GOUT TINCTURE, TINCTURE OF MEADOW SAFFRON; TINCTURA COLCHICI SEMINUM (B. P.); TINCTURA COLCHICI (Ph. L. & E.), T. SEMINUM COLCHICI (Ph. D.), L. *Prep.* 1. Colchicum seed, bruised, 1; proof spirit, 8: macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator, and let it drain, then pour on the remainder of the spirit; when it ceases to drop, wash the marc with spirit to make up 8.—*Dose.* 15 to 30 minims.

2. (Ph. L.) Seeds of meadow saffron (Colchicum autumnale), bruised (finely ground in a coffee-mill—Ph. E.), 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.; or percolate—Ph. E.); then press, and filter.—*Dose.* 15 to 20 drops to 1 fl. dr.; in gout, &c.

Tincture of Colchicum (Compound). *Syn.* TINCTURA COLCHICI COMPOSITA (Ph. L.), SPIRITUS COLCHICI AMMONIATUS, L. *Prep.* (Ph. L.) Colchicum seeds, bruised, 5 oz.; aromatic spirit of ammonia, 1 quart; digest for 7 days, then press, and filter.—*Dose.* 20 drops to 1 fl. dr.; in gout, &c.

Tincture of Colchicum Flowers. *Syn.* TINCTURA FLORUM COLCHICI; EAU MEDICINALE D'HUSSON (Dr. Wilson). *Prep.* Take of the fresh juice of colchicum flowers, 2 parts; French brandy (or proof spirit), 1 part; mix, and in a few days decant, or filter, and preserve it in small bottles in a cool place.

Tincture of Copai'ba (Alkaline). *Syn.* TINCTURA COPAIBÆ ALKALINE, L. *Prep.* (Lewis Thompson.) Dissolve carbonate of potassa, 2 oz., in water, 1 pint, and add to this balsam of copaiba, in a thin stream, constantly stirring, until the mixture, at first white and milky, becomes clear, like jelly or amber, which will generally take place when about a pint of balsam has been added; set the mixture aside for two or three hours, then pour in of rectified spirit, 1 quart, and mix the whole together. Sweet spirit of nitre may be substituted for spirit of wine, provided it does not contain free acid.—*Dose.* 1 to 2 teaspoonfuls.

Tincture of Cu'bebs. *Syn.* ESSENCE OF CUBEBS; TINCTURA CUBEBÆ (B. P., Ph. L. & D.), TINCTURA PIPERIS CUBEBÆ, L. *Prep.* 1. (B. P.) Cubebs, in powder, 1; rectified spirit, 8: macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator and let it drain; pour on the remaining spirit, and when it ceases to drop, wash the marc with spirit to make up 8.—*Dose.* 1 to 2 drs.

2. (Ph. L.) Cubebs (bruised or ground in a pepper-mill), 1 lb.; proof spirit, 1 quart; macerate for 7 days, press out the liquor, and filter.—*Dose.* ½ to 1 fl. dr., three or four times a day, in gonorrhœa, &c.

3. (Ph. D., & Ph. L. 1836.) Cubebs, 5 oz.; rectified spirit, 1 quart (proof spirit—Ph. D. 1826); macerate for 14 days.—*Dose.* 1 to 2 fl. drs.

Tincture of Cuspa'ria. *Syn.* TINCTURA CUSPARIÆ (Ph. E.), T. ANGOSTURÆ, L. *Prep* (Ph. E.) Angostura bark or cusparia, 4½ oz.; proof spirit, 1 quart; digest or percolate

Tonic, stimulant, and stomachic.—*Dose.* 1 to 2 fl. drs.

Tincture of Deadly Nightshade. Tincture of belladonna.

Tincture, De Coetlogon's. Haffenden's tincture.

Tincture of Digita'lis. Tincture of fox-glove.

Tincture of Elecampane'. *Syn.* TINCTURA INULÆ, T. HELENII, L. *Prep.* (P. Cod.) Powdered elecampane, 4 oz.; proof spirit, 1 pint; macerate for 15 days. Tonic, deobstruent, and expectorant.—*Dose.* ½ to 2 fl. drs.; in dyspepsia, palsy, dropsies, uterine obstructions, &c.

Tincture of Er'got. *Syn.* TINCTURA SECALII CORNUTI TINCTURA ERGOTÆ (B. P., Ph. D.), L. *Prep.* 1. (B. P.) Ergot, bruised, 1; proof spirit, 4: macerate 48 hours with 3 of the spirit, agitating occasionally, pack in a percolator, let it drain, then pour on the remaining spirit; when it ceases to drop, wash the marc with the spirit to make up 4.—*Dose.* 15 to 60 minims.

2. (Apothecaries' Hall.) Ergot (ground in a coffee-mill), 2½ oz.; proof spirit, 1 pint; digest for 7 days.—*Dose.* A teaspoonful; to excite the action of the uterus in labour.

3. (Ph. D.) Ergot, 8 oz.; proof spirit, 1 quart; macerate for 14 days, and strain, with expression.—*Dose.* 20 drops to 1 fl. dr.; as the last.

Tincture of Ergot (Ethereal). *Syn.* TINCTURA ERGOTÆ ÆTHEREA (Ph. L.), L. *Prep.* (Ph. L.) Ergot, bruised, 15 oz.; ether, 1 quart; macerate for 7 days, press, and filter.—*Dose.* 10 drops to 1 fl. dr.

Tincture of Fox'glove. *Syn.* TINCTURA DIGITALIS (Ph. L. E. & D.), L. *Prep.* (Ph. L.) Dried foxglove leaves, 4 oz. (5 oz.—Ph. D.); proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.; or percolate—Ph. E.); then press, and strain.

Obs. This tincture is a powerful sedative, diuretic, and narcotic. The commencing dose should be 10 drops, gradually and cautiously increased to 30, or even 40; in asthmas, dropsies, fevers, phthisis, &c. "If 40 fl. oz. of spirit be allowed to pass (percolate) through, the sp. gr. will be ·944; and the solid contents of 1 fl. oz. will amount to 24 gr." (Ph. E.)

Tincture of Gal'banum. *Syn.* TINCTURA GALBANI, L. *Prep.* (Ph. D. 1826.) Galbanum, 2 oz.; proof spirit, 32 fl. oz.; digest 7 days. Stimulant and antispasmodic.—*Dose.* 1 to 3 fl. drs. "If less nauseous than tincture of assafœtida, it is also less powerful." (Dr. A. T. Thomson.)

Tincture of Galls. *Syn.* TINCTURA GALLÆ (B. P., Ph. L. & D.), TINCTURA GALLARUM (Ph. E.), L. *Prep.* 1. (B. P.) Galls, bruised, 1; proof spirit, 8: macerate for 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator, let it drain, and then pour on the remaining spirit; when it ceases to drop, wash the marc with spirit to make up 8.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Galls, in powder, 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.); or percolate—Ph. E.); then express the liquid, and filter it. Astringent and styptic.—*Dose.* ½ to 2 fl. drs. It is chiefly used as a test for iron.

Tincture of Gen'tian (Compound). *Syn.* BITTER STOMACHIC TINCTURE; TINCTURA GENTIANÆ COMPOSITA (B. P., Ph. L. E. & D.), TINCTURA AMARA, L. *Prep.* 1. (B. P.) Gentian, bruised, 1½; bitter orange peel, bruised, ¾; cardamom seeds, bruised, ¼; proof spirit, 20; macerate for 48 hours with 15 of the spirit, agitating occasionally, pack in a percolator, let it drain, and then pour on the remaining spirit; when it ceases to drop, wash the marc with spirit to make up 20.—*Dose.* 1 to 2 drs.

2. (Ph. L.) Gentian root, sliced and bruised, 2½ oz.; dried orange peel, 10 drs.; cardamoms, bruised, 5 drs.; proof spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.). The Edinburgh College substitutes canella for cardamoms, and adds of cochineal, ½ dr.

3. (Ph. D.) Gentian root, 3 oz.; dried bitter orange peel, 1½ oz.; cardamoms, ½ oz.; proof spirit, 1 quart; macerate for 14 days.

4. (Wholesale.) Gentian, 2½ lbs.; dried orange peel, 1¼ lb.; bruised cardamoms, 2½ lbs.; proof spirit, 4 galls. (or rectified spirit and water, of each, 2 galls.); digest as last.

Obs. This is an elegant and popular stomachic bitter and tonic.—*Dose.* 1 to 2 fl. drs.; in dyspepsia, loss of appetite, &c.

Tincture of Gentian (Ammoniated). *Syn.* TINCTURA GENTIANÆ AMMONIATÆ, L.; ELIXIR ANTISCROFULEUX, Fr. *Prep.* (P. Cod.) Gentian, 1 oz.; sesquicarbonate of ammonia, ¼ oz.; proof spirit, 32 fl. oz. As the last; but preferred in acidity and low spirits.

Tincture of Gin'ger. *Syn.* TINCTURA ZINGIBERIS (B. P., Ph. L. E. & D.). *Prep.* 1. (B. P.) Ginger, bruised, 1; rectified spirit, 8; macerate the ginger 48 honrs in 6 of the spirit, agitating occasionally; pack in a percolator, let it drain, pour on the remaining spirit, and when it ceases to drop press, filter, and add spirit to make 8.—*Dose.* 10 to 30 minims.

2. (Ph. L.) Ginger, bruised, 2½ oz.; rectified spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.).

3. (Wholesale.) Coarsely powdered unbleached Jamaica ginger, 1¼ lb.; rectified spirit (or spirit distilled from the essence), 1½ gal.; water, ½ gal.; digest as above. Stimulant and carminative.—*Dose.* 1 to 2 fl. drs.

Obs. The formula of the Ph. D. 1826 resembles the above; that of the last Ph. D. orders 8 oz. of ginger to 1 quart of rectified spirit. The product is, consequently, of fully 3 times the strength of that of the others; and is similar to the common ESSENCE OF GINGER of the shops.

Tincture, Gout. *Syn.* TINCTURA ANTARTHRITICA, L. *Prep.* 1. (Dr. Graves's.) Take of dried orange peel and powder of aloes and

canella, of each, 2 oz.; rhubarb, 1 oz.; French brandy (or proof spirit), 1 quart; digest a week, and strain, with expression.—*Dose.* 1 to 2 teaspoonfuls, night and morning.

2. (Dr. Wilson's.) Tincture of colchicum flowers.

3. Tincture of colchicum.

Tincture of Gua'iacum. *Syn.* TINCTURA GUAIACI (Ph. E. & D.), L. *Prep.* (Ph. E., & Ph. L. 1836.) Guaiacum resin (powdered), 7 oz. (8 oz.—Ph. D.); rectified spirit, 1 quart; digest for 14 days, and filter. An excellent sudorific; in chronic gout and rheumatism.—*Dose.* 1 to 3 fl. drs., taken in milk.

Tincture of Guaiacum (Compound). *Syn.* AMMONIATED TINCTURE OF GUAIACUM, VOLATILE T. OF G., RHEUMATIC DROPS; TINCTURA GUAIACI COMPOSITA (Ph. L.), T. G. AMMONIATA (B. P., Ph. E.), L. *Prep.* 1. (B. P.) Guaiac resin, in fine powder, 4; aromatic spirit of ammonia, 20; macerate 7 days, filter, and wash the filter with the spirit to make up 20.—*Dose.* ½ to 1 dr., with 1 dr. of mucilage or yolk of egg, to form an emulsion.

2. (Ph. L.) Guaiacum, in coarse powder, 7 oz.; aromatic spirit of ammonia (spirit of ammonia—Ph. E.), 1 quart; digest for 7 days, and decant or filter. A powerful, stimulating sudorific and emmenagogue; in chronic rheumatism, gout, amenorrhœa, &c.—*Dose.* 1 to 2 fl. drs., in milk, or some viscid liquid.

Tincture, Haffenden's Balsam'ic. *Syn.* DE COETLOGON'S BALSAMII TINCTURE. This is a nostrum, of many virtues, prepared from tincture of serpentary (of double strength), 1½ fl. oz; compound of tincture of benzoin, 1 fl. oz.; tinctures of tolu and opium, of each, ½ fl. oz.; with rectified spirits, q. s. to render the mixture 'bright,' should it turn milky. ('Anat. of Quackery.')

Tincture, Hatfield's. *Prep.* From gum guaiacum and soap, of each, 2 drs.; rectified spirit, 1 pint; digest for a week. *Used* as TINCTURE OF GUAIACUM; also externally.

Tincture of Hel'lebore. *Syn.* TINCTURE OF BLACK HELLEBORE; TINCTURA HELLEBORI (Ph. L.), L. TINCTURA HELLEBORI NIGRI. *Prep.* (Ph. L.) Black hellebore root, bruised, 5 oz.; proof spirit, 1 quart; macerate 7 days, then strain, with expression.

Obs. This tincture is a powerful emmenagogue, and was a favourite remedy with Dr. Mead, in uterine obstructions and certain cutaneous affections.—*Dose.* 20 drops to ½ fl. dr. See TINCTURE OF VERATRUM.

Tincture of Hem'lock. *Syn.* TINCTURA CICUTÆ, T. CONII (Ph. L. & E.), T. CONII MACULATI, L. *Prep.* 1. (Ph. L.) Dried hemlock leaves, 5 oz.; proof spirit, 1 quart; digest a week, press, and filter. In the Ph. L. 1836, cardamom seeds, 1 oz., was added.

2. (Ph. E.) Fresh hemlock leaves, 12 oz.; express the juice, bruise the residuum, and treat it, by percolation, first with tincture of cardamoms, 10 fl. oz., and next with rectified spirit, 1½ pint; mix the liquids, and filter. Deobstruent and narcotic.—*Dose* of the Ph. L., 20 to 60 drops; that of the Ph. E. tincture is less, it being a much stronger and certain preparation. See HEMLOCK.

Tincture of Hemp. Tincture of Indian Hemp.

Tincture of Hen'bane. *Syn.* TINCTURA HYOSCYAMI (B. P., Ph. L. E. & D.). *Prep.* 1. (B. P.) Hyoscyamus leaves, dried and bruised, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, pack in a percolator, and when it has drained pour on the remaining spirit, and when it ceases to drop, press, and wash the marc with spirit to make up 8.—*Dose.* 15 to 60 minims.

2. (Ph. L.) Dried leaves of henbane, 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days,—Ph. D.; or percolate—Ph. E.), then press, and filter. Anodyne, sedative, soporific, and narcotic.—*Dose.* 20 drops to 2 fl. drs.

Obs. This, as well as the TINCTURES OF FOXGLOVE, HEMLOCK, HOPS, JALAP, LOBELIA INFLATA, RHATANY, SAVINE, SQUILLS, SENNA, VALERIAN WORMWOOD, &c., is usually prepared by the druggists with 1 lb. of the dried leaves (or dried drugs) to each gal. of a mixture of equal parts of rectified spirit and water.

Tincture of Hops. *Syn.* TINCTURA LUPULI (B. P., Ph. L. & E.), TINCTURA HUMULI, L. *Prep.* 1. (B. P.) Hop, 1; proof spirit, 8; macerate 48 hours in 6 of the spirit, agitating occasionally, pack in a percolator, let it drain, add the remaining spirit, and when fluid ceases to drop, wash the marc, filter, and make up 8. —*Dose.* ½ to 2 drs.

2. (Ph. E.) Hops, 6 oz.; proof spirit, 1 quart; digest 7 days, then press, and filter. Anodyne, sedative, and soporific.—*Dose.* ½ to 2 fl. drs. For the formula of the Ph. E. and D., see TINCTURE OF LUPULIN.

Tincture, Hudson's. Tooth tincture.

Tincture, Huxham's. Compound tincture of cinchona.

Tincture of Indian Hemp. *Syn.* TINCTURA CANNABIS INDICÆ (B. P.), TINCTURA CANNABIS, T. C. INDICÆ (Ph. D.), L. *Prep.* 1. (B. P.) Extract of Indian hemp, 1; rectified spirit, 20; dissolve.—*Dose.* 5 to 20 minims with 1 dr. of mucilage, adding 1 oz. of water.

2. (Ph. D.) Purified extract of Indian hemp, ½ oz.; rectified spirit, ½ pint; dissolve. 21 drops (minims) contains 1 gr. of the extract.

Obs. The formulæ of O'Shaughnessy and the Bengal Ph. are similar.—*Dose.* 10 drops, every ½ hour, in cholera; 1 fl. dr., every ½ hour, in tetanus, till the paroxysms cease, or catalepsy is induced.

Tincture of Indian Tobac'co. Tincture of lobelia.

Tincture of I'odine. *Syn.* TINCTURA IODINEI (Ph. E.), TINCTURA IODINII, L. *Prep.* (Ph. E.) Iodine, 2½ oz.; rectified spirit, 1 quart; dissolve, and preserve it in well-closed bottles.—*Dose.* 5 to 30 drops, twice or

thrice daily, where the use of iodine is indicated. Externally, as a paint, &c.

Obs. The formulæ of Magendie, the Ph. U. S., and the Paris Codex, are similar.

Tincture of Iodine (Compound). *Syn.* ANTISCROFULOUS DROPS; TINCTURA IODI (B. P.), TINCTURA IODINII COMPOSITA (Ph. L. & D.), L. *Prep.* 1. Iodine, ½; iodide of potassium, ½; rectified spirit, 20; dissolve.—*Dose.* 5 to 20 minims. Also an excellent application to the throat in diphtheria.

2. (Ph. L. & D.) Iodine, 1 oz.; iodide of potassium, 2 oz.; rectified spirit, 1 quart; dissolve.—*Dose*, &c., as the last.

Tincture of Ipecacuan'ha. *Syn.* TINCTURA IPECACUANHA, L. *Prep.* (Ph. Bor.) Ipecacuanha (coarsely powdered), 1 oz.; spirit, sp. gr. ·897 to ·900 (16 to 17 o. p.), 8 oz.; macerate for 8 days. The tincture of the P. Cod. has twice its strength.—*Dose.* 10 or 12 drops to 2 fl. drs., according to the intention.

Tincture of Jal'ap. *Syn.* TINCTURA JALAPÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Jalap, in coarse powder, 1; proof spirit, 8; macerate for 48 hours in six of the spirit, agitating occasionally, pack in a percolator, and when the fluid ceases to pass, pour on the remaining spirit, press, filter, and add spirit to make 8.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Jalap, coarsely powdered, 5 oz. (10 oz.—Ph. L. 1836; 7 oz.—Ph. E.); proof spirit, 1 quart, (1½ pint, —Ph. D.); macerate for 7 days (or percolate—Ph. E.), then press, and filter. Carthartic.—*Dose.* 1 to 4 fl. drs.

Tincture of Ki'no. *Syn.* TINCTURA KINO (B. P., Ph. L. & E.), L. *Prep.* 1. (B. P.) Kino, in powder, 1; rectified spirit, 10; macerate 7 days, filter, and make up 10.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Powdered kino, 3½ oz.; rectified spirit, 1 quart; macerate for 7 days (or percolate—Ph. E.), and filter. Astringent.—*Dose.* 1 to 2 fl. drs., combined with chalk mixture; in diarrhœa, &c.

Tincture of Lactuca''rium. *Syn.* TINCTURA LACTUCARII, L. *Prep.* (Ph. E.) Powdered lactucarium, 4 oz.; proof spirit, 1 quart; digest or percolate. Anodyne, soporific, antispasmodic, and sedative.—*Dose.* 20 to 60 drops; in cases for which opium is unsuited. 10 drops (minims) contain 1 gr. of lactucarium.

Tincture of Lav'ender (Compound). *Syn.* RED LAVENDER, RED LAVENDER DROPS, RED HARTSHORN; TINCTURA LAVENDULÆ COMPOSITA (B. P., Ph. L. & D.), SPIRITUS LAVANDULÆ COMPOSITUS (Ph. E.), L. *Prep.* 1. (B. P.) English oil of lavender, 90 minims; English oil of rosemary, 10 minims; cinnamon, bruised, 150 grs.; nutmeg, bruised, 150 grs.; red sandal wood, 300 grs.; rectified spirit, 40 oz.; macerate the cinnamon, nutmeg, and red sandal-wood in the spirit for 7 days, then press out and strain; dissolve the oils in the strained tincture and add sufficient rectified spirit to make 40 oz.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Cinnamon and nutmegs, of each, bruised, 2½ drs.; red sanders wood, sliced, 5 drs,; rectified spirit, 1 quart; macerate for 7 days, then strain, with expression, and dissolve in the strained liquid, oil of lavender, 1½ fl. dr., oil of rosemary, 10 drops.

3. (Ph. L. 1836.) Spirit of lavender, 1½ pint; spirit of rosemary, ½ pint; red sanders wood (rasped), 5 drs.; cinnamon and nutmegs (bruised), of each, 2½ drs.; macerate for 14 days.

4. (Ph. E.) Spirit of lavender, 1 quart; spirit of rosemary, 12 fl. oz.; cinnamon, 1 oz.; nutmeg, ½ oz.; red sanders, 3 drs.; cloves, 2 drs.; as No. 1.

5. (Ph. D.) Oil of lavender, 3 fl. drs.; oil of rosemary, 1 fl. dr.; cinnamon, 1 oz.; nutmegs, ½ oz.; cloves and cochineal, of each, ¼ oz.; rectified spirit, 1 quart; macerate for 14 days.

6. (Wholesale.) From oil of cassia, ¾ fl. oz.; oil of nutmeg, 1 fl. oz.; oils of lavender and rosemary, of each, 4½ fl. oz.; red sanders (rasped), 3 lbs.; proof spirit, 6 galls. (or rectified spirit and water, of each, 3 galls.); digest 14 days. Should it be cloudy, add a little more proof spirit.

Obs. Compound tincture of lavender is a popular stimulant, cordial, and stomachic.—*Dose.* 1 to 3 teaspoonfuls (½ to 2 fl. drs.); in lowness of spirits, faintness, flatulence, hysteria, &c.

Tincture of Lem'ons. *Syn.* TINCTURA LIMONUM (Ph. L.), TINCTURA LIMONIS (B. P., Ph. D., Ph. L.), L. *Prep.* 1. (B. P.) Fresh lemon peel, sliced thin, 1; proof spirit, 8; macerate for 7 days in a closed vessel with occasional agitation, strain, press, filter, and make up with spirit to 8.—*Dose.* ½ to 2 drs.

2. Fresh lemon peel, 3½ oz. (cut thin, 5 oz. —Ph. D.); proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.), then express the liquid, and filter it. An aromatic bitter and stomachic.—*Dose.* ½ to 2 fl. drs.

Tincture of Lobe''lia. *Syn.* TINCTURE OF INDIAN TOBACCO; TINCTURA LOBELIÆ INFLATÆ, TINCTURA LOBELIÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Lobelia, dried and bruised, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator, and let it drain, pour on the remaining spirit, and when it ceases to drop, press and wash the marc with spirit to make up 8.—*Dose.* 10 to 30 minims, but 1 dr. may be given for dyspnœa; 4 drs. as an emetic.

2. (Ph. L.) Dried and powdered lobelia inflata, 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.; or percolate—Ph. E.), press, and filter.—*Dose.* As an expectorant, 10 to 60 drops; as an emetic and antispasmodic, 1 to 2 fl. drs., repeated every third hour until it causes vomiting. It is

principally employed in spasmodic asthma, and some other pulmonary affections.

Tincture of Lobelia (Ethereal). *Syn.* TINCTURA LOBELLÆ ÆTHEREA (B. P., Ph. L. & E.), L. *Prep.* 1. Lobelia, dried and bruised, 1; spirit of ether, 8; macerate 7 days, press, and strain 8.—*Dose.* 10 to 30 minims as an antispasmodic.

2. (Ph. L.) Indian tobacco, powdered, 5 oz.; ether, 14 fl. oz.; rectified spirit, 26 fl. oz.; macerate 7 days, press, and filter.

3. (Ph. E.) Dry lobelia, 5 oz.; spirit of sulphuric ether, 1 quart; by digestion for 7 days, or by percolation.—*Dose.* 6 or 8 drops to 1 fl. dr.

4. (Whitlaw's.) From lobelia, 1 lb.; rectified spirit and spirit of nitrous ether, of each, 4 pints; sulphuric ether, 4 oz.—*Dose*, &c., as the last.

Tincture of Lu'pulin. *Syn.* TINCTURE OF HOPS; TINCTURA LUPULI (Ph. E.), TINCTURÆ LUPULINÆ (Ph. D.) L. *Prep.* (Ph. D). Lupulin (the yellowish-brown powder attached to the scales of hops, separated by friction and sifting), 5 oz.; rectified spirit, 1 quart; macerate for 14 days (or proceed by displacement—Ph. E.), press, and filter. —*Dose.* ½ to 2 fl. drs. See TINCTURE OF HOPS.

Tincture of Mat'ico. *Syn.* TINCTURA MATICO (Ph. D.), L. *Prep.* (Ph. D.) Matico leaves, in coarse powder, 8 oz.; proof spirit, 1 quart; macerate for 14 days, and strain, with expression.—*Dose.* ½ to 2 fl. drs., as an internal astringent or hæmostatic. It is a very feeble remedy, as matico leaves are destitute of either tannin or gallic acid, and derive their power of stopping local bleeding from the peculiar mechanical construction of their surface.

Tincture of Mea'dow Saffron. Tincture of colchicum.

Tincture of Mone'sia. *Syn.* TINCTURA MONESIÆ, L. *Prep.* From monesia, 2½ oz.; proof spirit, 1 pint; macerate a week. Astringent.—*Dose.* ½ to 2 fl. drs.

Tincture of Musk. *Syn.* TINCTURA MOSCHI, L. *Prep.* (Ph. D. 1826.) Musk, 2 drs.; rectified spirit, 16 fl. oz.; digest 7 days. Antispasmodic; but principally used as a perfume, being too weak for medical use.

Tincture of Myrrh. *Syn.* GOLDEN TOOTH-DROPS; TINCTURÆ, (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Myrrh, in coarse powder, 1; rectified spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator, and when it ceases to drop, pour on the remaining spirit, wash the marc, press, and make up to 8.—*Dose.* ½ to 1 dr. More frequently *used* mixed with water to form a gargle.

2. (Ph. L.) Myrrh, in powder, 3 oz. (3½ oz., Ph. E.; 4 oz.,—Ph. D.; rectified spirit, 1 quart; macerate for 7 days (14 days,—Ph. D.; or by displacement—Ph. E.), and filter.

3. (Wholesale.) Myrrh (in coarse powder), 2¼ lbs.; rectified spirit, 2 galls.; water, 1 gal.; as the last.

Obs. Tincture of myrrh is tonic and stimulant.—*Dose.* ½ to 1 fl. dr., as an adjuvant in mixtures, gargles, &c. Chiefly *used* diluted with water, as a dentifrice or wash for ulcerated and spongy gums.

Tincture of Myrrh. (Compound). *Syn.* TINCTURA MYRRHÆ COMPOSITA, L. *Prep.* From myrrh and Socotrine aloes, of each, 2 lbs.; rectified spirit, 3 galls.; water, 2 galls.; digest for 14 days. This is frequently substituted for 'COMPOUND TINCTURE OF ALOES' in the wholesale trade.

Tincture of Nux Vomi'ca. *Syn.* TINCTURA NUCIS VOMICÆ, L. *Prep.* 1. Nux vomica, 1 rectified spirit, 10; soften the nux vomica by steam, dry rapidly, and reduce to fine powder. Macerate 48 hours in three fourths of the spirit, agitating occasionally, pack in a percolator, let it drain, pour on the remaining spirit, and when it ceases to drop, press, filter, and make up to 10.—*Dose.* 10 to 30 minims.

2. (Ph. D. 1826.) Nux vomica (ground in a coffee-mill), 2 oz.; rectified spirit, 8 fl. oz.; macerate 7 (14) days.—*Dose.* 5 to 20 drops; in paralysis, &c. It is poisonous.

Tincture, Odontal'gic. *Syn.* TOOTHACHE TINCTURE; TINCTURA ODONTALGICA, L. *Prep.* 1. Tincture of opium, 1 fl. dr.; ether, 2 fl. drs.; oil of cloves, 15 drops.

2. Rectified spirit, 3 fl. drs.; chloroform, 2 drs.; creasote, 1 dr.; mix.

3. (Collier.) Pellitory of Spain, 4 drs.; camphor, 3 drs.; opium, 1 dr.; oil of cloves, 2 fl. drs.; rectified spirit, 16 fl. oz.; digest for a week.

4. (Niemann.) Digest 60 or 80 common lady-birds (*Coccinella septempunctata*,—Linn.) in rectified spirit, 1 fl. oz., for 8 days, and strain.

Obs. The above are commonly applied, on a small piece of lint, in toothache. For other formulæ see DROPS, TINCTURES OF MYRRH and PELLITORY, &c.

Tincture of O'pium. *Syn.* LAUDANUM, LIQUID, L., ANODYNE TINCTURE, THEBAIC T.; TINCTURA OPII,—(B. P., Ph. L. E. & D.), THEBAICA, LAUDANUM LIQUIDUM, L. *Prep.* 1. (B. P.) Opium in coarse powder, 1½; proof spirit, 20; macerate 7 days, strain, express, filter, and add spirit to make 20.—*Dose.* 10 to 30 minims.

2. (Ph. L.) Powdered opium, 3 oz. (3 oz.—Ph. D.); proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.), and strain, with expression.

3. (Ph. E.) Opium, sliced, 3 oz.; boiling water, 13½ fl. oz.; digest, with heat, for 2 hours, break down the opium with the hand, strain, and express the infusion; then macerate the residuum for about 20 hours in rectified spirit, 1 pint 7 fl. oz.; next strain, press, mix the watery and spirituous infusions, and filter.

Obs. This preparation has a deep brownish-red colour, and the characteristic odour and taste of opium. 14 minims or measured drops of the London, and about 15 minims of the Edinburgh and Dublin tinctures, are equivalent to 1 gr. of dry opium, or 1·12 gr. of ordinary opium. 14 minims of this tincture are equal to about 25 drops of it poured from a bottle. Its sp. gr. is ·952. (Phillips.)—*Dose.* 10 to 60 drops; as an anodyne, sedative, or hypnotic. The following form is substituted for that of the Pharmacopœia by many of the wholesale drug houses:—Take of Turkey opium, 2½ lbs.; boiling water, 9 quarts; digest till dissolved or disintegrated, cool; add of rectified spirit, 2 galls.; and, after repose for 24 hours, decant the clear portion. *Prod.* 4 galls.

Tincture of Opium (Ammoniated). *Syn.* AMMONIATED TINCTURE OF OPIUM, SCOTCH PAREGORIC; TINCTURA OPII AMMONIATA (B. P., Ph. E.), L. *Prep.* 1. (B. P.) Opium in powder, 100 grs.; saffron, cut small, 180 grs.; benzoic acid, 180 grs.; oil of anise, 60 minims; strong solution of ammonia, 4 oz.; rectified spirit, 16 oz.; macerate 7 days in a closed vessel, with occasional agitation, strain, and add sufficient rectified spirit to make up 20 oz.—*Dose.* ½ to 1 dr.

2. (Ph. E.) Benzoic acid and hay saffron, of each, 6 drs.; opium, sliced, 4 drs.; oil of aniseed, 1 dr.; spirit of ammonia (Ph. E.), 1 quart; digest for a week, and filter. Stimulant, antispasmodic, and anodyne.—*Dose.* 20 to 80 drops; in hysteria, hooping-cough, &c.

Obs. This preparation is called 'PAREGORIC,' or 'PAREGORIC ELIXIR,' in Scotland, but should be carefully distinguished from the compound tincture of camphor, which passes under the same names in England; as the former contains about 4 times as much opium as the latter. 80 minims, or 145 poured drops, contain about 1 gr. of opium.

Tincture of Opium (Cam'phorated). Compound tincture of camphor.

Tincture of Or'ange Peel. *Syn.* TINCTURA AURANTII (B. P., Ph. L. E. & D.), T. CORTICIS AURANTII, L. *Prep.* 1. (B. P.) Dried bitter orange peel, cut small and bruised, 1; proof spirit, 10; macerate for 7 days in a closed vessel with occasional agitation, then strain, press, and filter, add sufficient proof spirit to make 10.—*Dose.* 1 to 2 drs.

2. (Ph. L.) Dried orange peel, 3½ oz. (4 oz. —Ph. D.); proof spirit, 1 quart; digest for 7 days (14 days—Ph. D.; or by percolation —Ph. E), press, and filter. A grateful bitter stomachic.—*Dose.* 1 to 3 fl. drs.; chiefly as an adjuvant in mixtures, &c.

Tincture of Pel'litory. *Syn.* TOOTHACHE TINCTURE; TINCTURA PYRETHRI, B. P. *Prep.* 1. (B. P.) Pellitory root, in coarse powder, 4; rectified spirit, 20; macerate for 48 hours with 15 of the spirit, agitating occasionally, then pack in a percolator, let it drain, and pour on the remaining spirit; when it ceases to drop, press, filter, and make up to 20.

2. Pellitory of Spain (bruised), 1 oz.; rectified spirit, ¼ pint; digest a week. In the P. Cod. a tincture is ordered prepared with spirit about 41 o. p., and another prepared with spirit of sulphuric ether.

3. (COMPOUND.—Brande.) Pellitory root, 4 drs.; camphor, 3 drs.; oil of cloves, 2 drs.; opium, 1 dr.; rectified spirit, 6 fl. oz.; digest for eight days. Both the above are used for the toothache. See ODONTALGIC TINCTURE.

Tincture of Phos'phorus (Ethereal). *Syn.* ÆTHER PHOSPHORATUS, TINCTURA PHOSPHORI ÆTHEREA, L. *Prep.* 1. Ph. Hann. 1831.) Phosphorus (powdered by agitation with rectified spirit), 16 grs.; ether, 2 oz.; macerate, with agitation, for 4 days, then decant the clear portion, and preserve it in a stoppered bottle, in a cool dark situation.

2. (P. Cod.) Phosphorus, cut small, 1 part; ether, 50 parts; digest, with occasional agitation, for 1 month, and decant the clear.—*Dose.* 5 to 15 drops, in any bland vehicle, thrice daily; in impotency, low sinking conditions of the system, &c.

Tincture of Quas'sia. *Syn.* TINCTURA QUASSIÆ (B. P., Ph. E.), L. *Prep.* 1. (B. P.) Quassia in chips, ¾; proof spirit, 20; digest 7 days, filter, and make up to 20.—*Dose.* 1 to 2 drs.

2. (Ph. E.) Quassia, in chips, 10 drs.; proof spirit, 1 quart; digest 7 days. Bitter, tonic. —*Dose.* ½ to 2 fl. drs.; in dyspepsia, &c.

Tincture of Quassia (Compound). *Syn.* TINCTURA QUASSIÆ COMPOSITA (Ph. E.), L. *Prep.* (Ph. E.) Cardamoms and cochineal, of each, bruised, ½ oz.; powdered cinnamon and quassia chips, of each, 6 drs.; raisins, 7 oz.; proof spirit, 1 quart; digest for 7 days (or by percolation), then press, and filter. Aromatic and tonic.—*Dose* and *use*, as the last.

Tincture of Quinine' (Compound). *Syn.* FEVER DROPS; TINCTURA QUINÆ, B. P.; TINCTURA QUINÆ COMPOSITA (Ph. L.) *Prep.* 1. (B. P.) Sulphate of quinia, 1; tincture of orange peel, 60; dissolve with a gentle heat, digest for 3 days with occasional agitation, and strain.—*Dose.* 1 to 1½ dr.

2. (Ph. L.) Sulphate of quinine, 5 drs. 1 scrup. (or 320 grs.); tincture of orange peel, 1 quart; digest, with agitation, for 7 days, or until solution is complete.

Obs. Unless the tincture employed as the solvent be of the full strength, some of the disulphate remains undissolved. It is an excellent medicine when faithfully prepared. —*Dose.* ½ to 2 fl. drs.; in debility, dyspepsia, &c.

Tincture of Red Lav'ender. Compound tincture of lavender.

Tincture of Rhat'any. *Syn.* TINCTURA KRAMERIÆ (B. P., Ph. D.), L. *Prep.* 1. (B. P.) Rhatany, bruised, 1; proof spirit, 8; macerate 48 hours in 6 of the spirit, agitating occasionally, pack in a percolator; when it ceases to drop, pour on the remaining spirit,

and wash the marc with spirit to make up 8.—*Dose.* 1 to 2 drs.

2. (Ph. D.) Rhatany root, in coarse powder, 8 oz.; proof spirit, 1 quart; macerate for 14 days, then press, and filter. Astringent.—*Dose.* 1 to 2 fl. drs. The formula of the Ph. U. S. is similar.

Tincture of Rhu'barb. *Syn.* TINCTURA RHEI (B. P., Ph. E.), L. *Prep.* 1. (B. P.) Rhubarb, bruised, 2; cardamom seeds, bruised, ¼; coriander, bruised, ¼; saffron, ¼; proof spirit, 20; macerate for 48 hours with 15 of the spirit, agitating occasionally, pack in a percolator, and when it ceases to drop pour on the remaining spirit, press and wash the marc, and add spirit to make up 20.—*Dose.* As a stomachic, 1 to 2 drs.; as a purgative, ½ to 1 oz.

2. (Ph. E.), Powdered rhubarb, 3½ oz.; cardamom seeds, bruised, ½ oz.; proof spirit, 1 quart; digest, or proceed by the method of displacement.

3. (Ph. L. 1824.) Rhubarb, 2 oz.; cardamoms, 4 drs.; saffron, 2 drs.; proof spirit, 32 fl. oz. Both the above are cordial, stomachic, and laxative.—*Dose.* 1 fl. dr. to 1 fl. oz.

Tincture of Rhubarb (Compound) *Syn.* TINCTURA RHEI COMPOSITA (Ph. L. & D.) *Prep.* 1. (Ph. L.) Rhubarb, sliced, 2½ oz.; liquorice root, bruised, 6 drs.; ginger (bruised) and hay saffron, of each, 3 drs.; proof spirit, 1 quart; macerate for 7 days, then press, and filter.

2. (Ph.) Rhubarb, 3 oz., cardamoms, 1 oz.; liquorice root, ½ oz.; saffron, ¼ oz.; proof spirit, 1 quart; macerate for 14 days.

3. (Ph. L.) 1824. Rhubarb, 2 oz.; liquorice root, 4 drs.; ginger and saffron, of each, 2 drs.; proof spirit, 16 fl. oz.; water, 12 fl. oz.

Obs. This tincture is a popular remedy in diarrhœa and colic, and is an especial favourite with drunkards.—*Dose,* as a stomachic, 1 to 3 fl. drs.; as a purgative, ½ to 1½ fl. oz. The tincture of rhubarb of the shops is mostly inferior, being generally deficient both in rhubarb and spirit. The following forms we have seen extensively employed in the wholesale trade:—East Indian rhubarb, 20 lbs.; boiling water, q. s. to cover it; infuse for 24 hours, then slice the rhubarb, and put it into a cask with moist sugar, 14 lbs.; ginger, bruised, 3½ lb.; hay saffron, 1 lb.; carbonate of potash, ½ lb.; bruised nutmegs, ¼ lb.; rectified spirit, 19 galls.; water, 21 galls.; macerate with frequent agitation for 14 days, decant the clear portion, and press and filter the bottoms. Those houses that adhere to the Ph. L. for 1824 substitute cardamom seeds, 5 lbs., for the ginger. For the corresponding Ph. E. formula see the last article.

Tincture of Rhubarb (Brandish's Al'kaline). *Syn.* TINCTURA RHEI ALKALINA BRANDISHII, L. *Prep.* From rhubarb, in coarse powder, 1½ oz.; Brandish's alkaline solution, 1 quart; macerate for a week. In the original formula only ½ oz. of rhubarb is ordered.—*Dose.* 20 drops to 2 fl. drs., in any bland liquid, not acidulous; in acidities, dyspepsia, &c.

Tincture of Rhubarb and Al'oes. *Syn.* SACRED ELIXIR†; TINCTURA RHEI ET ALÖES, (Ph. E.), L. *Prep.* (Ph. D.) Rhubarb, in powder 1½ oz.; Socotrine or East Indian aloes, 6 drs.; cardamom seeds, bruised, 5 drs.; proof spirit, 1 quart; macerate 7 days, or percolate. A warm stomachic purgative.—*Dose.* ½ fl. oz. to 1 fl. oz.

Tincture of Rhubarb and Gen'tian. TINCTURA RHEI AMARA, TINCTURA RHEI ET GENTIANÆ (Ph. E.), L. *Prep.* (Ph. E.) Rhubarb, 2 oz.; gentian, ½ oz.; proof spirit, 1 quart; proceed as for the last. Stomachic, tonic, and purgative.—*Dose.* 1 fl. dr. to 1 fl. oz.

Tincture of Rhubarb and Sen'na. *Syn.* WARNER'S GOUT CORDIAL; TINCTURA RHEI ET SENNÆ (Ph. U. S.), L. *Prep.* (Ph. U. S.) Rhubarb, 1 oz.; senna and red sanders wood, of each, 2 drs.; coriander and fennel seed, of each, 1 dr.; saffron and extract of liquorice, of each, ½ dr.; stoned raisins, 6 oz.; proof spirit, 2½ pints; macerate for 14 days. A popular stomachic and laxative.—*Dose.* ½ to 1½ fl. oz.

Tincture, Riemer's Nervous. *Prep.* From oil of juniper, 1 part; volatile liquor of hartshorn, 4 parts; rectified spirit, 16 parts.—*Dose.* 1 teaspoonful, in water.

Tincture, Ruspini's. Tooth tincture.

Tincture of Saf'fron. *Syn.* TINCTURA CROCI (B. P., Ph. E. & D.), T. C. SATIVÆ, L. *Prep.* 1. (B. P.) Saffron, 1; proof spirit, 20; macerate 48 hours with 15 of the spirit, agitating occasionally, pack in a percolator, let it drain, and then pour on the remaining spirit; when it ceases to drop, wash the marc with spirit to make up 20.—*Dose* ½ to 2 drs.

2. (Ph. E.) Hay saffron, 2 oz. (2 oz.—Ph. D.); proof spirit, 1 quart (1 pint—Ph. D.); proceed either by maceration (for 14 days—Ph. D.) or by displacement. Stimulant, and emmenagogue.—*Dose.* 1 to 2 fl. drs. Chiefly used for its colour and flavour.

Tincture of Senna (Compound). *Syn.* TINCTURE OF SENNA, ELIXIR OF HEALTH†; TINCTURA SENNÆ (B.P.), TINCTURA SENNÆ COMPOSITÆ (Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Senna, broken small, 5; raisins, freed from seeds, 4; caraway, bruised, 1; coriander, bruised, 1; proof spirit, 40; macerate the ingredients 48 hours in three fourths of the spirit, agitating occasionally; pack in a percolator, and when it ceases to drop, pour on the remaining spirit; press, filter, and make up 40.—*Dose.* 2 to 8 drs.

2. (Ph. L.) Senna, 3½ oz.; caraway seeds, bruised, 3½ drs.; cardamom seeds, bruised, 1 dr.; stoned raisins, 5 oz.; proof spirit, 1 quart; macerate for 7 days, press, and filter.

3. (Ph. E.) Senna and stoned raisins, of each, 4 oz.; sugar, 2½ oz.; corianders, 1 oz.;

jalap, 6 drs.; caraways and cardamoms, of each, 5 drs.; proof spirit, 1 quart; digest, or proceed by percolation.

4. (Ph. D.) Senna, 4 oz.; caraway and cardamom seeds, of each, bruised, ½ oz.; proof spirit, 1 quart; macerate for 14 days.

5. (Wholesale.) From senna, 6 lbs.; treacle, 2 lbs.; caraways, ¾ lb.; cardamoms, ¼ lb.; rectified spirit and water, of each, 4 galls.; as before. Carminative, stomachic, and purgative.—*Dose.* ½ to 1 fl. oz.

Obs. "If Alexandrian senna be used for this preparation, it must be freed from cynanchum (argel) leaves, by picking." (Ph. E.)

Tincture of Ser'pentary. *Syn.* TINCTURE OF VIRGINIAN SNAKE ROOT; TINCTURA SERPENTARIÆ (B. P., Ph. L. & E.), L. *Prep.* 1. (B. P.) Serpentary, bruised, 1; proof spirit, 8; macerate 48 hours, with 6 of the spirit, agitating occasionally, pack in a percolator and let it drain; pour on the remaining spirit, and when it ceases to drop, press, and wash the marc to make up 8.—*Dose.* ½ to 2 drs.

2. (Ph. L.) Serpentary, bruised, 3½ oz. (cochineal, 1 dr.—Ph. E.); proof spirit, 1 quart; macerate for 7 days (or by percolation—Ph. E.), strain, and filter. Stimulant, tonic, and diaphoretic.—*Dose.* 1 to 3 fl. drs.

Tincture of Sesquichlo''ride of Iron. *Syn.* TINCTURE OF MURIATE OF IRON, TINCTURE OF STEEL, STEEL DROPS; TINCTURA FERRI PERCHLORIDI (B. P.), TINCTURA FERRI SESQUICHLORIDI (Ph. L. & D.), T. FERRI MURIATIS (Ph. E.), FERRI MURIATIS LIQUOR, L. *Prep.* 1. (B. P.) Strong solution of perchloride of iron, 1; rectified spirit, 3: mix.—*Dose.* 10 to 30 minims in water.

2. (Ph. L.) Sesquioxide of iron, 6 oz.; hydrochloric acid, 1 pint; mix, and digest in a sand bath, frequently shaking (with a gentle heat, for a day—Ph. E.), until solution is complete, then add, when cold, of rectified spirit, 3 pints, and (in a short time) filter. Sp. gr. ·992. "1 fl. oz., potash being added, deposits nearly 30 grs. of sesquioxide of iron." (Ph. L.)

3. (Ph. D.) Iron wire, 8 oz.; pure hydrochloric acid, 1 quart; distilled water, 1 pint; mix, and dissolve by a gentle heat; next add, in successive portions, of pure nitric acid, 18 fl. drs.; evaporate by a gentle heat to a pint, and, when cold, mix this in a bottle with rectified spirit, 1½ pint; lastly, after 12 hours, filter. Sp. gr. 1·237.

Obs. This tincture is an active ferruginous tonic.—*Dose.* 10 to 30 drops, gradually increased, taken in water, ale, or wine. In the old tinctura martis, Ph. L., iron filings, and in the T. ferri muriatis, Ph. E. 1817, black oxide of iron, were used instead of the sesquioxide or carbonate. 'Bestuchef's nervine tincture of the P. Cod. is prepared by dissolving 1 dr. of dry sesquichloride of iron in 7 drs. of spirit of sulphuric ether. See GOLDEN DROPS.

Tincture of Sesquini'trate of Iron‡. *Syn.* TINCTURA FERRI SESQUINITRATIS, L. *Prep.* (Onion.) Iron filings, ½ oz.; nitric acid (1·5), 2½ oz.; dissolve, add of hydrochloric acid (1·16), 6 drs., simmer for 2 or 3 minutes, cool, add of rectified spirit, 8 oz., and filter. Proposed as a substitute for the last preparation, but the name misrepresents its chemical constitution.

Tincture of Squills. *Syn.* TINCTURA BECHICA, TINCTURA SCILLÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B. P.) Dried squill, bruised 1; proof spirit, 8; macerate for 48 hours with 6 of the spirit, agitating occasionally, pack in a percolator, let it drain, and pour on the remaining spirit; when it ceases to drop, press, filter, and make up to 8.—*Dose.* 15 to 30 minims.

2. (Ph. L.) Squills, recently dried and sliced (or in coarse powder), 5 oz.; proof spirit, 1 quart; macerate for 7 days (14 days—Ph. D.; or by percolation—Ph. E.), press and filter. A stimulating expectorant and diuretics. —*Dose.* 10 to 30 drops; in chronic coughs, and other bronchial affections.

Tincture, Stomach'ic. Compound tincture of cardamoms. Compound tincture of gentian is also, occasionally, so called.

Tincture of Stramo''nium. *Syn.* TINCTURE OF THORN-APPLE; TINCTURA STRAMONII (B.P., Ph. D. & U. S.), L. *Prep.* 1. (B. P.) Stramonium seeds, bruised, 1; proof spirit, 8; macerate 48 hours with 6 of the spirit, agitating occasionally; pack in a percolator, let it drain, and pour on the remaining spirit. When it ceases to drop, press, filter, and add spirit to make 8.—*Dose.* 10 to 20 minims.

2. (Ph. D.) Stramonium or thorn-apple seeds (bruised), 5 oz.; proof spirit, 1 quart; macerate for 14 days (or by displacement—Ph. U. S.), then press, and filter. Anodyne.—*Dose.* 10 to 20 drops; in neuralgia, rheumatism, &c. Said to be superior to laudanum.

Tincture of Sum'bul. *Syn.* TINCTURA SUMBULI, B. P. *Prep.* 1. (B. P.) Sumbul, bruised fine, 1; proof spirit, 8; digest 7 days and filter.—*Dose.* 15 to 30 minims.

2. From sumbul, bruised, 5 oz.; proof spirit, 1 quart; macerate for a week, and strain, with expression. Stimulant and tonic. —*Dose.* 10 to 30 or 40 drops.

Tincture of Thorn-apple. Tincture of stramonium.

Tincture of Tobac'co. *Syn.* TINCTURA NICOTIANÆ, TINCTURA TABACI, L. *Prep.* From pure manufactured tobacco, 1¼ oz.; proof spirit, 1 pint; macerate for 7 days. Compound spirit of juniper is often used instead of proof spirit. Sedative and narcotic.—*Dose.* 10 to 30 drops. A tincture is also made from the fresh leaves. See VEGETABLE JUICES and TINCTURES (Ethereal).

Tincture of Tol'u. *Syn.* TINCTURA TOLUTANUS (B. P.), TINCTURA TOLUTANA (Ph. L. & D.), T. BALSAMI TOLUTANI, T. TOLUIFERÆ BALSAMI, L. *Prep.* 1. (B. P.) Balsam of tolu, 1; rectified spirit, 8; dissolve, filter, and

make up to 8.—*Dose.* 15 to 30 minims, mixed with mucilage or syrup.

2. (Ph. L.) Balsam of Tolu, 2 oz. (3½ oz.—Ph. E.); rectified spirit, 1 quart (1 pint—Ph. D.); dissolve (by the aid of a gentle heat—Ph. E. & D.), and filter.

Obs. This tincture is reputed pectoral and expectorant; but it is chiefly used as an adjuvant in mixtures, on account of its flavour.—*Dose.* 10 to 60 drops.

Tincture, Tooth. *Prep.* 1. (Greenhough's.) From bitter almonds, 2 oz.; Brazil wood, cinnamon, and orris root, of each, ½ oz.; alum, cochineal, and salt of sorrel, of each, 1 dr.; spirit of scurvy grass, 2 fl. oz.; proof spirit, 1½ pint; macerate a week.

2. (Hudson's.) From the tinctures of myrrh and cinchona, and cinnamon water, equal parts, with a little arquebusade and gum arabic.

3. (Ruspini's.) From orris root, 8 oz.; cloves, 1 oz.; ambergris, 20 grs.; rectified spirit, 1 quart; digested for 14 days. The above are used as cosmetics for the teeth and gums. The last has long been a popular dentifrice.

Tincture, Toothache. Odontalgic tincture. See also DROPS, ESSENCE, &c.

Tincture of Vale'rian. *Syn.* TINCTURA VALERIANÆ (B. P., Ph. L. E. & D.), L. *Prep.* 1. (B.P.) Valerian bruised, 1; proof spirit, 8; macerate the valerian 48 hours with 6 of the spirit, agitating occasionally; pack in a percolator, let it drain, pour on the remainder of the spirit; when it ceases to drop, press and filter, washing the marc with spirit to make up 8.—*Dose.* 1 to 2 drs.

2. (Ph. L.) Valerian root, bruised, 5 oz.; proof spirit, 1 quart; macerate 7 days (14 days—Ph. D.; or by percolation—Ph. E.), press, and filter. Tonic and antispasmodic.—*Dose.* 1 to 3 fl. drs.; in hysteria, epilepsy, &c.

Tincture of Valerian (Compound). *Syn.* AMMONIATED TINCTURE OF VALERIAN, VOLATILE T. OF V.; TINCTURA VALERIANÆ COMPOSITA (Ph. L.), T. V. AMMONIATA (B. P., Ph. E.), L. *Prep.* 1. (B.P.) Valerian, bruised, 1; aromatic spirit of ammonia, 8; macerate the valerian 7 days, press, filter, and add spirit to make up 8.—*Dose.* ½ to 1 dr.

2. (Ph. L.) Valerian root, bruised, 5 oz.; aromatic spirit of ammonia (simple—Ph. E.), 1 quart; macerate for 7 days (or by percolation—Ph. E.), then press, and filter. Stimulant, tonic, and antispasmodic.—*Dose* and *use*, same as those of the simple tincture, than which it is thought to be more powerful. The tincture of the shops is generally made with only 1 lb. of the root to the gallon.

Tincture of Vera'trum. *Syn.* TINCTURE OF WHITE HELLEBORE; TINCTURA VERATRI VIRIDIS; TINCTURA HELLEBORI ALBI, T. VERATRI (Ph. E.), L. *Prep.* 1. (B. P.) Green hellebore root, in coarse powder, 4; rectified spirit, 20; macerate the powder with 15 of the spirit 48 hours, agitating occasionally, pack it in a percolator, let it drain, pour on the remainder of the spirit, when it ceases to drop, press, filter, wash the marc with spirit to make up 20.—*Dose.* 5 to 20 minims.

2. (Ph. E.) White hellebore, 4 oz.; proof spirit, 1 pint; digest or percolate.—*Dose.* 10 drops, 2 or 3 times a day, gradually increased; in gout, rheumatism, &c., as a substitute for colchicum; also, externally.

Tincture of Virginian Snake Root. Tincture of serpentary.

Tincture of Vittie-vayr. *Syn.* TINCTURA VETIVERIÆ, L. *Prep.* From vittie-vayr (roots of Andropogon muricatis), 2½ oz.; proof spirit, 1 pint; macerate a week. Stimulant, tonic, and sudorific.—*Dose.* 15 to 30 drops.

Tincture, Warburg's Fever. *Syn.* TINCTURA FEBRIFUGA WARBURGII. According to M. Fuchs, this tincture may be exactly imitated as follows:—Take of hepatic aloes and zedoary root, of each, 1 dr.; saffron, 3 grs.; angelica root and camphor, of each, 2 grs.; spirit (·897, or about 18 o. p.), 3 oz.; make a tincture (which should be 25 drs.), and dissolve in it (by the aid of a gentle heat), 30 grs. of sulphate of quinine. It is put up in 5-dr. bottles, each of which contains a dose, and is sold at about 5*s.* English. If the spirit be weaker than 18 or 20 o. p., some of the sulphate remains undissolved.

TINCTURES (Concentrated). *Syn.* TINCTURÆ CONCENTRATÆ HAENLI, L. *Prep.* (Ph. Baden.) Digest 8 parts of the vegetable powder in 16 of spirit of the sp. gr. ·857 (45 o. p.), for 4 days, at 72° Fahr., with occasional agitation, then press, and filter; to the marc or residuum add as much spirit as it has absorbed, and again press, and filter; the weight of the mixed liquors should be 16 parts. In this way are prepared concentrated tinctures of aconite leaves; arnica and chamomile flowers; belladonna, digitalis, hemlock, henbane, peppermint, and savine leaves; ipecacuanha and valerian roots, &c.

TINCTURES (Culinary). See ESSENCES, SPIRITS, &c.

TINCTURES (Ethe''real). *Syn.* TINCTURÆ ÆTHEREÆ, L. *Prep.* (P. Cod.) From the vegetable substance, 1 oz.; sulphuric ether, 4 oz. (or 6 fl. oz.); by maceration, for 4 days, in a well-closed vessel; or, preferably, by percolation in a cylindrical glass vessel furnished with a stopper, and terminating at the lower end in a funnel, obstructed with a little cotton. The powder being introduced over the cotton, pour on enough ether to moisten it, put in the stopper, fix the tube into the neck of a bottle, and leave it for 48 hours; then add, gradually, the remaining portion of the ether, and, lastly, enough water to displace the ether absorbed. In this manner are prepared the ethereal tinctures of aconite leaves, arnica flowers, belladonna, hemlock, foxglove, tobacco, pellitory, solanum, valerian, stramonium, &c., of the Paris Codex.

The ethereal tinctures of amber, ambergris,

æssafœtida, cantharides (acetic ether), castor, musk, tolu, &c., are prepared by maceration only.

TINCTURES (Odorif'erous). These are prepared from odoriferous substances by the usual processes of digestion or percolation. See SPIRITS.

TINCTURES from Recent Vegetables. See VEGETABLE JUICES.

TIN'DER (German). See AMADOU.

TISANE. [Fr.] *Syn.* PTISAN; PTISANA, L. This form of medicine is much used in France. Tisanes may be readily prepared by slightly medicating barley, rice, or tamarind water, lemonade, &c. See DECOCTION, INFUSION, JULEP, PTISAN, &c., and below.

Tisane Antiscorbutique. An infusion of buckbean and the fresh roots of horseradish.

Tisane Antivenerienne. Various compound decoctions of sarsaparilla are known by this name.

Tisane Commune. A decoction of pearl-barley and couch-grass, flavoured with liquorice root.

Tisane Pectorale. An infusion of the roots of liquorice and marsh-mallow, Canadian maiden-hair, and the flowers of the red poppy and coltsfoot, in a decoction of rice.

Tisane Royale. From senna, fresh chervil, and sulphate of soda, of each, 4 drs.; aniseed and cinnamon, of each, 1 dr.; 1 lemon, sliced; cold water, 1¾ pint; macerate for 24 hours, stirring occasionally, then press and filter. Aperient.—*Dose.* A wine-glassful, or more, repeated every half-hour, until it operates.

TIS'SUE (Blis'tering). See VESICANTS.

TITA'NIUM. A rare metal, discovered by Klaproth in 1794, and examined by Wollaston in 1822. It is occasionally found at the bottom of the smelting furnaces of iron works, in combination with nitrogen and cyanogen, under the form of minute crystals, having a coppery lustre.

TOAST (Essence of). This is liquid burnt sugar or spirit colouring. *Used* to make extemporaneous toast-and-water (3 or 4 drops to the glass), and to flavour soups, gravies, &c.

TOBAC'CO. *Syn.* TABACUM (Ph. L. E. & D.), L.; TABAC, Fr. The prepared leaf of *Nicotiana Tabacum* (Linn.), or other species of the same genus. The name was given to this herb by the Spaniards, because it was first seen by them at Tabasco, or Tabaco, a province of Yucatan, in Mexico.

The tobacco of commerce is chiefly obtained from Virginia, and other parts of the United States, and recently from Japan and California, but the finest varieties are imported from Havannah and from the East. The plants are gathered when mature, during hot dry weather, and are hung up in pairs, in sheds, to dry. When sufficiently dry, the leaves are separated from the stems, bound up in bundles, and these are formed into bales, or packed in hogsheads, for exportation.

Prep. To impart to the dried leaves the characteristic odour and flavour of tobacco, and to render them agreeable to smokers and snuffers, it is necessary that they should undergo a certain preparation, or kind of fermentation. If a fresh green leaf of tobacco be crushed between the fingers, it emits merely the herbaceous smell common to most plants; but if it be triturated in a mortar along with a very small quantity of quicklime or caustic alkali, it will immediately exhale the peculiar odour of manufactured tobacco. This arises from the active and volatile ingredients being liberated from their previous combination, by the ammonia developed by fermentation, or the action of a stronger base. Tobacco contains a considerable quantity of chloride of ammonium, and this substance, as is well known, when placed in contact with lime or potassa, immediately evolves free ammonia. If we reverse the case, and saturate the excess of alkali in prepared tobacco by the addition of any mild acid, its characteristic odour entirely disappears. In the preparation of tobacco previously to its manufacture for sale, these changes are effected by a species of fermentation. Pure water, without any addition, is quite sufficient to promote and maintain the perfect fermentation of tobacco. The leaves soon become hot and evolve ammonia; during this time the heaps require to be occasionally opened up and turned over, lest they become too hot, take fire, or run into the putrefactive fermentation. The extent to which the process is allowed to proceed varies, for different kinds of snuff or tobacco, from one to three months.

Qual., &c. Tobacco is a powerful narcotic, sedative, and emetic; and is also cathartic and diuretic; but the last in a weaker degree than either squills or foxglove. Its action is violently depressing and relaxing, producing fainting, and even death, in comparatively small quantities. Toxicologists rank it among the more active narcotico-acrid poisons; and physicians, when they wish to produce sudden physical prostration, in accidents or spasmodic diseases, order an enema of the infusion or smoke of tobacco. Its deleterious properties depend on the presence of narcotine, one of the most frightful vegetable poisons known, of which ordinary Virginia tobacco contains from 6 to 7⅞. Yet of such a vegetable substance, so rich in such a deadly poison, upwards of 30,000,000 lbs. are said to be annually consumed in the British islands alone, by smokers and snuffers.

Tobacco, British. *Syn.* HERB TOBACCO; TABACUM ANGLICUM, SPECIES STEENUTORIÆ; L. *Prep.* Take of thyme, marjoram, and hyssop, of each, 2 oz.; betony and eyebright, 3 oz.; rosemary and lavender, of each, 4 oz.; coltsfoot, 1 lb.; mix, press them together, and cut the mass in imitation of manufactured foreign tobacco. Some asthmatic subjects add 5 or 6 oz. of stramonium or thorn-apple

leaves; and others add ½ lb. of genuine tobacco.

Tobacco, Indian. See LOBELIA.

TOD'DY. Obtained from various species of palms, by cutting off the end of the flowering bud, and collecting the sap. *Used*, fresh, as a cooling beverage; and, after fermentation, as an intoxicating one. Sweetened grog is so called in Cornwall, and in some other parts of England.

TOF'FY. *Syn.* EVERTON TOFFY. A sweetmeat prepared by heating brown sugar, in a saucepan or skillet, with about one half its weight of fresh butter, for 15 to 20 minutes, or until a 'little of it dropped into cold water forms a lump that breaks crisply;' it is then poured into a little buttered tin mould.

TOM'BAC. A species of brass with excess of zinc. Red tombac is red brass or Dutch gold; white tombac, an alloy of copper with arsenic.

TON'ICS. Medicines that increase the tone of the muscular fibre, and impart vigour to the system.

TON'QUIN REMEDY. *Syn.* PULVIS TRUNCHINENSIS, P. ALEXIPHARMICUS SINENSIS, L. *Prep.* From valerian, 20 grs.; musk, 16 grs.; camphor, 6 grs.; mix. Antispasmodic and alexiterial, in doses of 6 to 12 grs., in hooping-cough, &c.; 1 dr., in hydrophobia, exanthemata, and mania.

TOOTH'ACHE. *Syn.* ODONTALGIA, L. This annoying affection frequently arises from sympathy with a disordered stomach. In such cases a saline purgative should be administered, and an emetic, if required. When cold is the cause, an excellent remedy is a hot embrocation of poppy-heads, followed by the use of flannel and diaphoretics. When it arises from a hollow or decayed tooth, the best application is a piece of lint moistened with creasote, or a strong spirituous solution of creasote, and closely rammed into the cavity of the tooth. Laudanum, the essential oils of cloves, caraway, and cajeput, and essence or tincture of pellitory of Spain, are also used in the same way. To prevent the recurrence of the latter kind of toothache, the cavity should be filled with an amalgam of gold, or with mineral marmoratum, or some other good cement. In many cases, chewing a piece of good ginger, or, still better, a small piece of pellitory, will afford relief in a few minutes. The celebrated John Wesley recommended a 'few whiffs' at a pipe containing a little caraway seed mixed with the tobacco. A slight 'shock' from a voltaic battery will often instantly remove the toothache after all other means have failed. See DROPS, ESSENCE, TINCTURE, &c.

TOOTH CEMENTS. *Prep.* 1. Amalgam of gold, applied warm. Silver, and even tin, are also used in the same way.

2. A piece of purified white gutta percha, softened in hot water, and applied at once. Efficient and durable.

3. Zinc filings, 1 part; quicksilver, 2 parts; mixed, and applied at once. Not very durable.

4. (Bernotte's.) From powdered mastic mixed with about half its weight of ether, and, afterwards, with enough finely powdered burnt alum to form a stiff paste. 'Taveare's Cement' is similar.

5. (Evans.) Pure tin, 2 parts; cadmium and bees' wax, of each, 1 part; melt them together, cast the compound metal into a small ingot, and reduce it to filings. For use, form these into a liquid amalgam with quicksilver, q. s.; squeeze out the excess of quicksilver through a piece of chamois leather, and at once apply it to the tooth. (See No. 9.) Recommended as very durable and unobjectionable.

6. ('MARMORATUM.') From anhydrous phosphoric acid, 12 grs.; pure caustic lime, 13 grs.; both finely pulverised, mixed rapidly in a mortar, and applied, in the dry state, as rapidly as possible, as it soon becomes moist; the mixed powder, after being well pressed in, is smoothed off with the finger moistened with a drop of water. This is white and durable, and soon acquires great hardness. In its composition it resembles the natural earthy matter of the teeth.

7. ('MINERAL MARMORATUM.') The same as 'mineral succedaneum' (No. 9), with the addition of a little powdered glass or quartz. A common sort is made of levigated glass, mixed with amalgam of tin.

8. ('MINERAL METALLIC CEMENT.') Add finely levigated steel filings to some mineral succedaneum. Dark-coloured inferior to 'mineral marmoratum.'

9. ('MINERAL SUCCEDANEUM.') This is merely amalgam of gold first above noticed. The common method of proceeding is to heat pure gold in a bright iron ladle, and to add enough pure mercury to render it of a doughy consistence at the heat of hot water; when cold, the excess of mercury, if any, must be removed by pressure in a piece of chamois leather. For use, a little must be kneaded, as hot as possible, in the hand, and at once wedged into the cavity of the tooth.

10. (Ostermaier's.) Same as No. 6.

11. ('POUDRE METALLIQUE.') The article sold in Paris under this name is said to be a triple amalgam of mercury, silver, and ammonium, with the latter in excess; part of the ammonium escapes as ammoniacal gas, whilst the remainder of the ammonium, silver, and mercury, remains as a firm alloy in the cavity of the tooth. (Redwood.)

12. ('SILICA.') From levigated porcelain, plaster of Paris, and iron filings, equal parts, made into a paste with the thickest quick-drying copal varnish.

13. ('VIENNA CEMENT.') From powdered asbestos, made into a paste with mastic varnish.

14. (Wirth's.) From levigated quartz, made into a paste with very thick mastic varnish.

Obs. It is absolutely necessary for success that the teeth be well cleaned out, and wiped dry, before applying any of the above stoppings or cements.

TO'PAZ. See GEMS.

TOR'MENTIL. *Syn.* TORMENTILLÆ RADIX; TORMENTILLA (Ph. L. & E.), L. The root or rhizome of *Potentilla Tormentilla*. It is astringent and febrifuge, without being stimulant.—*Dose.* 20 to 60 grs.; in agues, diarrhœa, &c.; also, formerly, in syphilis.

TOUCH-NEEDLES. See ASSAYING.

TOUCH-WOOD. See AMADOU.

TOUS-LES-MOIS. The fecula of the roots of *Canna edulis* (Ph. D.); intended as a substitute for arrow-root. To the naked eye, it closely resembles the finest quality of potato-starch, but under the microscope its granules are found to be oblong, oval, with a concentric structure, and larger than those of the potato tuber.

TOXICOL'OGY. See POISON.

TRAG'ACANTH. See GUM.

TRANSPA''RENCIES. Water-colour pictures on paper, linen, or calico, if executed in non-opaque or glazing colours, may be converted into transparencies by simply brushing over their backs with Canada balsam, thinned down, when necessary, with a little oil of turpentine. For coarse work, boiled oil may be employed.

TRAUMAT'IC BALSAM. Compound tincture of benzoin is known by this name. See TINCTURE.

TRAUMAT'ICINE. This article, as manufactured by the Gutta Percha Company, is simply a solution of white and dry unmanufactured gutta percha in bisulphuret of carbon. A small portion dropped on a wound, or raw surface, almost instantly forms a pliable, waterproof, and air-tight defensive covering to the part. The only objection to the preparation is the fetid odour of the menstruum, which, however, is lost in a few seconds, or may be obviated by employing chloroform as the solvent.

TREA'CLE. *Syn.* MOLASSES; THERIACA (B. P.), THERIACA, SACCHARI FÆX, Ph. L. & E.), L. The viscid, brown, uncrystallisable syrup which drains from moist sugar during its formation (molasses), and from the sugar-refining moulds (sugar-house molasses). The last, according to Dr. Ure, has generally the sp. gr. 1·4, and contains about 75% of solid matter.

Treacle is more laxative than sugar, and always contains more or less free acid. It is used as the vehiculum in some of the pill-masses of the Ph. L. See SUGAR.

Treacle, German. *Syn.* THERIACA GERMANIÆ, L. An evaporated infusion or decoction of juniper berries. It is sweet-tasted, aromatic, and diuretic.

Treacle, Venice. *Syn.* LONDON TREACLE; THERIACA, T. ANDROCHI, L. The theriaca of the Ph. L. 1746 consists of 61 ingredients, and contains 1 gr. of opium in 75 grs.; that of the Paris Codex consists of 72 ingredients, and contains 1 gr. of opium in 72 grs.; that of the Ph. E. 1744 consists of 10 ingredients, and contains 1 gr. of opium in every 100 grs. It is prepared as follows:—Take of serpentary root, 6 oz.; valerian and contrayerva roots, of each, 4 oz.; aromatic powder, 3 oz.; guaiacum resin, castor, and nutmeg, of each, 2 oz.; saffron and opium (dissolved in a little wine), of each, 1 oz.; clarified honey, 75 oz.; reduce all the dry ingredients to fine powder, then mix them. The confections or electuaries of catechu and opium are the representatives of the above polypharmic compounds in the modern British Pharmacopœias.

TRI-, TRIS-. See NOMENCLATURE.

TRIP'OLI. *Syn.* ROTTEN STONE; ALANA, TERRA CARIOSA, L. A mineral employed as a polishing powder, originally imported from Tripoli, in Barbary. It consists almost entirely of silica, and is composed of the skeletons of minute infusoria, the precise character of which is readily distinguishable under the microscope.

TRIS'MUS. See TETANUS.

TRITURA'TION. *Syn.* TRITURA, TRITURATIO, L. The act of rubbing a solid body to powder. See PULVERIZATION.

TRO'CHES. See LOZENGES.

TRO'NA. A native carbonate of soda, found on the banks of the soda-lakes of Sokena, in Africa.

TROPH'AZOME. A concentrated infusion of minced lean meat mixed with the fluid obtained from the residuum after being heated for 20 minutes in a water bath, and flavoured with salt and spices, the whole being, lastly, simmered for a few minutes. Excellent for convalescents.

TROUT. The *Salmo fario* of Linnæus, a highly esteemed fish, found in most of the rivers and lakes of this country. Other members of the genus *salmo* are also so called; as, *S. eriox*, the bull or gray trout; *S. ferox*, the great gray or lake trout; *S. trutta*, the salmon trout, &c. All of these varieties are in the finest condition from the end of May to late in September.

TUNG'STEN. W. *Syn.* TUNGSTENUM, WOLFRAMIUM, L. A heavy, gray, brittle metal, discovered by Delhuyart.

TUNGSTATE OF SODIUM. Na_2WO_4. This salt is used for rendering linen, cotton, and other fabrics uninflammable; also as a substitute for stannate of sodium as a mordant in dyeing. It may be prepared by adding 9 parts of finely powdered tungsten to 8 parts of fused carbonate of sodium, and continuing the heat for some time; on boiling the cooled and pulverised mass with water, evaporating the filtrate to dryness, and treating the residue with luke-warm water, the salt dissolves out. Muslin steeped in a 20% solution of this salt is perfectly uninflammable when dry, and the saline film left upon its surface is so smooth that the

muslin may be ironed without difficulty. See Richardson and Watt's 'Chemical Technology,' i,[4]48.

TUR'BOT. The *Rhombus maximus* (Cuvier), said to be the best and, excepting the halibut, the largest of our flat fishes. Dutch turbots are the most esteemed.

TUR'KEY. See POULTRY.

TUR'MERIC. *Syn.* CURCUMA (Ph. L. & D.), L. The rhizome of *Curcuma longa.* The best is imported from Ceylon. It is stimulant and carminative, but is chiefly used in dyeing yellow, and as an ingredient in curry-powder; also as a test for alkalies. It gives a fugitive golden yellow with wold, and an orange tinge to scarlet. It dyes wool and silk, mordanted with common salt, or sal ammoniac, a fugitive yellow.—*Dose.* 10 to 30 grs. See CURCUMINE.

TURNBULL'S BLUE. *Syn.* FERRICYANIDE OF IRON; FERRI FERRIDCYANIDUM, L. *Prep.* Precipitate a solution of protosulphate of iron with another of red prussiate of potash (ferricyanide of potassium).

Obs. This is a variety of Prussian blue, remarkable for its beautiful colour, and may be distinguished from the ordinary Prussian blue of commerce by its action on the yellow prussiate of potash. When boiled in a solution of the latter, it is decomposed, a portion is dissolved, and a gray residue remains.

TURNER'S YELLOW. See YELLOW PIGMENTS.

TURN'SOLE. See LITMUS.

TUR'PENTINE. *Syn.* TURPENTIN; TEREBINTHINA (Ph. L. E. D.), L. An oleo-resin flowing from the trunk, the bark being removed, of *Pinus palustris* (pitch or swamp pine) and *Pinus Tæda* (loblolly or old field pine)." (Ph. L.) "From *Pinus sylvestris* (the Scotch fir)." (Ph. D.) "From various species of *Pinus* and of *Abies*." (Ph. E.) It is viscid, of the consistence of honey, and transparent; by distillation it is resolved into oil of turpentine, which passes over into the receiver; and into resin, which remains in the still.

Turpentine, Bordeaux. *Syn.* FRENCH TURPENTINE. From the *Pinus maritima,* or cluster pine. Solidifies with magnesia. (Lindley.)

Turpentine, Chian. *Syn.* CHIO TURPENTINE, CYPRUS T., SCIO T.; TEREBINTHINA CHIA (Ph. L. & E.), L. "An oleo-resin flowing from the incised trunk of *Pistachia terebinthus*" (Linn.). (Ph. L.) It is pale, aromatic, fragrant, and has a warm taste, devoid of acrimony or bitterness. It is much adulterated. A factitious article (terebinthina Chia factitia), made as follows, is also very generally sold for it:—Black resin, 7 lbs.; melt, remove the heat, and stir in of balsam of Canada, 7 lbs.; oils of fennel and juniper, of each, 1 fl. dr.

Turpentine, Venice. *Syn.* TEREBINTHINA VENETA (Ph. E.), L. Liquid resinous exudation from the *Abies Larix,* or larch tree. It is sweeter and less resinous-tasted than common turpentine, but is now scarcely ever met with in trade. That of the shops is wholly a factitious article, made as follows:—Black resin, 48 lbs.; melt, remove the heat, and add of oil of turpentine, 2 galls.

TUR'PETH MINERAL. Basic sulphate of mercury.

TUR'TLE. *Syn.* GREEN TURTLE. The *Testuda midas* (Linn.), a chelonian reptile, highly esteemed for its flesh, eggs, and fat.

TUSSILA'GO. See COLTSFOOT.

TU'TENAG. A name sometimes applied to German silver; at others, to pale brass and bell metal. "In India zinc sometimes goes under this name." (Brande.)

TUT'TY. *Syn.* TUTIA, TUTHIA, IMPURE OXIDE OF ZINC. The sublimate that collects in the chimneys of the furnaces in which the ores of zinc are smelting. Drying; astringent. *Used* in eye-waters and ointments.

TYPE METAL. An alloy formed of antimony, 1 part; lead, 3 parts; melted together. Small types are usually made of a harder composition than large ones. A good stereotype metal is said to be made of lead, 9 parts; antimony, 2 parts; bismuth, 1 part. This alloy expands as it cools, and, consequently, brings out a fine impression.

UL'MIN, ULMIC ACID. By boiling sugar in dilute sulphuric acid for a long time, a brownish-black substance is produced. Boullay and Malaguti state that this is a mixture of two distinct bodies—ulmin (sacchulmin—Liebig) and ulmic acid (sacchulmic acid—Liebig). The first is insoluble in solutions of the alkalies; the latter dissolves in them freely. A number of black uncrystallisable substances, produced by the action of powerful chemical agents upon vegetable matter, have been confounded under these names.

ULTRAMARINE'. *Syn.* LAPIS-LAZULI BLUE, ULTRAMARINE B.; CÆRULEUM ULTRAMONTANUM, L. This beautiful pigment is obtained from the blue mineral azure stone, lazulite, or lapis lazuli, the finest specimens of which are brought from China, Persia, and Great Bucharia.

Prep. Pure lapis lazuli (reduced to fragments about the size of a pea, and the colourless pieces rejected), 1 lb., is heated to redness, quenched in water, and ground to an impalpable powder; to this is added, of yellow resin, 6 oz.; turpentine, bees' wax, and linseed oil, of each, 2 oz.; previously melted together; the whole is next made into a mass, which is kneaded in successive portions of warm water, as long as it colours it blue; from these it is deposited on repose, and is then collected, well washed with clean water, dried, and sorted according to its qualities. The first water, which is usually dirty, is thrown away; the second gives a blue of the first quality; and the third, and following ones, yield samples of less value. The process is founded on the property which the colouring matter of

azure-stone has of adhering less firmly to the resinous cement than the foreign matter with which it is associated. When azure-stone has its colour altered by a moderate heat, it is reckoned bad or factitious.

Obs. Ultramarine is the most costly, but at the same time the most splendid and permanent, of our blue pigments, and works well in oil.

Ultramarine Ashes. *Syn.* SAUNDER'S BLUE. Obtained from the resinous mass from making ultramarine, by melting it with fresh oil, and kneading it in water containing a little potash or soda; or, by burning away the wax and oil of the mass and well grinding and washing the residue with water. Very permanent, but much less brilliant than ultramarine.

Ultramarine, Artificial. *Syn.* AZURE BLUE, MEISSNER ULTRAMARINE, PARIS B., VIENNA B.; CÆRULEUM ULTRAMONTANUM FACTITIUM, L. From the researches of Clement, Desormes, and Robiquet, it has been inferred that the colour of ultramarine depends on the presence of sulphuret of sodium in a peculiar state of combination with the silicates of soda and alumina; but, according to Elsner and Tirnmon, a minute quantity of sulphuret of iron is also an essential ingredient. It is by heating mixtures of this kind that the artificial ultramarine of commerce is prepared. The finer specimens, thus obtained, are quite equal in durability and beauty of colour to those prepared from lazulite, while they are very much less expensive.

Prep. 1. Kaolin, 37 parts; sulphate of soda, 15; carbonate of soda, 22; sulphur, 18; charcoal, 8; intimately mixed and heated from 24 to 30 hours, in large crucibles; the product is then heated again in cast-iron boxes, at a moderate temperature, till the required tint is obtained; it is, finally, pulverised, washed, and dried.

2. (Gmelin.) Sulphur, 2 parts; dry carbonate of soda, 1 part; mix well; gradually heat them in a covered crucible to redness, or till the mixture fuses, then sprinkle in, by degrees, another mixture of silicate of soda and 'aluminate of soda' (containing 72 parts of silica and 70 parts of alumina), and continue the heat for an hour. The product contains a little free sulphur, which may be separated by water.

3. (Robiquet.) By exposing to a low red heat, in a covered crucible, as long as fumes are given off, a mixture of pure kaolin, 2 parts; anhydrous carbonate of soda and sulphur, of each, 3 parts. Some manufacturers who adopt this process use 1-3rd less carbonate of soda.

4. (Tirnmon.) Take of crystallised carbonate of soda, 1075 grs.; apply a gentle heat, and, when fused in its water of crystallisation, shake in of finely pulverised orpiment, 5 grs., and, when partly decomposed, add as much gelatinous hydrate of alumina as contains 7 grs. of anhydrous alumina; finely sifted clay, 100 grs., and flowers of sulphur, 221 grs., are next to be added, and the whole placed in a covered crucible, and at first gently heated, to drive off the water; but as soon as this is effected, raised to redness, the heat being so regulated that the ingredients only 'sinter' together, without actually fusing; the mass is then to be cooled, finely pulverised, suspended in river water, and brought upon a filter; the product has now a very beautiful delicate green or bluish colour, but on being heated in a covered dish, and stirred about from time to time, until the temperature reaches that of dull redness, at which it must be kept for 1 or 2 hours, it changes to a rich blue. If the heat of the first calcination has been properly regulated, the whole of the mass taken from the crucible will have uniform colour; but if too little heat has been used, and the ingredients have not been properly mixed, there will be colourless parts, which should be rejected; if too much heat has been used, or the mass allowed to fuse, brown parts will appear, especially if the crucible is of a bad kind, or easily destroyed; these must also be rejected. ('Compt. Rend.,' 1842.)

Ultramarine, Cobal'tic. *Syn.* CHINESE BLUE, COBALT B., LOUISA B., HÖFFNER'S B., THÉNARD'S B. A very rich blue pigment, with many synonymes, prepared by slowly drying and heating the dull redness a mixture of freshly precipitated alumina (freed from water as much as possible), 8 to 10 parts; arseniate or phosphate of cobalt, 1 part. By daylight it is of a pure blue, but by artificial light the colour turns on the violet. For other formulæ see BLUE PIGMENTS.

U'PAS. The Javan name for several deadly poisons. 'Bohun upas' is a gum-resin obtained from the bark of the *Antiaris toxicaria*. (See ANTIARINE.) The 'upas tieuté' is obtained from the *Strychnos Tieuté*, and owes its fatal power to strychnine. They are both used to poison arrows and other deadly weapons.

URA'NIUM. U. A rare metal, discovered by Klaproth, in 1789. It occurs in the pitchblende of Saxony, and the uranite of Cornwall.

Uses. Its ores and oxides are occasionally used to colour glass and enamels.

U'RATES. Salts of uric acid.

U'REA. COH_4N_2. *Syn.* CYANATE OF AMMONIUM (Anomalous). A crystalline, colourless, transparent substance, discovered by Fourcroy and Vauquelin in Urine, and by Wöhler as the first organic compound artificially produced.

Prep. (Thénard.) Fresh urine, gently evaporated to the consistence of a syrup, is treated with its own volume of nitric acid of sp. gr. 1·19; the mixture is shaken and immersed in an ice bath, to solidify the crystals of nitrate of urea; these are washed with ice-cold water, drained, and pressed between sheets of blotting paper; they are next dissolved in water, and the solution is decomposed and precipitated with carbonate of potassium (or carbonate of barium); the whole is then gently evaporated nearly to dryness, and the residuum is exhausted with pure alcohol, which dissolves

the urea, which crystallises out as the solution cools.

Urea, Ni'trate of. *Syn.* UREÆ NITRAS, L. *Prep.* From urine, as described above; or it may be prepared by saturating artificial urea with nitric acid. Diuretic.—*Dose.* 2 to 5 grs., twice or thrice daily; in dropsy.

U'RIC ACID. $C_5H_4N_4O_3$. *Syn.* LITHIC ACID; ACIDUM LITHICUM, A. URICUM, L. A substance discovered by Scheele, and peculiar to the urine of certain animals, and the excrement of serpents and several birds. The fæces of the boa constrictor consist of little else than urate of ammonium. It constitutes one of the commonest varieties of urinary calculi, and of the red gravel or sand which is voided in certain morbid states of the urine. Guano derives its principal value as a manure from the presence of urate of ammonium. The gouty concretions of the joints, popularly known as chalk-stones, consist chiefly of urate of sodium.

Prep. Dissolve the chalk-like excrement of serpents, reduced to fine powder, in a solution of caustic potassa, by boiling, then add hydrochloric acid in excess, again boil for 15 minutes, and well wash the precipitate with water.

Prop., &c. Brilliant, very minute, white and silky scales, which are tasteless, inodorous, slightly soluble in boiling water, and dissolve in strong sulphuric acid, but are again precipitated by water. It forms salts with the bases called urates, all of which are very sparingly soluble. The characteristic reaction of uric acid is, that, when moistened with nitric acid and heated, it dissolves, and by evaporation yields a red compound, which, upon the addition of a drop or two of solution of ammonia, assumes a magnificent crimson colour, being converted into murexide.

U'RINE. The density of the urine varies from 1·005 to 1·030; the average, in health, being 1·020, when it contains about 380 grs. of solid matter in the pint. According to Berzelius, the proportion is about 6⅔ %, the rest being pure water. It exhibits a decidedly acid reaction, and is never alkaline, except during disease, or the use of large quantities of alkaline salts of the vegetable acids. The average quantity secreted during 24 hours may be taken at 1½ pint to 1¾ pint.

The presence of bile in urine, or other like fluids, may be detected as follows:—Put a small quantity of the suspected liquid into a test-tube, and add to it drop by drop, strong sulphuric acid, until it becomes warm, taking care not to raise the temperature above 122° Fahr.; then add from 2 to 5 drops of syrup (made with 5 parts of sugar to 4 of water), and shake the mixture. If the liquid contain bile, a violet coloration is observed. Acetic acid may be substituted for sugar.

The presence of sugar, and the quantity present, may be determined in the manner described under SUGAR (tests for). White merino, that has been wet with a solution of bichloride of tin, is also said to form a ready test for sugar in urine.

The quantity of urea present in urine is best determined by treating that liquid with a solution of pernitrate of mercury of known strength, alternately with a solution of baryta, as long as a white precipitate falls. As soon as the whole of the urea is thrown down, the precipitate assumes a yellow colour.

URINOM'ETER. An hydrometer adapted to determining the density of urine. That of Dr. Prout is the simplest and best.

URN POWDER. Crocus martis, or jeweller's rouge.

URTICAR'IA. See RASH.

US'QUEBAUGH. *Syn.* ESCUBAC. Literally, mad water, the Irish name of which, 'whiskey,' is a corruption. At the present time it is applied to a strong cordial spirit, much drunk in Ireland, and made in the greatest perfection at Drogheda.

Prep. 1. Brandy or proof spirit, 3 galls.; dates (without their kernels) and raisins, of each, bruised, ½ lb.; juniper berries, bruised, 1 oz.; mace and cloves, of each, ¾ oz.; coriander and aniseed, of each, ½ oz.; cinnamon, ¼ oz.; macerate, with frequent agitation, for 14 days, then filter, and add of capillaire or simple syrup, 1 gall.

2. Pimento and caraways, of each, 3 oz.; mace, cloves, and nutmegs, of each, 2 oz.; aniseed, corianders, and angelica root, of each, 8 oz.; raisins, stoned and bruised, 14 lbs.; proof spirit, 9 galls.; digest as before, then press, filter, or clarify, and add of simple syrup, q. s. Should it turn milky, add a little strong spirit, or clarify it with alum, or filter through magnesia.

Obs. Usquebaugh is either coloured yellow with saffron (about ¼ oz. per gall.), or green with sap-green (about ½ oz. per gall.); either being added to the other ingredients, before maceration in the spirit.

VACCINA'TION. See COW-POX.

VAC'CINE MATTER. *Syn.* LYMPHA VACCINIÆ, L. This is collected either upon the points of lancet-like pieces of ivory, or by opening the pustule, and applying a small glass ball and tube (like those called by the boys in London candle-pops, or fire-pops) to the orifice, expelling part of the air in the ball by bringing a lighted taper near it; then, withdrawing the taper, the matter is sucked into the ball, in which it may be sealed up hermetically or cemented, and thus kept for a length of time. It is, however, now generally preserved between two small pieces of glass, or in straight capillary glass tubes. It is said that cotton thread is a convenient and efficient vehicle. The matter may be liquefied with a little clean water before application. A degree of heat scarcely higher than that of the blood lessens its efficacy.

VAC'UUM. Empty space; a portion of

space void of matter. For experimental and manufacturing purposes, a sufficient vacuum is produced either by means of the air-pump, or by filling an enclosed space by steam, which is then condensed by the application of cold. Evaporation proceeds much more rapidly, and liquids boil at much lower temperatures in an exhausted receiver than when exposed to the air. Thus, under ordinary circumstances, in the air, ether boils at 96°, alcohol at 177°, and water at 212° Fahr.; but in vacuo water boils at about 88°, alcohol at 56°, and ether at —20° Fahr. In the best vacuum obtainable by a powerful air-pump, water placed over oil of vitriol, to absorb the aqueous vapour as it forms, will often enter into violent ebullition whilst ice is in the act of formation on its surface. The reduction of the boiling-point with reduced pressure is practically taken advantage of by the pharmaceutist in the preparation of extracts, by the sugar refiner in the evaporation of his syrups, by the distiller in the production of certain liqueurs, and by the chemist in a variety of processes of interest or utility. See EXTRACTS, EVAPORATION, REFRIGERATION, &c.

VALE'RIAN. *Syn.* VALERIANÆ RADIX (B. P.), VALERIANÆ RADIX, VALERIANA (Ph. L. E. & D.), L. "The root of the wild plant *Valeriana officinalis* (Linn.), or wild valerian." (Ph. L.) An excitant, antispasmodic, tonic, and emmenagogue, not only acting on the secretions, but exercising a specific influence over the cerebro-spinal system, and in large quantities producing agitation, mental exaltation, and even intoxication.—*Dose.* 10 to 30 or 40 grs., thrice daily; in hysteria, epilepsy, headache (affecting only one side), morbid nervous sensibility, &c. Even the odour of it exerts a species of fascination over cats.

VALERIAN'IC ACID. $HC_5H_9O_2$. *Syn.* VALERIC ACID; ACIDUM VALERIANICUM, A. VALERICUM, L. *Prep.* 1. A mixture of potato oil or corn-spirit oil (hydrated oxide of amyl) with about 10 times its weight of quicklime and hydrate of potassa in equal proportions, placed in a glass flask, is kept heated to about 400° Fahr., for 10 or 12 hours, by means of a bath of oil or fusible metal; the nearly white solid residuum is mixed with water, an excess of sulphuric acid added to the mixture, and the whole subjected to distillation; the distillate is supersaturated with potassa, evaporated nearly to dryness, to dissipate any undecomposed potato oil, and then mixed with weak sulphuric acid in excess; a light oily liquid (terhydrated valerianic acid) separates, which, by cautious rectification, yields at first water containing a little acid, and afterwards pure monohydrated valerianic acid, which is perfectly identical with that prepared from valerian root.

2. (Ph. D.) See VALERIANATE OF SODIUM. This is the most economical process.

Prop., &c. A limpid oily liquid, smelling strongly of valerian root; it has an acid taste and reaction, and leaves a sensation of sweetness and a white spot on the tongue; is inflammable; boils at 347°; is freely soluble in alcohol and ether; dissolves in 30 parts of water, and forms salts called valerianates, most of which have a sweetish taste, are soluble, and uncrystallisable; sp. gr. ·937; placed in contact with water, it absorbs a portion of it, and is converted into the terhydrated acid, with increase of sp. gr., and reduction of the boiling-point.

VALE'RIC ACID. See VALERIANIC ACID.

VALO'NIA. The cup of a large species of acorn, imported from the Levant. *Used* in tanning leather.

VANAD'IC ACID. V_2O_5. *Syn.* VANADIC ANHYDRIDE, TEROXIDE OF V.; ACIDUM VANADICUM, L. *Prep.* (Johnston.) From the native vanadate of lead, by dissolving it in nitric acid, passing sulphuretted hydrogen through the solution, to throw down lead and arsenic, filtering, and evaporating the resulting blue liquid to dryness; the residuum is then dissolved in a solution of ammonia, and a piece of sal ammoniac, considerably larger than can be dissolved, introduced; as the latter dissolves, a pulverulent precipitate of vanadate of ammonium is formed, which must be washed, first in a solution of sal ammoniac, and then in alcohol of ·860; by exposing this salt, in an open platinum crucible, to a heat a little below redness, and keeping it constantly stirred, until it acquires a dark red colour, pure vanadic acid is obtained.

Prop., &c. Vanadic acid is orange-coloured, scarcely soluble in water, and forms, with the alkaline bases, soluble salts called vanadates; and with the other bases sparingly soluble salts. All of these have an orange or yellow colour. "Vanadate of ammonia mixed with solution of galls forms a black fluid, which is the best writing ink hitherto known. The quantity of the salt required for this purpose is very small; the writing is perfectly black, and not obliterated by alkalies, acids, chlorine, or other reagents." (Ure.)

VANA'DIUM. V. A rare metal discovered by Sefstom, in 1830, in some Swedish iron extracted from an iron mine near Jönköping. It has since been found in a lead ore from Scotland, and in the iron slag of Staffordshire.

VANIL'LA. *Syn.* VANILLE, Fr. The dried pods of various species of Vanilla, a genus of the natural order *Orchidaceæ*. It is chiefly used in the manufacture of chocolate and perfumery. As a *medicine*, it is much employed on the Continent as an aromatic stimulant and neurotic.—*Dose.* 6 to 12 grs.; in asthenic fevers, hysteria, hypochondriasis, impotency, &c.

Vanilla is reduced to powder (PULVIS VANILLÆ; POUDRE DE VANILLE) by slicing it, and triturating the fragments with twice or thrice their weight of well-dried lump sugar. For SUCRE DE VANILLE, 11 parts of sugar are employed.

must then be well agitated for 5 minutes, and afterwards allowed to settle.

Varnish, Oak. *Syn.* WAINSCOT VARNISH, COMMON TURPENTINE V. *Prep.* 1. Clear pale resin, 3½ lbs.; oil of turpentine, 1 gal.; dissolve.

2. To the last add of Canada balsam, 1 pint. Both are cheap and excellent common varnishes for wood or metal.

Varnish, Oil. The finer qualities are noticed under AMBER, BODY, CARRIAGE, and COPAL VARNISH; the following produces the ordinary oil varnish of the shops:—Take of good clear resin, 3 lbs.; drying oil, ½ gal.; melt, and thin with oil of turpentine, 2 quarts. A good and durable varnish for common work.

Varnish, Painter's. See CARRIAGE, COPAL, MAHOGANY, OAK, OIL, and other varnishes. The selection depending greatly on the colour and quality of the work.

Varnish, Patent Leather. This is carefully prepared drying oil. The skins being stretched on a board, and every trace of grease being removed from them by means of a mixture of fuller's earth and water, they are ready to receive the varnish, which is then spread upon them, very thinly, by means of a species of scraper. The first coat varnish consists of pale Prussian blue (that containing some alumina), 5 oz.; drying oil, 1 gal.; boiled to the consistence of single size, and, when cold, ground with a little vegetable black; it is stoved, and afterwards polished with fine-grained pumice;—the second coating resembles the first, excepting in having a little pure Prussian blue mixed with it;—the third coat varnish consists of a similar mixture, but the oil is boiled until it strings well, and a little more pure Prussian blue and vegetable black are added;—the last coat varnish, or finish, is the same as the third, but must contain ½ lb. of pure dark-coloured Prussian blue, and ¼ lb. of pure vegetable black per gal., to which a little oil copal or amber varnish is often added; each coat being duly stoved and pumiced before the next is applied. The heat of the stove or oven is commonly 120° Fahr. for 'enamelled skins,' as those of the calf and seal, intended for 'uppers;' and 175° to 180° for stout 'japan leather;' the exposure in the stove is commonly for 6 to 10 hours. The skins are next oiled and grained. The 'graining' of the 'enamelled skins' is done by holding the skin in one hand, and with a curved board lined with cork (graining stick), lightly pressed upon the fleshy side, working it up and down until the proper effect is produced.

Varnish, Picture. Several varnishes, especially mastic varnish, are called by this name. Pale copal or mastic varnish is generally used for oil paintings, and crystal, white hard spirit, or mastic varnish, for water-colour drawings on paper.

Varnish, Printer's. Diluted with twice its volume of oil of turpentine, it forms a good common varnish.

Varnish, Sealing-wax. Black, red, or any coloured sealing-wax, broken small, with enough rectified spirit (or methylated spirit) to cover it, digested till dissolved. A most useful varnish for wood-work of electrical or chemical apparatus, for tops of corks, &c.

Varnish, Spirit. *Prep.* 1. (BROWN HARD. —*a.* From gum sandarach, 3 lbs.; pale seed-lac or shell lac, 2 lbs.; rectified spirit (65 o. p.), 2 galls.; dissolve, and add of turpentine varnish, 1 quart; agitate well, strain (quickly) through gauze, and in a month decant the clear portion from the sediment. Very fine.

b. From seed-lac and yellow resin, of each, 1½ lb.; rectified spirit, 5 quarts; oil of turpentine, 1¼ pint; dissolve. Inferior to the last.

2. (WHITE HARD.)—*a.* From gum sandarach (picked), 5 lbs.; camphor, 2 oz.; washed and dried coarsely pounded glass, 3 lbs.; rectified spirit (65 o. p.), 7 quarts; proceed as in making mastic varnish; when strained, add of pure Canada balsam, 1 quart. Very pale, durable, and brilliant.

b. From gum sandarach and gum mastic, of each, picked, 4 oz.; coarsely powdered glass, 8 oz.; rectified spirit, 1 quart; dissolve, and add of pure Strasburg turpentine, 3 oz. Very fine.

3. (SOFT BRILLIANT.) From sandarach, 6 oz.; elemi (genuine), 4 oz.; animé, 1 oz.; camphor, ½ oz.; rectified spirit, 1 quart; as before.

4. (SCENTED.) To the preceding add some gum benzoin, balsam of Peru, balsam of Tolu, oil of lavender, or the essence of musk or ambergris. The first two can only be employed for dark varnishes.

Obs. The above varnishes are chiefly applied to articles of the toilette, as work-boxes, card-cases, &c.; but are also suitable to other articles, whether of paper, wood, linen, or metal, that require a brilliant and quick-drying varnish. They dry almost as soon as applied, and are usually hard enough to polish in 24 hours. They are, however, much less durable, and more liable to crack, than oil varnishes.

Varnish, Stopping-out. *Syn.* PETIT VERNIS, Fr. From lampblack, made into a paste with turpentine. *Used* by engravers. See ETCHING.

Varnish, Tingry's. MASTIC VARNISH.

Varnish, Toy. Similar to common spirit varnish, but using carefully rectified wood naptha as the solvent. See LAC and SPIRIT VARNISH.

Varnish, Transfer. *Syn.* MORDANT VARNISH. *Prep.* From mastic (in tears) and sandarach, of each, 4 oz.; rectified spirit, 1½ pint; dissolve, and add of pure Canada balsam, ½ pint. *Used* for transferring and fixing engravings or lithographs on wood, and for gilding, silvering, &c. See CRYSTAL VARNISH.

Varnish, Turpentine. See MASTIC and OAK VARNISH.

Varnish, Wainscot. See OAK VARNISH.

Varnish, Wax. *Syn.* MILK OF WAX; EMULSIO CERÆ SPIRITUOSA, L. *Prep.* Take of white wax (pure), 1 lb.; melt it with as gentle a heat as possible, add of warm rectified spirit, sp. gr. ·830 (60 o. p.), 1 pint; mix perfectly, and pour the liquid out upon a cold porphyry slab; next grind it with a muller to a perfectly smooth paste, adding more spirit, as required; put the paste into a marble mortar, make an emulsion with water, 3½ pints, gradually added, and strain it through muslin. *Used* as a varnish for paintings; when dry, a hot iron is passed over it, or heat is otherwise evenly applied, so as to fuse it, and render it transparent, after which, when quite cold, it is polished with a clean linen cloth. The most protective of all varnishes.

2. Wax (pure), 5 oz.; oil of turpentine, 1 quart; dissolve. *Used* for furniture. See SEALING-WAX VARNISH.

Varnish, White. See SPIRIT VARNISH, 2 *a* and *b*.

VAR'NISHING. To give the highest degree of lustre to varnish after it is laid on, as well as to remove the marks of the brush, it undergoes the operation of polishing. This is performed by first rubbing it with very finely powdered pumice-stone and water, and, afterwards, with an oiled rag and tripoli, until the required polish is produced. The surface is, last of all, cleaned with soft linen cloths, cleared of all greasiness with powdered starch, and then rubbed bright with the palm of the hand.

In varnishing, great care must be taken that the surface is free from grease or smoke; as, unless this be the case, the best oil or turpentine varnish in the world will not dry and harden. Old articles are usually washed with soap and water, by the painters, before being varnished, to prevent any misadventure of the kind alluded to.

VEAL. "The grain should be close, firm, and white, and the fat of a pinkish-white, not a dead white, and the kidneys well covered with a thick white fat." (Soyer.)

Veal, like pork, requires to be well dressed, to develop its nutritive qualities. It should also be eaten fresh, as a peculiar principle is generated in it when improperly kept, which acts as a malignant poison. See ROASTING, &c.

VEG'ETABLE AL'KALI†. Potassa.

VEGETABLE JUICES. See *below*.

VEGETABLES. Vegetables are organic beings, which are distinguished from animals by a number of characteristics, but, like them, are composed of certain proximate principles, or compounds, which possess a high degree of scientific interest, and in many cases are invaluable to man. Among the most important of these are—albumen, gluten, gum, lignin, starch, sugar, tannin, wax, the fixed and volatile oils, the resins, and gum-resins, the alkaloids, and innumerable forms of extractive matter. Several of these substances are noticed under their respective names.

The method of propagating plants from their seeds, depending on their simple exposure, at the proper season, to warmth and moisture, under the protection of the soil, is well known; that by propagation from 'slips' and 'cuttings,' which will doubtless prove interesting to the amateur gardener, are noticed below.

The choice of slips and cuttings should be made from the side shoots of trees and plants, and, when possible, from such as recline towards the ground, observing, when they are removed by the knife, to leave a little wood of a former year or season's growth attached to them, as such are found to take root more readily than when they are wholly composed of new wood. The time to take slips or cuttings is as soon as the sap gets into full motion. Before setting them the latter should be cut across, just below an eye or joint, with as smooth a section as possible, observing not to injure the bud. The superfluous leaves may be removed, but a sufficient number should be left on for the purposes of vegetation. The common practice of removing all or nearly all the leaves of cuttings is injudicious. In some cases leaves alone will strike root. When cuttings are set in pots, they should be so placed as to reach to the bottom and touch the sides throughout their whole length, when they will seldom fail to become rooted plants. In the case of tubular-stalked plants, it is said to be advantageous to insert both ends into the soil, each of which will take root, and may then be divided, when two plants will be produced instead of one. An equable temperature, a moist atmosphere, a shady situation, and a moderate supply of water, are the principal requisites to induce speedy rooting. Excess of any of these is prejudicial. When the size of the cuttings admit, it is better to place them under a hand- or bell-glass, which will preserve a constant degree of heat, and prevent evaporation from the surface of the leaves, which is the most common cause of their dying, especially in hot, dry weather.

Qual. The vegetable kingdom furnishes by far the larger portion of the food of man, and indirectly, perhaps, the whole of it. The great value of culinary vegetables and fruit in a mixed diet need not be insisted on, since it is a fact which is almost universally known and appreciated.

In the choice of culinary vegetables, observe, that if they are stiff and break freely and crisply, they are fresh, and fit for food; if, on the contrary, they have a flabby appearance, or are soft or discoloured, they are stale, and should be rejected.

The dose of the generality of vegetable substances that exercise no very marked action on the human frame is about ½ to 1 dr. of the powder, night and morning; or 1 oz., or q. s. to impart a moderately strong colour or taste,

may be infused, or boiled, in 1 pint of water, and a wine-glassful or thereabouts, taken 2 or 3 times a day.

Collection and pres. The following general directions are given in the London Pharmacopœia for the collection and preservation of vegetable substances—(vegetabilia Ph. L.):—

"Vegetables are to be collected in dry weather, and when neither wet with rain nor dew; they are to be collected annually, and are not to be kept beyond a year.

"Barks are to be collected at that season in which they can be most easily separated from the wood." Spring is the season here alluded to; as at this time, after the sap begins to ascend, the bark is, in general, very easily separated.

"Flowers are to be collected recently blown." The red rose, however, must be gathered before the buds are expanded.

"Fruits and seeds are to be collected when ripe.

"Herbs and leaves are to be gathered after the flowers have expanded, and before the seeds are mature.

"Roots and rhizomes (underground stems), for the most part, are to be dug up after the old leaves and stalks have fallen, and before the new ones appear." ("Roots, which are required to be preserved fresh, should be buried in dry sand."—Ph. L. 1836.)

"Seeds are to be collected when they are ripe, and before they drop from the plant." ("They ought to be preserved in their seed vessels."—Ph. L. 1836.)

"The different parts of vegetables are to be kept dried for use, except where we shall otherwise direct. Expose those you wish to dry, within a short time after they have been gathered, in shallow wicker baskets, to a gentle heat, in a dark place, and where there is a current of air. Then, the moisture being driven off, gradually increase the heat to 150° Fahr., in order that they may be dried. Finally, preserve the more delicate parts, viz., flowers and leaves, in black glass vessels, well closed, and keep the rest in proper vessels, preventing the access of light and moisture."

Fruits, culinary vegetables, and vegetable juice, of every class, may be preserved for any length of time by several of the methods described under PUTREFACTION. On the small scale, the following method is often adopted:—The substances to be preserved are put into strong glass or stoneware bottles, with necks of a proper size, which are then corked with the greatest care, tied or wired, and luted with a mixture of lime and soft cheese, or with a paste formed of linseed meal and water, spread on rags; or, tin cases are employed, and are soldered up instead of being corked. The bottles are then placed in an oven, the temperature of which is cautiously raised to fully 212° Fahr.; or, they are enclosed, separately, in canvas bags, and put into a copper of water to which some salt has been added, which is then gradually heated until it boils, and thus kept for 15 or 20 minutes; the whole is next left to cool, when the bottles are taken out and carefully examined before being laid by, lest they should have cracked, or the lute have given way.

Herbs and flowers are now generally preserved for distillation by means of common salt. The objection which is raised against the use of fresh aromatic plants is thus obviated, whilst the odours of the distilled products are rendered superior to those obtained from either the recent or dried plant, fruit, or flower, without the great loss, inconvenience, or trouble-attending the common methods. Besides, many aromatic and odorous substances almost entirely lose their properties by drying; while most of them yield more oil, and that of a finer quality, in the fresh than in the dried state. The odours of roses, elder flowers, and a variety of others, are vastly improved by this treatment, and these flowers may thus be preserved with ease and safety from season to season, or even longer, if required. The process simply consists in intimately mixing the flowers, or other vegetables, soon after being gathered, with about ¼ their weight, or less, of good dry salt, and ramming down the mixture as tightly as possible in strong casks. The casks are then placed in a cold cellar, and covered with boards, on which heavy weights are put, to keep the mass tight and close. See FRUITS, PUTREFACTION, &c.

Juices of Vegetables. 1. (EXPRESSED VEGETABLE JUICE, SIMPLE V. J.; SUCCI EXPRESSI, L.) These are obtained by bruising the fresh leaves, or other vegetable matter, in a marble mortar, or in a mill, and expressing the liquid portion by means of a powerful screw press. After defecation for 12 or 14 hours in a cold situation, the juice is either decanted or filtered from the feculous sediment, and is next heated for some minutes to about 185° Fahr., to coagulate albuminous matter. The clear portion is subsequently separated as before, and the product preserved for use in well-closed and well-filled bottles, in a cool situation. Some plants, as borage, cabbage, &c., require the addition of ¼ of water before being pressed. The expression of the juice of lemons, oranges, quinces, &c., is facilitated by previously mixing the pulp with clean chopped straw. Buckthorn berries, mulberries, &c., after being crushed between the hands, are commonly left for 3 or 4 days to undergo a slight fermentation, before pressing them.

The expression of the juices of the narcotic plants, and of some other vegetables, has lately assumed considerable interest, from these juices being now extensively used in pharmacy for the preparation of extracts and the preserved juices, noticed below. It appears that the juice of young plants just coming into flower yield only ⅛ the amount of extract which may be obtained from the same quantity of juice expressed from the matured plant, or

when the flowers are fully blown, and the strength of the product is also inferior; the case appears to be best met by selecting the plants when more than half the flowers are fully blown. The leaves alone should be preferably employed, and should be exclusively of the second year's growth, when the plants are biennials. (Squire.) The homœopathists commonly employ the whole flowering herb.

The INSPISSATED VEGETABLE JUICES (SUCCUS SPISSATIS) are now included among the extracts.

The principal simple vegetable juices of commerce are:—

BUCKTHORN JUICE (SUCCUS RHAMNI—Ph. L.), from the fruit of *Rhamnus catharticus*, or buckthorn berries.

CITRON JUICE (SUCCUS CITRI), chiefly imported from Italy in large casks.

LEMON JUICE (SUCCUS LIMONUM—Ph. L.), from lemons that spoil before they can be sold; also imported.

MULBERRY JUICE (SUCCUS MORI—Ph. L.), from the fruit of the mulberry.

ORANGE JUICE (SUCCUS AURANTII), obtained from the same source as that of lemons.

CONCENTRATED ORANGE JUICE (SUCCUS SPISSATIS AURANTII vel AURANTIORUM) and CONCENTRATED LEMON JUICE (SUCCUS SPISSATUS LIMONUM) are prepared by evaporating the fresh juices of oranges and lemons, either alone or mixed with sugar, and are employed as substitutes for the fruit, where the latter cannot be obtained.

2. (ALCOHOLISED VEGETABLE JUICES, PRESERVED V. J.; TINCTURES OF RECENT PLANTS; SUCCI ALCOHOLATI, L.; ALCOOLATURES, Fr.) *Prep. a.* The juice, obtained by powerful pressure, in the manner noticed above, is allowed to remain for 24 hours in a cold place, when the clear portion is decanted from the feculous matter which has subsided, and is then agitated with one half its volume of rectified spirit (56 o. p.); after another 24 hours the clear portion is again decanted and, if necessary, filtered through bibulous paper or linen. In this way are now generally prepared the preserved juices of aconite, belladonna, colchicum (corms), hemlock, henbane, foxglove, elaterium, lactura virosa, taraxacum, &c., sold in this country.

b. (P. Cod.) To the fresh leaves, bruised in a marble mortar, is added an equal weight of rectified spirit, and, after maceration for 15 days, the whole is pressed, and the resulting tincture filtered. In this manner are prepared tinctures of the fresh leaves of aconite (tinctura aconiti cum foliis recentibus, belladonna, foxglove, hemlock, henbane, strong-scented lettuce (*Lactuca virosa*), stramonium, trailing poison oak (*Rhus toxicodendron*), mugwort (*Artemisa vulgaris*), colchicum (corms), squirting cucumber, white poppy, taraxacum, &c., &c., of the Paris Codex.

Obs. These tinctures are much more powerful, and more certain in their operation, than those prepared from the dried plants. The commencing dose is from 2 to 5 drops, the effects of which should be carefully watched. The products of the first of the above formulæ keep as well as the ordinary tinctures, and there is less waste of spirit than with the second. That of the P. Cod. is, however, preferred by M. Soubeiran, as affording more uniform products; an opinion which is questionable. Béral orders equal weights of juice and spirit; Mr. Squire recommends ½ part; Messrs. Bentley & Davenport ¼ part (both by volume), and Mr. Gieseke only ⅓ part (by weight), of spirit, to 1 part of the expressed juice. The homœopathists generally go with M. Béral. "Our own experience, which has been very considerable, and extends over upwards of 16 years, leads us to prefer the proportions given in formula *a*, which are similar to those of Mr. Squire. If less spirit be employed, the product is apt to suffer rapid deterioration when kept in a warm shop or surgery." (Cooley.)

3. (ETHERIZED VEGETABLE JUICES; SUCCI ÆTHERIZATI,—L.; ÉTHÉROLATURES, SUCS ETHÉRÉS, Fr.) For these we are indebted to M. Bouchardat. They are prepared as follows: Ether is gradually added to the depurated freshly expressed juice, until, after active agitation, a thin layer of it rises to the surface on the mixture being allowed to repose for a minute or two; the whole is then set aside for 24 hours, when the supernatant ether is expertly removed by means of a pipette or syringe, and the juice is filtered; lastly, the decanted ether is returned to the filtrate, and the etherised juice is at once put into well-stoppered bottles. For *use*, one of the bottles is reversed, and the dose taken from the lower part, so that the ether remains behind. We find, in practice, that decantation, carefully conducted, may be substituted for filtration; thus not only rendering the process less costly, but ensuring a more uniform product.

The etherised juices are said to retain their active properties for an indefinite period. The method has been successfully applied to the juices of aconite, anemone, black hellebore, and hemlock, and is probably applicable to many others; but, we think, not to the juices of all the narcotic plants, as has been asserted.

VEGETA'TION (Metallic). This name has been fancifully applied to the following:—

LEAD TREE; ARBOR SATURNI. Take of sugar of lead, 1 oz.; distilled water, 1½ pint; acetic acid, a few drops; dissolve, place the liquid in a clear white glass bottle, and suspend a piece of zinc in it, by means of a fine thread.

SILVER TREE; ARBOR DIANÆ. From nitrate of silver, 20 grs.; water, 1 fl. oz.; dissolve in a phial, and add about ½ dr. of pure mercury.

TIN TREE; ARBOR JOVIS. From chloride

of tin, 3 drs.; nitric acid, 10 to 15 drops; distilled or rain water, 1 pint; dissolve in a white glass bottle, and hang in it, by a thread, a small rod of zinc.

Obs. In the above experiments, the metals are precipitated in a very beautiful arborescent form. It is curious to observe the laminæ shoot out, as it were, from nothing, assuming forms resembling real vegetation. This phenomenon results from voltaic action being set up between the liquid and the metal.

VEGETO-AL'KALI. See ALKALOID.

VEL'LUM. A fine kind of parchment prepared from the skins of calves, kids, and lambs. The skins are limed, shaved, washed, and stretched in hoops or other frames, where they are scraped and trimmed with the currier's fleshing-knife, and next carefully rubbed down with pumice-stone; they are, lastly, polished with finely powdered chalk or fresh-slaked lime, and then dried. A green colour is given with a solution of crystallised verdigris, to which a little cream of tartar and nitric acid has been added; and a blue colour, with a solution of indigo. The surface is often finished off with white of egg, and subsequent friction.

The skins of sheep are commonly used for parchment; those of he-goats and wolves for drum-heads; and those of the ass, for battledores. The species of vellum used for church services by binders is said to be prepared from pig-skins. See POUNCE.

VEL'VET COLOURS. *Syn.* MAP STAINS, PAPER S.; LACCA FLUIDA, L. *Prep.* 1. (BLUE.)—*a.* Dissolve litmus in water, and add ⅓ of spirit of wine.—*b.* Dilute Saxon blue or sulphate of indigo with water. If required for delicate work, neutralize the acid with chalk.—*c.* To an aqueous infusion of litmus add a few drops of vinegar, until it turns of a full blue.

2. (GREEN.)—*a.* Dissolve crystallised verdigris in water.—*b.* Dissolve sap green in water, and add a little alum.—*c.* Add a little salt of tartar to a blue or purple solution of litmus, until it turns green.—*d.* Dissolve equal parts of crystallised verdigris and cream of tartar in water.

3. (PURPLE.)—*a.* Steep litmus in water, and strain the solution.—*b.* Add a little alum to a stained decoction of logwood.—*c.* Add a solution of carmine (red) to a little blue solution of litmus or Saxon blue.

4. (RED.)—*a.* Macerate ground Brazil wood in vinegar, boil a few minutes, strain, and add a little alum and gum.—*b.* Add vinegar to an infusion of litmus until it turns red.—*c.* Boil or infuse powdered cochineal in water containing a little ammonia or sal volatile.—*d.* Dissolve carmine in liquor of ammonia, or in weak carbonate of potash water; the former is superb.

5. (YELLOW.)—*a.* Dissolve gamboge in water, and add a little alum.—*b.* Dissolve gamboge in equal parts of proof spirit and water. Golden coloured.—*c.* Steep French berries in boiling water, strain, and add a little alum.—*d.* Steep turmeric, round zedoary, gamboge, or annotta, in a weak ley of subcarbonate of soda or potash.

Obs. The preceding, thickened with a little gum, are used as inks for writing, as colours to tint maps, foils, paper, artificial flowers, &c., and to paint on velvet. Some of them are very beautiful. Those containing litmus are, however, fugitive. It must be observed, that those made with strong spirit do not mix well with gum water, unless somewhat diluted with water. Any other transparent colours or stains may be employed for painting on velvet, as well as the above.

VELVET LEAF. *Syn.* PAREIRA BRAVA, PAREIRA (Ph. L. E. & D.), L. "The root of *Cissampelos Pareira*" (Ph. L.), white pareira or velvet leaf. It is tonic, aperient, and diuretic.—*Dose.* 20 to 60 grs.; in chronic and purulent inflammation and extreme irritability of the bladder; in leucorrhœa, dropsy, ulceration of the kidney, &c.

VEN'ISON. The flesh of several species of deer. That from good land, killed at the proper season, and eaten in a moderately fresh state, is most easily digestible, and, perhaps, the most wholesome, of all the red meats; but when it is 'high,' or in a state of incipient putrefaction, it is far from wholesome, and often poisonous.

VENO BENO (La). See TEA.

VENTILA'TION. The proper ventilation of our habitations, as well as of other buildings in which we pass any considerable portion of our time, is quite as necessary to health as food and clothing. Lavoisier, writing in the middle of the last century, remarks—"It is certain that mankind degenerate when employed in sedentary manufactures, or living in crowded houses, or in the narrow lanes of large cities; whereas they improve in their nature and constitution in most of the country labours which are carried on in the open air." Yet many persons, by the care which they take to shut out fresh air, and to prevent the escape of that which their own bodies, by pulmonary and surfacial respiration, have contaminated, would seem to hug to themselves the discomfort of breathing over and over again an impure and unrefreshing atmosphere, and to be anxious to finish their career by lingering suicide. The almost universal indifference to the subject, considering its importance, is unaccountable.

The first step towards effecting and maintaining a liberal supply of fresh air, is either by means of ventilators or by regularly opening the windows for stated periods daily. During the colder portion of the year, when fires are kept burning, and there is an upcurrent in the chimney, nothing is so simple and effective as the well-known chimney-valve of Dr. Arnott; and, indeed, without this, open fires are powerful instruments of ventilation. In cold weather, where expense is not an ob-

ject, the apartments may be supplied with air that has been previously warmed by passing through a heated chamber, on the principle recommended by Dr. Reid; but care must be taken that, in warming the air, we do not over-heat it, nor contaminate it.

A sufficient supply of light, another powerful sanitary agent, is now regarded as nearly as essential as thorough ventilation, and the two are commonly treated of together. According to Palladio, the opening of windows should not exceed a fourth, nor be less than a fifth, of the length of the side of a room, and should be in height two and one sixth times the width. Mr. Gwilt, another high authority on this subject, has given as a definite rule, that we should allow 1 square foot of glass to every 100 cubic feet of space in any apartment or enclosure. A great deal must, however, depend on the shape of the apartment; but, in all cases, care should be taken that the windows are placed at the longest side of the room, and not at the narrowest, or the end of it. A southern aspect affords the most light and heat; a northern one, the most diffused and least variable light, and is hence usually chosen by artists for their studios.

VERA'TRINE. $C_{32}H_{53}N_2O_8$. *Syn.* VERATRIA, VERATRINA, SABADILLINE; VERATRIA (B. P., Ph. L. & E.), L. An alkaloid discovered by Pelletier and Caventou, in the seeds of *Asagreæ officinalis* (sabadilla), and in the rhizomes of *Veratrum album* (white hellebore).

Prep. 1. (Ph. E.) Digest sabadilla seeds in boiling water for 24 hours, then squeeze them, dry them thoroughly by a gentle heat, beat them in a mortar, and separate the seeds from the capsules by agitation in a deep and narrow vessel; next grind the seeds in a coffee-mill, and exhaust them by percolation with rectified spirit; concentrate the resulting tincture by distillation, so long as no deposit forms, and pour the residuum, whilst still hot, into 12 times its volume of cold water; then filter through calico, and wash the residuum on the filter as long as the washings yield a precipitate with ammonia; unite the filtered liquid with the washings, add ammonia in excess, collect the precipitate on a filter, wash it slightly with cold water, and dry it first by imbibition with filtering paper, and then in the vapour bath. "The product is not pure, but sufficiently so for medical use. From this coloured substance it may be obtained white, but at considerable loss, by solution in very weak hydrochloric acid, decolorisation with animal charcoal, and reprecipitation with ammonia."

2. (Ph. L. 1836.) This is the same in principle as the last; a tincture is formed by boiling the seeds in rectified spirit, which is then evaporated to a syrup, dissolved in very dilute sulphuric acid, the veratrine precipitated with magnesia, redissolved in very dilute acid, treated with animal charcoal, the filtrate again evaporated to a syrup, and precipitated with ammonia; it is, lastly, washed and dried.

3. By means of ether, as noticed under ALKALOID and ACONITINE. This is by far the best method.

Prop. Pure veratrine is perfectly white; but as usually met with, it is a yellowish or greenish-white powder; it is highly acrid; uncrystallisable; scarcely soluble in water, soluble in ether, and freely soluble in hot alcohol; heated to about 125° Fahr., it fuses like wax, and solidifies, upon cooling, to a transparent yellow mass. With the dilute acid it forms salts, which are either amorphous or difficultly crystallisable. The smallest possible portion of its powder causes violent sneezing.

Tests. 1. Potassa, ammonia, and their carbonates, give flocculent white precipitates, which at first are not crystalline under the microscope, but which, after some minutes, assume the appearance of small scattered clusters of short prismatic crystals; they are insoluble in excess of potassa and its carbonate, and only very slightly so in excess of ammonia.—2. With sulphuric acid it strikes an intense red colour, changing afterwards to crimson, and finally to violet.—3. A dilute acetic solution of veratrine is turned to a superb red by strong sulphuric acid.

Veratrine is distinguished from brucine and the other alkaloids by its fusibility—by the crystalline form of its precipitate with potassa, and—by its reaction with oil of vitriol.

Uses, &c. "As an external application, it has been efficaciously employed by Magendie in France, and by Dr. Turnbull in this country; but the extravagant eulogies of the latter have not tended to confirm the reputation of this remedy." (Dr. A. T. Thomson.) From 6 to 12 grs., dissolved in 1 fl. oz. of rectified spirit, as a liniment; or 30 grs., mixed with 1 dr. of olive oil, and 1 oz. of lard, as an ointment, have been occasionally found very serviceable in neuralgia, and other like painful affections, and in gouty and rheumatic paralysis. As an internal remedy, it possesses no advantage, as it merely acts as a violent and depressing cathartic.—*Dose.* $\frac{1}{24}$ to $\frac{1}{12}$ gr. In larger doses, it acts as a powerful irritant poison. For antidotes, &c., see ALKALOID.

VERA'TRUM. See WHITE HELLEBORE.

VER'DIGRIS. *Syn.* ÆRUGO, L.; VERT-DE-GRIS, Fr. This is a mixture of several basic acetates of copper which have a green or blue colour. It is obtained in the wine districts of the south of Europe, by the action of refuse grapes, from which the juice has been expressed, on thin sheets of copper When pure, it should dissolve, almost entirely, and without effervescence, in dilute sulphuric acid. It is very poisonous; for antidotes, see COPPER.

An inferior quality of verdigris is now prepared from pommage, or apple marc, in the cider districts of England.

Verdigris, Distilled. *Syn.* CRYSTALLISED VERDIGRIS. This name is applied to the normal acetate of copper, which is prepared in the wine districts by dissolving ordinary verdigris, 1 part, in good distilled vinegar, 2 parts; the operation being performed in a copper vessel, by the aid of a gentle heat and agitation; the solution is afterwards slowly evaporated until a pellicle begins to form on the surface, when it is transferred into glazed earthen pans ('oulas'), in each of which is placed 2 or 3 cleft sticks, and it is then left in a warm apartment for 14 or 15 days, to crystallise.

A spurious article is often prepared by adding a solution of sulphate of copper, 12½ lbs., to a solution of sugar of lead, 19 lbs., or q. s., and filtering, evaporating, and crystallising the mixture.

There is an acetate of copper and lime which resembles distilled verdigris in colour. It was manufactured pretty extensively in Scotland some years ago, and fetched a high price, till Dr. Ure published an analysis of it in the 'Edin. Phil. Trans.' It is much inferior for all uses in the arts.

Pure distilled verdigris is entirely soluble in water, and is not precipitated on the addition of sulphuric acid or of ammonia in excess.

Verdigris, English. *Prep.* Blue vitriol, 24 lbs.; white vitriol, 16 lbs.; sugar of lead, 12 lbs.; alum, 2 lbs.; (all coarsely powdered;) mix, and heat them in a pot over the fire until they unite into a mass. Sold by fraudulent dealers for foreign verdigris.

VER'DITER. *Syn.* BLUE VERDITER, REFINER'S VERDITER, CENDRES BLEUES, Fr. A blue pigment, obtained by adding chalk, whiting, or milk of lime, to a solution of copper in nitric acid; or, by triturating recently precipitated and still moist carbonate of oxide of copper with hydrate of lime.

Prep. A quantity of whiting or milk of lime is put into a tub, and upon this the solution of copper is poured; the mixture is stirred every day for some hours together, until the liquor loses its colour; it is then poured off, and more solution of copper added; this is repeated until the whiting or lime has acquired the proper colour; the whole is then washed with water, drained, spread on chalk stones, and dried in the sun.

Obs. The cupreous solution employed in the above process is made by neutralising the nitric solution obtained from the refiners of gold and silver, by heating it along with metallic copper. For the finer qualities of verditer the lime should be of the purest kind, and the cupreous precipitate should be carefully triturated with it, after it is nearly dry, by which a fine velvety appearance is produced. The 'cendres bleues en pâtes' of the French differ from the above mainly in a solution of chloride of copper being employed, and in the resulting green precipitate being turned blue by the action of carbonate of potassa. Verditer is made into crayons whilst moist, or dried into a powder, or it is used as a water colour in the moist state.

Verditer, Green. *Syn.* BREMEN GREEN. The process for refiner's verditer frequently miscarries, and a green colour is produced instead of a blue one. It may also be obtained directly by omitting the 'blueing up' with carbonate of potassa, mentioned above.

VER'JUICE. *Syn.* AGRESTA, OMPHACIUM, L. The expressed juice of unripe grapes. The term is also often extended to the expressed juice of the wild or crab apple. It was formerly used as an astringent and refrigerant in medicine; but it is now principally employed as an ingredient in sauces, ragoûts, &c.

VERMICEL'LI. This, like macaroni, is prepared from a stiff paste made of a peculiar fine kind of granular wheat flour, called semoule, which is mixed up with hot water, and, after being well kneaded, is formed into small ribands, cylinders, or tubes, by being placed in a vertical cylinder press, the bottom of which is filled with proper-shaped holes, through which it is driven by an iron plate or 'follower' being forced down by a powerful screw. The pieces that protrude are broken off, twisted into any desired shape upon paper, and dried. Those in the form of fillets or ribands are called 'lazagnes.' See MACARONI.

VER'MIFUGES. *Syn.* ANTHELMINTICS; ANTHELMINTICA, HELMINTHAGOGA, VERMIFUGA, L. Medicines employed to destroy or expel intestinal worms. Some of these, as coarsely powdered tin- and iron-filings and cowhage, act as mechanical agents, by irritating the worms; others have a specific action upon worms, as male fern, kousso, santonin, &c.; others, again, owe their power to their action as purgatives, as calomel, gamboge, jalap, &c. See WORMS.

VERMIL'ION. *Syn.* FACTITIOUS CINNABAR, RED SULPHIDE OF MERCURY, RED SULPHURET OF MERCURY. This article may be prepared both in the moist and dry way; that of commerce is almost entirely obtained by the latter.

Prep. 1. By sublimation. Take of pure mercury, 202 parts; pure sulphur, 33 parts; fuse them together by a gentle heat, observing not to allow the mass to take fire; when fused, cover over the vessel, and, when the whole has become cold, powder the mass, and sublime it in a closed vessel, so placed in a furnace that the flame may freely circulate and play upon it to about half its height, the heat being at first gradually applied, and afterwards augmented until the lower part of the subliming vessel becomes red hot; the cold sublimate is broken into pieces, ground along with water to a fine powder, elutriated, passed through a sieve, and dried. *Prod.* Fully 112⅔ of the weight of the mercury employed.

2. In the humid way. (Brunner.) Take of pure quicksilver, 300 parts; pure sublimed sul-

phur, 114 parts; triturate them together for several hours, until a perfect 'ethiops' is formed, add gradually of caustic potassa, 75 parts, (dissolved in) water, 450 parts; continue the trituration for some time longer, then gently heat the mixture in an iron vessel, at first constantly stirring, but afterwards only from time to time, observing to keep the heat at about 113°, or, at all events, under 122° Fahr., and to add fresh water, to compensate for the portion evaporated. When the colour begins to redden, great caution is requisite to preserve the mixture at the lower temperature, and to keep the sulphuret of mercury perfectly pulverulent; as soon as the colour becomes nearly 'fine,' the process must be conducted with increased caution, and at a lower heat for some hours, or until a rich colour is produced, when the newly formed vermilion must be elutriated with water, to separate any particles of metallic mercury, and carefully dried. *Prod.* 332 parts of vermilion, equal in brilliancy to the finest Chinese.

Obs. It has been said that the rich tone of Chinese vermilion may be imitated by adding to the materials 1/9 of sulphuret of antimony, and by digesting the ground sublimate, first in a solution of sulphuret of potassium, and next in diluted hydrochloric acid, after which it must be well edulcorated with water, and dried. Our own belief is, that the finer qualities of vermilion owe their superiority of shade more to the care bestowed on their sublimation, and the extent to which their division is carried, than to anything else.

Vermilion is a beautiful and permanent red pigment, and works and covers well both in oil and water.

VERTIGO. Dizziness and swimming of the head. In its more serious forms there is more or less mental confusion; the objects around the patient appear in motion, the ears are oppressed with strange sounds, and visible illusions are experienced, whether the eyes be closed or open, and in darkness as well as in the light. The causes are fulness of the vessels of the head, nervous derangement, general debility, hæmorrhage, the use of narcotics, an overloaded stomach, and, in some cases, an empty one. It is also frequently symptomatic of fevers and inflammations, and of a condition threatening apoplexy. The treatment must be varied, according to the cause and the peculiar habit or condition of the patient.

VESICANTS. *Syn.* EPISPASTICS; EPISPASTICA, VESICANTIA, L. Substances which vesicate, or raise blisters. Among these are the cantharis or blistering fly, mezereon, croton oil, boiling water, &c.; the first only of which is now in common use in England.

"It is a principle sufficiently established with regard to the living system, that, where a morbid action exists, it may often be removed by inducing an action of a different kind, in the same or a neighbouring part. On this principle is explained the utility of blisters in local inflammation and spasmodic action, and it regulates their application in pneumonia, gastritis, hepatitis, phrenitis, angina, rheumatism, colic and spasmodic affections of the stomach; diseases in which they are employed with the most marked advantage. A similar principle exists with respect to pain; exciting one pain often relieves another. Hence blisters often give relief in toothache, and some other painful affections. Lastly, blisters, by their operation, communicate a stimulus to the whole system, and raise the vigour of the circulation. Hence, in part, their utility in fevers of the typhoid kind, though in such cases they are used with still more advantage to obviate or remove local inflammation." ('Med. Lex.')

Blisters are commonly prepared with cantharides plaster, or with some other preparation of cantharides; and, in the former case, are usually lightly covered with the powdered fly. In order to prevent the action of the cantharides upon the mucous membrane of the bladder, blistering plasters are often sprinkled with a little powdered camphor, or, better still, are moistened with camphorated ether, which leaves a thin layer of camphor. In all these cases the layer should not be too thick, for in that case the plaster would not take effect.

When it is not wished to maintain a discharge from the blistered part, it is sufficient to make a puncture in the vesicle, to let out the fluid; but when the case requires the blister to be 'kept open,' as it is called, the whole of the detached cuticle is carefully removed with a pair of scissors, and the part is dressed with either the ointment of cantharides or of savine, at first more or less diluted with lard, or simple ointment, with an occasional dressing of resin cerate. According to Mr. Crowther, the blistered surface is best kept clean by daily fomentation with warm water.

Of late years, to obviate the unpleasant effects occasionally arising from the common blister, various compounds having cantharides for their base have been wrought before the public. Of these, the vesicating collodion noticed under COLLODION is the most convenient and effective. The following also deserve notice:—

1. Take of cantharides, in fine powder, 2 parts; spermaceti, 2 parts; olive oil, 4 parts; white wax, 8 parts; water, 10 parts; simmer, with constant agitation, for 2 hours, strain through flannel, separate the plaster from the water, gently remelt it with common turpentine, 1 part, and spread the mass whilst still fluid. This nearly resembles the form recommended by MM. Henry and Guibourt.

2. (P. Cod.) Distil off the ether from a concentrated ethereal tincture of cantharides, melt the oily residue with twice its weight of white wax, and spread the mixture on thin oiled silk, or on cloth prepared with wax plaster.

3. (Oettinger.) Cantharidal ether (prepared from cantharides, 1 part; ether, 2 parts), and sulphuric ether, of each, 10 dr.; turpentine and black resin, of each, 2½ drs.; mix, dissolve, and apply it to the surface of stretched silk or taffeta which has been previously prepared with two coatings of a solution of isinglass.

Obs. The above compounds are spread on leather, linen, paper, silk, oiled silk, taffeta, &c., and then form the numerous compounds vended under the names of—blistering tissue, charta epispastica, rannus vesicatorius, papier epispastique, sparadrapum vesicatorium, taffetas vesicans, tela vesicatoria, &c.

Acetic extract of cantharides, croton oil, or extract of mezereon, is sometimes substituted for the ethereal extract ordered in the above formulæ.

The 'papier epispastique' of Vée is prepared of three strengths, which are respectively distinguished by the colours white, green, and red. The composition is made by boiling powdered cantharides for an hour with water, lard, and green ointment, or with lard coloured with alkanet root, adding white wax to the strained fats, and spreading the mixture whilst fluid:—No. 1 is made with 10 oz. of cantharides to 4 lbs. of lard; No. 2 of 1 lb. of cantharides to 8 lbs. of green ointment; and No. 3, of 1½ lb. of flies to 8 lbs. of reddened lard. To each are added 2 lbs. of white wax. (Dorvault.)

The magistral blister of Valleix is a revival of the vesicating epithem. See BLISTER, CANTHARIDES, COLLODION, &c., and *below*.

VESICATION. The formation of a blister is a vital process, and its success may be taken as a proof of the presence of life. Hence, a French physician, Dr. Mandl, has suggested such a stimulation of the skin as would ordinarily cause a blister as a test of life, in those cases of long-continued trance which we occasionally hear of, where all the functions of life seem to be extinct. Dr. Mandl's plan is to apply a stick of lunar caustic. The application of a little strong vinegar of cantharides, or other cantharidal blister, of the size of a sixpenny piece, or of two or three spoonfuls of boiling water by means of a bent tube of like diameter, is however, more certain and satisfactory.

VESICATORIN. *Syn.* CANTHAR'IDIN, CANTHARIDINA, CANTHARIDES-CAMPHOR. The blistering principle of Spanish flies, discovered by M. Robiquet.

Prep. 1. (P. Cod.) Exhaust powdered cantharides with concentrated alcohol, by percolation; distil off the spirit from the filtered tincture, and leave the residuum to deposit crystals; these may be purified by dissolving them in boiling alcohol, digestion with animal charcoal, filtration whilst hot, and crystallising by refrigeration.

2. (Thierry.) Macerate cantharides (in coarse powder) for several days in ether, in a closed displacement apparatus; then, after the whole of the soluble matter has been extracted by the addition of fresh portions of ether, pour on sufficient water to displace the retained ether; next distil off the ether, dissolve the remaining extract in boiling alcohol, filter while hot, and abandon the filtrate to spontaneous evaporation. *Prod.* ·5%.

3. Digest the aqueous extract of cantharides in hot alcohol, filter, evaporate to dryness, digest the residuum in sulphuric ether, evaporate, and slightly wash the resulting crystals with cold alcohol.

Prop., &c. Micaceous plates resembling spermaceti; fusible; vaporizable; insoluble in water; soluble in ether, oils, acetic acid, and hot alcohol; powerfully vesicant and poisonous. Its vapour, even at ordinary temperatures, frequently produces temporary blindness. The 1-100th part of a grain, placed on a piece of paper, and applied to the edge of the lower lip, caused small blisters in 15 minutes, which, when rubbed with a little simple cerate, extended over a large surface, and covered both lips with blisters. (Robiquet.)

VETCH. The common name of various leguminous plants of the genera *Vicia* and *Ervum*, now much cultivated as green fodder for milch cows and working stock. The seeds (tares) were formerly reputed detersive and astringent. Those of "the Canadian variety make good bread." (Lindley.)

VETERINARY MEDICINES. The common form of medicine for horses, is that popularly known as horse balls. They are usually prepared by mixing the dry ingredients, in the state of powder, with a sufficient quantity of treacle, or syrup bottoms, to give the mass a proper consistence for rolling into balls; adding, when necessary, linseed meal, or any other simple powder, to increase the bulk. The usual practice among the veterinary druggists is to keep a compound known in the trade as 'ball-mass,' or 'common mass,' ready prepared to give form and bulk to more active ingredients. This is usually made of about equal parts of linseed meal and treacle, together with a little palm or lard, thoroughly incorporated by kneading with the hands; and it is kept in a cool situation, tied over to prevent it drying and hardening. For use, the ball-masses are either rolled or moulded into small cylinders of about 1½ to 1¾ oz. in weight; and in size, from 2 to 2¾ inches long, and from about ½ to ⅞ of an inch in diameter; and they are wrapped in soft paper, which is administered with them. Those for dogs are commonly formed into large boluses or nut-like pieces. The common practice, in some houses, of adding a little salt of tartar or acetate of potassa to ball-masses kept in stock, for the purpose of preserving them in a soft state, is not to be commended, since these articles decompose many of the saline and mineral compounds which are subsequently added to them.

Medicines for neat cattle are always administered in a liquid form, popularly called drenches. A similar plan is adopted with small cattle, as sheep and goats. For these, however, the quantity should seldom exceed ½ pint. In all cases, drenches should be very slowly administered.

The following are a few useful horse-balls:—

ALTERATIVE BALLS.—1. Levigated sulphuret of antimony, sulphur, and linseed meal, of each, 3 oz.; nitre, 2 oz.; palm oil, q. s. to form a mass; for 12 balls. One to be taken every day, or every other day.

2. (Bell.) Sulphuret of antimony, nitre, sulphur, and ethiop's mineral, of each, 3 oz.; soft soap, 10 oz.; oil of juniper, ½ oz.; for 12 balls. As the last.

3. (White.) Sulphuret of antimony, caraways, and treacle, of each, ½ oz.; for one ball. As the last.

CORDIAL BALLS.—1. (Blaine.) Coriander seed, caraway, and gentian, of each, 8 oz.; ginger, 4 oz.; oil of aniseed, ½ oz.; honey or palm oil, q. s. to form a mass. Cordial, warming, and stomachic.—*Dose.* 1½ oz.

2. (Hill.) Anise, caraway, and cumin seed, of each, 4 lbs; ginger, 2 lbs.; treacle, q. s.; divide into 1½-oz. balls. *Prod.* 21 lbs.

COUGH BALLS.—1. (Blaine.) Ipecacuanha, 1 dr.; camphor, 2 drs.; honey, q. s. to form a ball. One night and morning.

2. (B. Clark.) Emetic tartar and benzoin, of each, 2 drs.; squills, 4 drs.; spermaceti and balsam of copaiba, of each, 1 oz.; elecampane and sulphur, of each, 2 oz.; syrup of poppies, q. s. to mix; for 8 balls. As the last.

DIURETIC BALLS.—1. (Bracy Clark.) Nitre and common turpentine, of each, 1 lb.; Castile soap, ½ lb.; barley meal, 2½ lbs., or q. s. For common-sized balls.

2. (Morton.) Digitalis, 1 oz.; aloes, 2 oz.; liquorice, 13 oz.; honey or Barbadoes tar, q. s. to mix; for 1-oz. balls. One, twice a day, with care.

PHYSIC BALLS, PURGING B., CATHARTIC B.—1. Aloes and hard soap, of each, 5 oz.; salt of tartar and cayenne pepper, of each, 1 oz.; melt together. For 8 balls.

2. (Vet. Coll.)—*a.* (Common physic ball.) Aloes, 8 oz.; treacle, 3 oz.; olive oil, 1 oz.; melted together.—*Dose.* 1 to 1½ oz.

b. (Stronger ball.) To each dose of the last, add of croton oil, 4 to 8 drops.

Obs. The *dose* of the above is 1 ball, fasting, in the morning, preceded by a bran mash, on one or two successive nights, and followed by gentle exercise until the ball begins to operate.

WORM BALLS.—1. Barbadoes aloes, 5 drs.; calomel and ginger, of each, 2 drs.; oil of cloves, 12 drops; treacle, q. s. for a ball.

2. (J. Bell & Co.) Barbadoes aloes, 5 to 8 drs.; powdered tin, ethiop's mineral, and ginger, of each, 2 drs.; oils of aniseed and savine, of each, 20 drops; treacle, q. s. for a ball.

3. (Clater.) Sulphur and emetic tartar, of each, 1 dr.; linseed meal, 4 drs.; palm oil, q. s. to form a ball. One every morning, having prepared the animal with a physic ball containing 1 dr. of calomel. See BALLS; also Tuson's 'Veterinary Pharmacopœia.'

VIN'EGAR. *Syn.* ACETUM, L.; VINAIGRE, Fr. Dilute acetic acid, more or less contaminated with gum, sugar, and vegetable matter.

1. MALT VINEGAR; ACETUM, BRITISH VINEGAR (B. P.); ACETUM BRITANNICUM (Ph. L. & E.), L. This is the ordinary coloured vinegar consumed in this country, and is correctly described in the Ph. L. as "impure (dilute) acetic acid, prepared by fermentation from an infusion of malt (malt-wort)."

In the manufacture of MALT VINEGAR a mixture of malt and barley is mashed with hot water, and the resulting wort fermented, as in the common process of brewing. The liquor is then run into barrels, placed endways, tied over with coarse canvas, and arranged side by side in darkened chambers, moderately heated by a stove, and freely supplied with air. Here it remains till the acetous fermentation is nearly complete, which usually occupies several weeks, or even months. The newly formed vinegar is next run off into two large tuns, furnished with false bottoms, on which some 'rape' (the pressed cake from making domestic wines, or the green twigs or cuttings of vines) is placed. One of these vessels is wholly, and the other only about 3-4ths, filled. The fermentation recommences, and the acetification proceeds more rapidly in the latter than in the former tun, and the liquor it contains consequently matures the sooner. When fit for sale, a portion of the vinegar is withdrawn from the smaller quantity, and its place supplied with a like quantity from the full tun, and this in its turn is refilled from the barrels before noticed. This process is carried on with a number of tuns at once, which are all worked in pairs.

Prop., &c. The general properties of malt vinegar are well known. Its pleasant and refreshing odour is chiefly derived from acetic acid and acetic ether. Its strength is distinguished by the makers as Nos. 18, 20, 22, and 24; the last of which, also called 'proof vinegar,' is the strongest, and usually contains about 4·6⅔ of real or about 5⅔ of glacial acetic acid. Its density varies according to the quantity of foreign matter which it contains. Sp. gr. 1·017 to 1·019—B. P. This vinegar usually contains a small quantity of sulphuric acid. The presence of 1-1000th part of this acid is allowed by law.

Pur. "Brownish; of a peculiar odour. Its sp. gr. is 1·019. 1 fl. oz. of the acid is saturated by 1 dr. of the crystals of carbonate of soda. If, after 10 minims of solution of chloride of barium have been added to the same quantity, more of the chloride be poured into the filtered acid, nothing further is thrown

down. The colour is not changed by the addition of hydrosulphuric acid." (Ph. L.)

2. WINE VINEGAR, FRENCH V.; ACETUM GALLICUM (Ph. E. & D.), A. VINI, L.; VINAIGRE D'ORLEANS, Fr. This is prepared, in wine countries, from grape juice and inferior new wines, worked up with wine-lees, by a nearly similar process to that adopted for malt vinegar. That prepared from white wine (WHITE-WINE VINEGAR) is the most esteemed. It is purer and pleasanter than malt vinegar. Sp. gr. 1·014 to 1·022—Ph. E.; 1·016—Phillips. It usually contains from 5 to 6% of acetic acid. "100 parts of good Orleans vinegar should require 10 parts of dry carbonate of potassa for saturation." (Soubeiran.)

3. GERMAN, or QUICK-METHOD OF MAKING VINEGAR; PROCESS OF HAM. This method is based upon the fact, that acetification is the mere oxidation of alcohol in contact with organic matter. Hence, by employing dilute alcohol, or liquors containing it, and by vastly enlarging the surface of the liquid exposed to the air at a proper temperature, we may reduce the period occupied in acetification from weeks to as many hours. In practice this is effected by causing the dilute spirit, previously mixed with 1-1000th part of sugar or malt extract, or the fermented and clarified malt-wort, to slowly trickle down through a mass of beech shavings steeped in vinegar, and contained in a vessel called a vinegar generator (essigbilder), or graduation vessel. This is an oaken tub, narrower at the bottom than at the top, furnished with a loose lid or cover, below which is a perforated shelf (colander or false bottom), having a number of small holes, which are loosely filled with packthread about 6 inches long, and prevented from falling through by a knot at the upper end. The shelf is also perforated with four open glass tubes, as air-vents, each having its ends projecting above and below the shelf. This arrangement is repeated a second and a third time, or even oftener, according to the size of the vessel. The tub or graduator at its lower part is pierced with a horizontal row of eight equidistant round holes, to admit atmospheric air. One inch above the bottom is a syphon-formed discharge pipe, whose upper curvature stands one inch below the level of the air-holes in the side of the tub. The floors or partitions of the tub or generator being covered with birch twigs or beech chips to the depth of a few inches, the alcoholic liquor (first heated to between 75° and 83° Fahr.) is introduced at the upper part of the apparatus. This immediately commences trickling slowly down through the holes by means of the packthreads, diffuses itself over the chips or twigs forming the respective strata, slowly collects at the bottom of the tub, and then runs off by the syphon pipe. The air enters by the circumferential holes, circulates freely through the tub, and escapes by the glass tubes. As the acetification proceeds, the temperature of the liquid rises to 100° or 105° Fahr., and remains stationary at that point while the action goes on favorably. The alcoholic solution or wort requires to be passed three or four times through the cask before acetification is complete, which is, in general, effected in from 24 to 36 hours.

Obs. For the production of a superior vinegar by this process, it is necessary that the spirit employed be sufficiently pure not to contaminate the product with its flavour or odour, and that the malt-wort should be fermented and treated with all the care usually employed in the production of beer. The best English manufacturers who have adopted this process are in the habit of filtering or clarifying their fermented wash, and also of storing it away for several months before they subject it to acetification in the graduator. The most favorable temperature for the process is about 90° Fahr., and this should be preserved, as much as possible, by artificial means. *Prod.* A malt-wort of the sp. gr. 1·072, or, in "technical language, weighing about 26 lbs. per barrel, afforded a vinegar containing 5·4% of pure acetic acid, and a residuary extract of 10 lbs., from 36 galls. The former of these would indicate 35 lbs. of sugar, or 13·7 lbs. per barrel of gravity; whilst the latter shows 3·8 lbs. per barrel; the two united being only 17·5 lbs., instead of 26, the original weight. The loss, therefore, has been 8·5 lbs., or from a sp. gr. of 1·072 to less than 1·050." (Ure.) Thus, about one third of all the extractive matter of the malt is lost or dissipated during the processes of fermentation and acetification. According to Knapp, a mixture of about 80 galls. of water, 9 galls. of spirit of from 44 to 45% Tralles (18 or 20 u. p.), and 3 galls. of vinegar containing 3·5% of real acid, forming together 92 galls., yield, on an average, an almost equal quantity of vinegar, or about from 90 to 91 galls. of the above-stated strength.

4. WOOD VINEGAR. See PYROLIGNEOUS ACID.

5. OTHER VARIETIES OF VINEGAR, of minor importance; chiefly domestic, and commonly 'worked' as malt vinegar.—ALE VINEGAR, ALEGAR; ACETUM CERVISIÆ. From strong pale ale which has soured.—ARGOL VINEGAR; ACETUM EX TARTARO. From white argol or cream of tartar, 1 lb.; dissolved in boiling water, 2 galls.; with the addition, when cold, of proof spirit or whiskey, 3 pints.—CRYSTAL VINEGAR. Pickling vinegar, discoloured with fresh burnt animal charcoal.—CIDER VINEGAR. From cider, worked as malt vinegar.—GERMAN HOUSEHOLD VINEGAR. From soft water, 7½ galls.; honey or brown sugar, 2 lbs.; cream of tartar, 2 oz.; corn spirit or whiskey, 1 gall.—GOOSEBERRY VINEGAR. From bruised gooseberries and brown sugar, of each 1¼ lb.; water, 1 gall. Other fruits may be substituted for gooseberries.—PICKLING VINEGAR. The strongest pale malt

vinegar.—RAISIN VINEGAR. From the marc left from making raisin wine, 1 cwt. to every 12 or 15 galls. of water, along with a little yeast.—SUGAR VINEGAR. From brown sugar, 4 lbs. to each gallon of water.—WHISKEY VINEGAR. From whiskey, 1 pint; sugar, 2 oz.; yeast, a dessert-spoonful.

Pur., tests, & assay. These are, for the most part, rather fully noticed under ACETIC ACID, ACETIMETRY, and above. The following additional tests, &c., may, however, be useful:—1. Paper written on or smeared with pure vinegar is not charred when strongly warmed before the fire; if it is, the sample examined contained fully $2\frac{2}{3}$ of oil of vitriol.—2. A small porcelain capsule, or china cup, dipped into a solution of sugar in 30 times its weight of water, and then heated to a temperature equal to that of boiling water, is not materially discoloured when a drop of pure vinegar is poured on it; but a spot of an intensely brown or black colour is formed if the sample contain only 1-300th part of sulphuric acid; if it contains only 1-1000th part, the spot is olive green; and if a less quantity, then only of a pale green colour.—3. The heavy white precipitate given with chloride of barium (see *above*) shows the presence of sulphuric acid; each grain, after being dried, and gently ignited, represents ·344 grs. of dry sulphuric acid. If the precipitate from 1000 grs. of the vinegar exceeds $2\frac{1}{2}$ grs., it contains an illegal quantity of this acid.—4. If a solution of nitrate of silver gives a cloudy white precipitate, hydrochloric acid is present.—5. If, after the addition of 2 or 3 grs. of carbonate of potash, and evaporation of the sample to dryness, the residuum deflagrates when ignited, the sample under examination contains nitric acid.—6. If the vinegar be blackened by sulphuretted hydrogen or hydrosulphuret of ammonia, it contains either lead or copper. If it gives a yellow precipitate with iodide of potassium or chromate of potash, the metal is lead. If ferrocyanide of potassium gives a bronze-brown coloured precipitate, or a little olive oil, when agitated with some of the vinegar, be turned green, the metal is copper.—7. If a small sample, gently evaporated to dryness, leaves more than $1\frac{2}{3}$ of residuum, and this has a sweet taste, it is undecomposed sugar. The presence of acrid substances, as capsicum, chillies, grains of paradise, mustard seed, pellitory of Spain, pepper, &c., may be detected by neutralising the acidity of the vinegar with carbonate of soda, when the acrid taste of the adulterant will be readily perceived.

Vinegar, Aromat'ic. *Syn.* ACETUM AROMATICUM, L. *Prep.* 1. Glacial acetic acid, 1 lb.; oil of cloves, $1\frac{1}{2}$ dr.; oil of rosemary, 1 dr.; oils of bergamot, cinnamon, pimento, and lavender, of each, $\frac{1}{2}$ dr.; neroli, 20 drops; camphor, $2\frac{1}{2}$ oz.; rectified spirit, 2 fl. oz.; mix. Very fine.

2. (Henry's.) From glacial acetic acid, strongly scented with the oils of cloves, lavender, rosemary, and *Calamus aromaticus* to which the usual quantity of camphor is added. This is the formula adopted at Apothecaries' Hall.

3. (Extemporaneous.) From acetate of potash (dry), 1 dr.; oil of vitriol, 20 drops; oils of lemon and cloves, of each, 3 drops.

Obs. Aromatic vinegar is used as a pungent and refreshing perfume, in faintness, &c. For this purpose it is generally dropped on a small piece of sponge placed in a stoppered bottle or a vinaigrette. It is highly corrosive, and should therefore be kept from contact with the skin and clothes.

Vinegar, Camp. *Prep.* Take of sliced garlic, 8 oz.; Cayenne pepper, soy, and walnut ketchup, of each, 4 oz.; 36 chopped anchovies; vinegar, 1 gal.; powdered cochineal, $\frac{1}{2}$ oz.; macerate for a month, strain, and bottle.

Vinegar, Cam'phorated.

Vinegar of Canthar'ides. *Syn.* BLISTERING VINEGAR; ACETUM CANTHARIDIS (B. P., Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Cantharides, in powder, 2 oz.; acetic acid, 1 pint; macerate, with agitation, for 8 days, then press, and strain.

2. (Ph. E.) Cantharides, 3 oz.; euphorbium, $\frac{1}{2}$ oz.; acetic acid, 5 fl. oz.; pyroligneous acid, 15 fl. oz.; macerate a week.

3. (Ph. D.) Spanish flies, 4 oz.; strong acetic acid, 4 fl. oz.; commercial acetic acid (sp. gr. 1·044), 16 fl. oz.; macerate, as before, for 14 days.

4. (B. P.) Cantharides, in powder, 2; glacial acetic acid, 2; acetic acid (28 per cent.), 18, or a sufficiency: add the glacial acetic acid to 13 of acetic acid, and in this mixture digest the cantharides for two hours at a temperature of 200° F.; when cold, place them in a percolator, and when the liquid ceases to drop, pour over the residuum the remaining 5 of acetic acid, and when the percolation is finished, press and make the whole liquid up to 20.

Uses, &c. As a counter-irritant, and to raise blisters. For the last purpose it is applied on a piece of lint, evaporation being prevented with a piece of oiled skin or thin sheet gutta percha. The last is the best, and, indeed, the only effective form, the others being too weak. "If the acetic acid be strong, a blister will be as rapidly raised without the cantharides as with them." (Dr. A. T. Thomson?)

Vinegar, Cur'rie. *Prep.* From currie powder, $\frac{1}{2}$ lb.; vinegar, 1 gal.; infuse for a week. *Used* as a flavouring. Other like vinegars may be made in the same way.

Vinegar of Col'chicum. *Syn.* ACETUM COLCHICI (Ph. L. E. & D.), L. *Prep.* 1. (Ph. L.) Dried corms of colchicum or meadow saffron, $3\frac{1}{2}$ drs.; dilute acetic acid, 1 pint; macerate for 3 days, then press out the liquor, and, after defecation, add to the strained liquid, proof spirit, $1\frac{1}{2}$ fl. oz.

2. (Ph. E.) Fresh colchicum bulbs (dried), 1

oz.; distilled vinegar, 16 fl. oz.; proof spirit, 1 fl. oz.

3. (Ph. D.) Dried colchicum bulbs, 1 oz.; acetic acid (1·044), 4 fl. oz.; distilled water, 12 fl. oz.; as before, but prolonging the maceration for 7 days.

Obs. Vinegar of colchicum is chiefly used in gout. *Dose.* 20 drops to 1 fl. dr. The Dublin preparation is about three times as strong as the others, and the dose must therefore be proportionately less

Vinegar, Distill'ed. *Syn.* ACETUM DESTILLATUM (Ph. L. & E., and Ph. D. 1826), L. *Prep.* 1. (Ph. L.) Vinegar, 1 gal.; distil in a sand bath, 7 pints. Sp. gr. 1·0065.

2. (Ph. E.) Vinegar (preferably French), 8 parts; distil over with a gentle heat, 7 parts; and dilute the product, if necessary, with distilled water, until the sp. gr. is 1·005.

Pur., &c. "1 fluid oz. is saturated by 57 grs. of crystallised carbonate of soda." (Ph. L.) 100 grs. are saturated by 13 grs. of crystallised carbonate of soda. It contains about 4·6% of real acetic acid. If a pewter worm is used, a portion of lead is dissolved, and the product becomes cloudy and poisonous. Distilled vinegar is more agreeable than pure dilute acetic acid of the same strength.

Vinegar, Marseilles. *Syn.* VINEGAR OF THE FOUR THIEVES, PROPHYLACTIC VINEGAR; ACETUM PROPHYLACTICUM, A. ANTISEPTICUM, A. THERIACALE, A. QUATUOR FURUM, L.; VINAIGRE DES QUATRE VOLEURS, Fr. *Prep.* Take of the summits of rosemary and flowers of sage (dried), of each, 4 oz.; dried lavender flowers, 2 oz.; cloves, 1 dr.; distilled vinegar, 1 gal.; digest for 7 days, press, and filter. *Used* as a corrector of bad smells, and formerly as a prophylactic against the plague, and other contagious diseases. It is said to have been a favourite preventive with Cardinal Wolsey, who always carried some with him. The original formula also contained, of garlic, ¼ oz.; fresh rue, 1½ oz.; and camphor, dissolved in spirit, 1 oz.

Vinegar of O''pium. *Syn.* ACETUM OPII (Ph. E. & D.), L. *Prep.* 1. (Ph. E.) Opium, sliced, 4 oz.; distilled vinegar, 16 fl. oz.; macerate for 7 days, press, and filter.—*Dose.* 5 to 20 drops.

2. (Ph. D.) Opium, in coarse powder, 1½ oz.; dilute acetic acid, 1 pint; macerate for 7 days.—*Dose.* 10 or 12 to 60 drops.

Obs. These were intended to supersede the old 'black drop,' which they closely resemble in their action.

Vinegar, Rasp'berry. *Syn.* ACETUM RUBI IDÆI, L.; VINAIGRE FRAMBOISE, Fr. *Prep.* 1. Bruised ripe raspberries and white wine vinegar, of each, 3 pints; macerate for 3 days, press, strain, and to each pint add of white sugar, 1 lb.; boil, skim, cool, and at once bottle. Some persons add 2 fl. oz. of brandy to each pint.

2. (P. Cod.) Fresh raspberries, picked from their calices, 3 lbs.; (1 lb.—Ph. Bor.); good vinegar, 2 lbs.; macerate, in glass, for a fortnight, then strain, without pressure.

Obs. In a similar manner may be made cherry vinegar, strawberry v., and the vinegars of all other like fruits.

Vinegar of Squills. *Syn.* ACETUM SCILLÆ (Ph. L. E. & D.), ACETUM SCILLITICUM, L. *Prep.* 1. (Ph. L.) Take of squills, recently dried and bruised, 2½ oz.; dilute acetic acid, 1 pint; macerate with a gentle heat, in a covered vessel, for 3 days, then press out the liquor, and, after defecation, add to the strained liquid, proof spirit, 1½ fl. oz. The Edinburgh and Dublin Colleges direct cold maceration for 7 days in a glass vessel, and the Dublin omits the spirit.

2. (Wholesale.) From squills, 7 lbs.; distilled vinegar, 6 galls.; macerate in the cold for 10 days, press, and filter. Expectorant and diuretic.—*Dose.* ½ to 1½ fl. dr.; in chronic pulmonary affections, dropsies, &c.

Vinegars (Cul'inary). *Prep.* 1. BLACK PEPPER VINEGAR, CAPER V., CAPSICUM V., CELERY-SEED V., CHILLIE V., CRESS-SEED V., GARLIC V., GINGER V., HORSERADISH V., ONION V., RED-ROSE V., SEVILLE-ORANGE-PEEL V., SHALLOT V., TRUFFLE V., WHITE PEPPER V., with several others of a like kind, are made by steeping about an oz. of the respective articles in a pint of good vinegar for 14 days, and straining.

2. BASIL VINEGAR, BURNET V., CELERY V., CHERVILLE V., ELDER-FLOWER V., GREEN-MINT V., TARRAGON V., with several others from like substances, are prepared from 2 to 3 oz. of the leaves to each pint of vinegar; the whole being frequently shaken for 14 days, then strained and bottled. They are used in cookery. The culinary vinegars may also be prepared in the same manner as the 'culinary spirits' and 'tinctures,' by simply substituting strong pickling vinegar for the spirit.

Vinegars (Perfumed'). *Syn.* ACETA ODORIFERA, L. *Prep.* From the dried flowers, 1 to 2 oz., or the fresh flowers, 2 to 4 oz.; strongest distilled vinegar, 1 pint; digest for a week, strain with pressure, and repeat the process with fresh flowers, if necessary. They may also be made by adding 15 to 20 drops, or q. s., of the respective essential oils to the vinegar. In a similar way are prepared the vinegars of clove-gilly flowers, elder flowers, lavender f. (vinaigre distillé de lavande), musk roses, orange flowers (fresh), Provins roses, red roses (vinaigre de rose; acetum rosatum), rosemary flowers (vinaigre de rosmarin; acetum anthosatum), tarragon flowers, &c. &c. Another excellent plan is to add 1 fl. oz. of glacial acetic acid to each pint of the respective perfumed spirits. This answers admirably for acetic eau de Cologne and like perfumes.

VI'NOUS FERMENTA'TION. *Syn.* ALCOHOLIC FERMENTATION. The peculiar change by which sugar, in solution, is converted into carbonic acid, which is eliminated, and into alcohol, which remains in solution in the fermented liquor.

The presence of a 'ferment' is essential to excite the vinous fermentation, as a solution of absolutely pure sugar remains unaltered, even though exposed to the conditions most favourable to its accession. In the juices of the sweet fruits, and in those vegetable solutions that spontaneously run into a state of fermentation, the ferment is supplied by nature, and is intimately associated with the saccharine matter. In the juice of those grapes which produce the more perfect wines, the relative proportions of the exciters of fermentation and the sugar are so accurately apportioned, that the whole of the former are decomposed, and nearly the whole of the latter is converted into alcohol; so that the liquid (wine) is left in a state but little liable to future change. An infusion of malt, however, in which the nitrogenised matters (gluten, vegetable albumen, &c.) are absent, or at least present in too small quantities to vigorously excite the vinous fermentation, undergoes a mixed species of decomposition, with the formation of products widely different from those that result from the true vinous fermentation; or, in other words, the liquid becomes spoiled. But if a ferment (yeast) be added to this infusion of malt under the above circumstances, and in the proper proportion to the sugar present, the true vinous fermentation speedily commences, and the liquid becomes converted into beer. This is what actually takes place in the process of brewing, and the scientific brewer endeavours to employ a proper quantity of ferment to decompose the whole of the saccharine matter of his wort; but, at the same time, as equally endeavours to avoid the use of an excess.

The chief product of the vinous fermentation is alcohol, but there are other substances simultaneously produced, and which remain associated with the fermented liquor. Among the principal of these are œnanthic acid, œnanthic ether, fusel oil (oil of potato spirit, oil of grain), &c.; none of which exist previously to fermentation, and are generally supposed to result from the action of the nitrogenised matters of the solution on the sugar. Under certain circumstances these extraneous products are formed in much larger quantities than under others; and as these substances injure the value of the alcohol with which they are associated, a knowledge of the peculiar circumstances favourable and unfavourable to their production is a desideratum to the brewer and distiller.

According to MM. Colin and Thénard, Frémy, Rousseau, and others, the essential condition of a ferment, to be able to excite the pure vinous fermentation, is to be sufficiently acidulous to act on coloured test-paper; and this acidity should arise from the presence of certain vegetable acids and salts, capable of conversion into carbonic acid and carbonates by their spontaneous decomposition. Those acids and salts which are found to pre-exist in fermentable fruits and liquors, as the tartaric, citric, malic, and lactic acids, and their salts, should be chosen for this purpose; preference being given to the bitartrate of potassa, on account of its presence in the grape. The addition of any of these substances to a saccharine solution renders its fermentation both more active and complete. The favourable influence of cream of tartar on fermentation was first pointed out by Thénard and Colin, and the addition of a little of this article has been adopted in practice, with manifest advantage, by the manufacturers of British wine.

There is good reason for supposing that each variety of sugar which is susceptible of the alcoholic fermentation is first converted into grape sugar, by contact with the ferment, and that this variety of sugar is alone capable of yielding carbonic acid and alcohol.

The circumstances most favourable to this fermentation are, a certain degree of warmth —a sufficient quantity of active ferment, and its due distribution through the liquor. The temperature of from 68° to 77° Fahr., is usually regarded as the most propitious for the commencement and progress of fermentation; but it has been ably shown by Liebig that, at this temperature, the newly formed alcohol slowly undergoes the 'acetous fermentation,' forming vinegar, by which the vinous character of the liquor is lessened. This conversion of alcohol into vinegar proceeds most rapidly at a temperature of 95° Fahr., and gradually becomes more languid, until, at about 46° to 50° Fahr. (8 to 10 Cent.), it ceases altogether, while the tendency of the nitrogenous substances to absorb oxygen at this low temperature is scarcely diminished in a perceptible degree. "It is therefore evident that if wort (or any other saccharine solution) is fermented in wide, open, shallow vessels, as is done in Bavaria, which afford free and unlimited access to the atmospheric oxygen, and this in a situation where the temperature does not exceed 46° to 50° Fahr., a separation of the nitrogenous constituents, *i. e.* the exciters of acidification, takes place simultaneously on the surface, and within the whole body of the liquid." (Liebig.) By this method wine or beer is obtained, which is invariably far superior in quality to that fermented in the usual manner. See FERMENTATION.

The symptoms of a perfect fermentation of malt wort, according to the usual English system with top yeast (*oberhefe*), have been thus described by a well-known practical writer on brewing: 1. A cream-like substance forms round the edges of the gyle tun, which gradually extends itself, and ultimately covers the whole surface of the liquor.—2. A fine curly or cauliflower head in a similar way extends itself over the surface, and indicates to the experienced brewer the probable quality of the fermentation.—3. The 'stomach,' or vinous odour, is next evolved, and continues to increase with the attenuation of the wort.

The peculiar nature of this odour is also an indication of the state of the fermentation.—4. The cauliflower head changes, or rises to a fine 'rocky' or 'yeasty' head, and ultimately falls down.—5. In this stage the head assumes a peculiar yeasty appearance, called by brewers 'close-yeasty,' and the gas is evolved in sufficient quantity to blow up little bells or bubbles, which immediately burst, and are followed by others, at intervals depending on the activity and forwardness of the fermentation. These bells should be bright and clear; as, if they appear opaque or dirty, there is something the matter with the wort. (Black.)

It is often of the utmost importance to brewers, wine-merchants, sugar-refiners, druggists, &c., to be able to lessen the activity of the vinous fermentation, or to stop it altogether, or to prevent its accession to syrups and other saccharine and vegetable solutions. Whatever will still the motion of the molecules of the nitrogenous matter forming the ferment will render them inoperative as exciters of fermentation. Among the simplest means of effecting this object, and such as admit of easy practical application, may be mentioned exposure to either cold or heat. At a temperature below about 50° Fahr., the acetous fermentation is suspended, and the alcoholic fermentation proceeds with diminished activity as the temperature falls, until at about 38° Fahr. it ceases altogether. In like manner, the rapid increase of the temperature of a fermenting liquid arrests its fermentation, and is preferable to the action of cold, as it is of easier application, and perfectly precipitates the ferment in an inert state. For this purpose, a heat of about 180° Fahr. is sufficient; but even that of boiling water may be employed with advantage. In practice, fluids are commonly raised to their boiling-point for this purpose, or they are submitted to the heat of a water bath (207½° Fahr.). In this way the fermentation of syrups and vegetable solutions and juices is commonly arrested in the pharmaceutical laboratory.

Among substances that may be added to liquids to arrest fermentation, the most active are—the volatile oil of mustard, coarsely powdered mustard-seed or pure flour of mustard, sulphurous acid or the fumes of burning sulphur, sulphuric acid, sulphite of lime, tincture of catechu, strong spirit, strong acetic acid, chlorate of potassa, sugar of milk, bruised horse-radish, garlic, and cloves, and their essential oils, and all the other volatile oils that contain sulphur, and most of the salts that readily part with their oxygen. These substances arrest fermentation by rendering the yeast inoperative, and they possess this power nearly in the order in which they stand above. In practice, mustard, the fumes of burning sulphur, sulphite of lime, and chlorate of potassa, are those most adapted for beer, cider, wines, syrups, &c.; but some of the others are occasionally used, though less active. For arresting or preventing the fermentation of the vegetable juices and solutions, and the medicated syrups employed in pharmacy, mustard seed, either alone or combined with a little bruised cloves, may be safely used, as the addition of acids or salts would lead to the decomposition of their active principles. For this reason such liquids should be kept in a sufficiently low temperature to prevent fermentation; and should they pass into that state, it should be preferably arrested by the application of heat or cold, as above explained. Sugar of milk is also very effective for certain syrups, if not all of them.

To prevent, or rather to lessen, the production of fusel oil, it has been proposed to add a certain quantity of tartaric acid or bitartrate of potassa to the wort; or, to arrest the fermentative process somewhat before the liquid has reached its utmost degree of attenuation. The best means of depriving the spirit of this and other substances of a similar nature is to largely dilute it with water, and to redistil it at a gentle heat. Agitation with olive oil, decantation, dilution with a large quantity of water, and redistillation, have also been recommended. An excellent method is filtration through newly burnt and coarsely powdered charcoal. This plan succeeds perfectly with moderately diluted spirit. On the Continent, the addition of about 10% of common vinegar, and a very little sulphuric acid, followed by agitation, repose for a few days, and redistillation, is a favourite method. A solution of chloride of lime is also employed for the same purpose, and in the same way. In both these cases a species of ether is formed, which possesses a very agreeable odour. In the first, acetate of oxide of amyl (essence of jargonelle) is produced; and in the other, chloride of amyl, which also possesses a pleasant ethereal smell and taste. The affinity of the hydrated oxide of amyl (fusel-oil) for acetic acid is so great, that they readily unite without the intervention of a mineral acid. (Doebereiner.) Thus, the oil of vitriol mentioned above, though always used in practice, might be omitted without any disadvantage.

According to Messrs. Bowerbank, the distillers, quoted by Dr. Pereira, 500 galls. of corn spirit yield about one gal. of corn-spirit oil. See ACETIFICATION, ALCOHOL, BREWING, DISTILLATION, FERMENTATION, FUSEL OIL, SPIRIT, VINEGAR, VISCOUS FERMENTATION, YEAST, &c.

VI'OLET. *Syn.* PURPLE VIOLET, SWEET V.; VIOLA (Ph. L. & E.), L. "The recent petals of *Viola odorata*, Linn." (Ph. L.) It is chiefly used on account of its colour. See SYRUP.

VIOLET DYE. Violet, like purple, is produced by a mixture of red and blue colouring matter, applied either together or in succession. The 'aniline colours' are now almost exclusively used for obtaining violet on silk and wool (see ANILINE PURPLE & TAR COLOURS). With the old dye-stuffs, violet may thus be

obtained:—A good violet may be given to silk or wool by passing it first through a solution of verdigris, then through a decoction of logwood, and, lastly, through alum water. A fast violet may be given by first dyeing the goods a crimson with cochineal, without alum or tartar, and, after rinsing, passing them through the indigo vat.—Linens and cottons are first galled with about 18% of gall-nuts, next passed through a mixed mordant of alum, iron liquor, and sulphate of copper, working them well, then through a madder bath made with an equal weight of root, and, lastly, brightened with soap or soda. Another good method is to pass cloth, previously dyed Turkey red, through the blue vat. Wool, silk, cotton, or linen, mordanted with alum and dyed in a logwood bath, or a mixed bath of archil and Brazil, takes a pretty, but false, violet.

VIS'COUS FERMENTATION. *Syn.* MUCILAGINOUS FERMENTATION, MUCOUS F. The peculiar change by which sugar, in solution, is converted into gummy matters, and other products, instead of into alcohol.

When the expressed juice of the beet is exposed to a temperature of 90° to 100° Fahr., for a considerable time, the sugar it contains suffers this peculiar kind of fermentation. Gases are evolved which are rich in hydrogen, instead of being exclusively carbonic acid, and when the sugar has, for the most part, disappeared, mere traces of alcohol are found in the liquid, but, in place of that substance, a quantity of lactic acid, mannite, and a mucilaginous substance, resembling gum arabic, and said to be identical with gum in composition. By boiling yeast or the gluten of wheat in water, dissolving sugar in the filtered solution, and exposing it to a tolerably high temperature, the viscous fermentation is set up, and a large quantity of the gummy principle generated, along with a ferment of a globular texture, like that of yeast, but which is capable of producing only the viscous fermentation in saccharine solutions.

The peculiar cloudy, stringy, oily appearance of wine and beer, called by the French 'graisse,' and the English 'ropiness,' depends on the accession of the viscous fermentation. The mineral acids and astringent substances, especially the sulphuric and sulphurous acids, and tannin, precipitate the viscous ferment, and are, hence, the best cures for this malady of fermented liquors. It is the large amount of tannic acid in the red wines and well-hopped beer which is the cause of their never being attacked with 'graisse,' or 'ropiness.' See VINOUS FERMENTATION, WINES, &c.

VI''SION. The following means of preserving and restoring the sight may be appropriately inserted here:—

For NEAR-SIGHTEDNESS.—Close the eyes and press the fingers very gently, from the nose outward, across the eyes. This flattens the pupil, and thus lengthens or extends the angle of vision. This should be done several times a day, or at least always after washing the face, until short-sightedness is overcome.

For LOSS OF SIGHT BY AGE, such as require magnifying glasses, pass the fingers or towel from the outer corner of the eyes inwardly, above and below the eyeballs, pressing very gently against them. This rounds them up, and preserves or restores the sight.

It is said that many persons, by this last means, have preserved their sight so as to read fine print at 80 years of age; others, whose sight had been impaired by age, by carefully manipulating the eyes with their fingers, from their external angles inwardly, have restored their sight, and been able to dispense with glasses, and have since preserved it by a continuance of the practice. To be successful, or safe, these practices must be applied with great gentleness and caution. Many persons seriously damage their eyes by forcibly rubbing them when drowsy, especially on awaking in the morning.

The 'Lancet' remarks, that "there is good reason to believe that chicory (the coffee of the Londoners), from its narcotic character, exerts an injurious effect on the nervous system. So convinced of this is Professor Beer, of Vienna, a most celebrated German oculist, that he has enumerated chicoried coffee among the causes of amaurotic blindness."

To strengthen the eyes, to relieve them when swollen or congested, and to remove chronic ophthalmia, purulent discharges, &c., nothing is equal to frequently bathing them with water, at first tepid, but afterwards lowered in temperature to absolute coldness.

VIT'RIOL. A common name for sulphuric acid and for several of its salts. (See *below*.)

Vitriol, Blue. *Syn.* ROMAN VITRIOL. Commercial sulphate of copper.

Vitriol, Green. Commercial sulphate of iron.

Vitriol, White. Commercial sulphate of zinc.

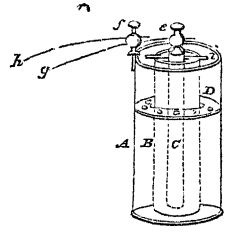
VITTIE VAYR. *Syn.* VETIVER. The Tamool name of the odorous and fibrous roots of the *Andropogon muricatus* sold by the perfumers.

VOLTA'IC ELECTRICITY. *Syn.* GALVANIC E., GALVANISM, VOLTAISM. That branch of electrical science which has reference to the phenomena attendant on the development of electricity by chemical action. Electricity thus developed may be made to show itself in the 'static' condition, so as to produce the effects of frictional electricity, but it is much more easily obtained in the 'dynamic' condition—in other words, as a 'voltaic current'—when it is especially remarkable for its chemical and magnetic effects. If a plate of zinc and a plate of platinum be immersed in dilute sulphuric acid, and connected outside the liquid by a wire, a current of electricity will immediately be set up, and will continue as long as the conducting circuit is complete and the action of the acid on the zinc goes on. The current of 'positive' electricity passes from the zinc, through the liquid, to the

platinum, and thence through the wire to the zinc. The arrangement of two dissimilar metals immersed in a liquid which acts upon one of them is called a voltaic couple: By uniting a number of couples together in regular order, a voltaic pile or battery is formed.

The older forms of the voltaic battery, viz., VOLTA'S PILE, CRUIKSHANK'S TROUGH, and WOLLASTON'S BATTERY, are now but little used. They all consist of a series of couples of zinc and copper, excited by an acid liquid, generally a mixture of water with $\frac{1}{10}$ of its bulk of sulphuric acid, and $\frac{1}{10}$ of nitric acid.

One of the most useful forms of the voltaic battery is that proposed by the late Prof. Daniell, and commonly known by his name. Its peculiar advantages arise from its action continuing without interruption for a long time, hence the name of 'constant battery' that has been applied to it. The following figure will explain the construction of each couple.



A. A copper cylinder, filled with a saturated solution of sulphate of copper.
B. A smaller porous cylinder (earthenware or membrane), containing a mixture of 1 measure of strong sulphuric acid, and about 8 measures of water.
C. A rod of amalgamated zinc, supported in the smaller cylinder by the cross piece (*i*).
D. A shelf full of small holes, for supporting crystals of sulphate of copper, to keep up the strength of the solution.
e and *f*. Screws and caps to connect the wires *g* and *h* with the battery.
g. The negative wire, connected with the zinc.
h. The positive wire, connected with the copper.

One of these couples is sufficient for electrotyping; six of them form a circle of considerable power, and about 20 produce one sufficiently strong for most experiments of demonstration and research.

In arranging these, as well as other batteries, when intensity, or travelling power, is desired, the metallic communication is made between the opposite metals (the zinc of one couple being united with the copper of another); but when simple quantity without intensity is required, the zinc of one battery is united with the zinc of the other, and the copper of the one with the copper of the other, an effect which is equally attainable with a single battery of enlarged dimensions.

Another useful apparatus is GROVE'S BATTERY, in which the positive metal consists of amalgamated zinc immersed in sulphuric acid, diluted with 10 times its bulk of water; and the negative metal of platinum immersed in strong nitric acid. The two liquids are kept separate by the use of porous vessels, as in 'Daniell's battery.' This is an extremely powerful arrangement, but not so constant as Daniell's, owing to the reduction of the nitric acid to lower oxides of nitrogen. After this battery has been in action for about an hour, copious red nitrous fumes are given off, which cause great annoyance.

In place of platinum, compact charcoal or coke, prepared by a rather troublesome process, may be used, and the arrangement then constitutes a BUNSEN'S BATTERY. Other substitutes for the costly platinum have been proposed, as lead coated with gold or platinum, and iron rendered 'passive' by immersion in strong nitric acid. Callan has obtained very good results with amalgamated zinc and cast iron immersed in diluted sulphuric acid, without the use of nitric acid (MAYNOOTH BATTERY).

In SMEE'S BATTERY, which is much used in the arts, pairs of amalgamated zinc and platinised silver (or platinised platinum) are immersed in dilute sulphuric acid (1 part acid to 7 parts water). The plates of zinc are usually bent double, and the platinised plates interposed between the two surfaces formed by the bend. See PLATINIZING (*page* 1099).

In every voltaic combination the passage of the electricity (*i. e.* the positive modification of the force) in the liquid is from the active element to the inactive element; in the case of a simple zinc-and-copper couple, for instance, it is from the zinc to the copper. If this simple fact be borne in mind, it will decide in every case the question which confuses so many, namely, which is the positive, and which the negative end of a battery? The positive is the end where the electricity leaves the battery; the negative where it re-enters it. For further information connected with the subject of voltaic electricity, see articles on ELECTRICITY, ELECTROLYSIS, ELECTROTYPE, ETCHING, &c.

VOLUMETRIC ANALYSIS. Quantitative chemical analysis by measure. This method of analysis "consists in submitting the substance to be estimated to certain characteristic reactions, employing for such reactions liquids of known strength, and from the quantity of the liquid employed determining the weight of the substance to be estimated by means of the known laws of equivalence." As an example of this method we give the following from the Introduction in Mr. Sutton's excellent 'Handbook of Volumetric Analysis:'—"Suppose that it is desirable to know the quantity of pure silver contained in a shilling. The coin is first dissolved in nitric acid, by which means a bluish solution, containing silver, copper, and probably other metals, is obtained. It is a known fact that chlorine combines with silver in the presence of other metals to form chloride of silver, which is insoluble in nitric acid. The proportions in which the combination takes place are 35·46 of chlorine to every 108 of silver; conse-

quently, if a standard solution of pure chloride of sodium is prepared by dissolving 58·46 grains of the salt (*i. e.* 1 equiv. sodium = 23, 1 eq. chlorine = 35·46 = 1 eq. chloride of sodium 58·46) in so much distilled water as will make up exactly 1000 grains by measure; every single grain of this solution will combine with ·108 grain of pure silver to form chloride of silver, which precipitates to the bottom of the vessel in which the mixture is made. In the process of adding the salt solution to the silver, drop by drop, a point is at last reached when the precipitate ceases to form. Here the process must stop. On looking carefully at the graduated vessel from which the standard solution has been used, the operator sees at once the number of grains which have been necessary to produce the complete decomposition. For example, suppose the quantity used was 520 grains; all that is necessary to be done is to multiply ·108 grain by 520, which shows the amount of pure silver present to be 56·16 grains." The volumetric method is much less troublesome than the ordinary method of analysis (by separating the constituents of a mixture and weighing them), and is admirably adapted for the examination of substances used in arts and manufactures. Most of the processes described under ACIDIMETRY and ALKALIMETRY are examples of this method. See those articles, also EQUIVALENTS, TEST-SOLUTIONS, &c.

WADE'S DROPS. Compound tincture of benzoin.

WA'FER PAPER. See WAFERS, in Cookery (*below*).

WA'FERS. Thin adhesive discs, used for securing letters or sticking papers together.

Prep. 1. (WAFERS, FLOUR W.) The finest wheaten flour is mixed with water, either pure or coloured, to a smooth pap or batter, which, after being passed through a sieve, to remove clots or lumps, is poured into the 'wafer-irons' (previously warmed and greased with butter or olive oil), and in this state exposed to the heat of a clear charcoal fire; the whole is then allowed to cool, when the irons are opened, and the thin cake, which has become hard and brittle, is cut into wafers by means of sharp annular steel punches, made exclusively for the purpose.

2. (GELATINE WAFERS, TRANSPARENT W.) Good gelatine or glue is dissolved, by the heat of a water bath, in just sufficient water to form a consistent mass on cooling; it is then poured, whilst hot, upon the surface of a warm plate or mirror glass, slightly oiled, and surrounded with a border of card paper (laid flat); a similar plate, also warmed and oiled, is next laid upon the gelatine, and the two plates pressed into as close contact as is permitted by the card paper; when quite cold, the thin sheet of gelatine is removed, and cut into wafers with punches, as before. 1 to 2 oz. of sugar is commonly added to each lb. of gelatine.

3. (MEDALLION WAFERS.) A sheet of metal or glass, having designs sunk in it corresponding to the raised part of seals, being provided, the hollows are filled up with a mixture formed of any appropriate coloured powder, made into a paste with gum water or size, leaving the flat part clear; melted coloured glue is then poured on the plate, and the process is otherwise conducted as before. For use, the paper is wetted where the wafer is to be applied.

Obs. Care must be taken that no poisonous colours be employed. For gelatine wafers, transparent colours only can be used. Those noticed under LIQUEURS and STAINS (Confectioner's) are appropriate. To these may be added plumbago, sesquioxide of iron (crocus martis), smalts, levigated vegetable charcoal, and vermilion.

Wafers. (In cookery.) *Prep.* Make fine flour, dried and sifted, into a smooth thin batter with good milk, or a little cream-and-water; add about as much white wine as will make it thick enough for pancakes, sweeten it with a little loaf sugar, and flavour it with powdered cinnamon. When thus prepared, have the wafer-irons made ready, by being heated over a charcoal fire; rub them with a piece of linen cloth dipped in butter; then pour a spoonful of the batter upon them, and close them almost immediately; turn them upon the fire, and pare the edges with a knife, if any of the batter oozes out. A short time will bake them, when the irons are perfectly heated. The wafers must be curled round whilst warm when they are for ornaments. 'Wafer paper' is prepared in a similar way to the above; but when intended to be kept for some time, the milk must be omitted. *Used* by cooks, &c.; and, recently, as an envelope for nauseous medicines.

Wafers, Da Silva's. These nostrums were introduced to the public some time ago, as though they were prepared from the formulæ of a celebrated physician whose name was affixed to them.[1] There are three varieties, which are said to be prepared as follows:—

1. APERIENT OR ANTIBILIOUS WAFERS. From sugar and extract of liquorice (Spanish juice), equal parts; senna and jalap, of each, in fine powder, about ½ dr. to [illegible] oz. of sugar employed; made into a mass with a concentrated infusion of senna, and divided into 12-gr. lozenges or squares with the corners rounded off.

2. FEMALE WAFERS. From sugar, horehound candy (or honey), and aperient wafer mass, equal parts; beaten to a proper consistence with weak gum water, to which a little orange-flower water has been added, and divided into 8 gr. tabellæ, as before.

3. PULMONIC WAFERS. From lump sugar and starch, of each, in powder, 2 parts; powdered gum, 1 part; made into a lozenge-mass

[1] For an exposition of the Da Silva quackery, with Dr. Locock's letter on the subject, see the 'Anat. of Quackery,' or the 'Med. Circ.," ii, 106-126.

with vinegar of squills, oxymel of squills, and ipecacuanha wine, equal parts, gently evaporated to 1-6th their weight, with the addition of lactucarium in the proportion of 20 to 30 grs. to every oz. of the dry powders; the mass being divided into half-inch squares, weighing about 7½ grs. each (when dry), as before.

WAL'NUT. The *Juglans regia*, a tree of the natural order *Juglandaceæ*. The sap yields sugar; the fruit is the walnut; the kernels of the latter are eaten and pressed for their oil; the peel or husks are used for 'rooting' or dyeing brown; the unripe fruit is pickled, and its juice is used as a hair dye; the leaves are reputed diaphoretic and antisyphilitic; and the wood is esteemed for cabinet work.

WARBURG'S FEVER DROPS. See WARBURG'S FEVER TINCTURE.

WARD'S RED DROP. A strong solution of emetic tartar in wine.

WARTS. *Syn.* VERRUCÆ, L. These chiefly attack the hands, and may be removed by the daily use of a little nitrate of silver, nitric acid, or aromatic vinegar, as directed under CORN. The first of the above applications produces a black stain, and the second a yellow one; both of which, however, wear off after the lapse of some days. Acetic acid scarcely discolours the skin. Erasmus Wilson, the eminent surgeon and talented author of several works on the skin, mentions the case of a gentleman who removed an entire crop of warts from his knuckles and fingers by subjecting them to a succession of sparks from one of the poles of an electrical machine. "He was in the habit, as is usual, of trying the amount of electric fluid collected in his machine by placing his knuckle near the brass knob, and receiving a spark. Observing that an odd sensation was produced whenever the spark struck a wart, he was tempted for amusement to give them a round of discharges. When his attention was next directed to his hands, he found, to his surprise and satisfaction, that all the warts had disappeared." Dr. Peez, of Wiesbaden, recommends the internal use of carbonate of magnesia in cases of warts.

The papular eruption which covers the hands of some persons, and which is occasionally called 'soft warts,' is best removed by the daily use of Gowland's lotion.

WASH. The fermented wort of the distiller.

WASH-BALLS. See SAVONETTES.

WASHERWOMAN'S SCALL. See PSORIASIS.

WASHES. The familiar name of lotions, more especially of those employed as cosmetics. See FRECKLES, LOTION, MILK OF ROSES, SKIN COSMETICS, &c., and *below*.

Washes, Hair. *Prep.* 1. From rosemary tops, 2 oz.; boiling water, 1 pint; infused together in a teapot or jug, either with or without the addition of rectified spirit, 1 fl. oz. (or rum, 2 fl. oz.) to the cold strained liquor.

2. Box leaves, a small handful; boiling water, 1 pint; digest for an hour, simmer 10 minutes, and strain. Both are used to improve the growth of and strengthen the hair.

3. To clean the 'partings,' remove scurf, &c.—*a.* (ANTIPITYRIENNE.) From sesquicarbonate of ammonia, 1 oz.; spirit of rosemary, ½ pint; rose of elder-flower water, 1½ pint.

b. (DETERGENT ESSENCE.) From honey, 2 oz.; borax, 1 oz.; cochineal (bruised), ¼ oz.; camphor, 1 dr.; (dissolved in) rectified spirit, 2 fl. oz.; soft water, ¾ pint; oil of rosemary, 20 drops.

c. (VEGETABLE EXTRACT.) Take of salt of tartar, 1 oz.; rosemary water, 1 pint; burnt sugar, q. s. to tinge it brown; dissolve, filter, and add of essence of musk, 10 drops.

4. To darken the hair.—*a.* From pyrogallic acid, ¼ oz.; distilled water, orange-flower water, and rectified spirit, of each, 1½ fl. oz.

b. (LA FOREST'S COSMETIC LOTION or LIQUID HAIR DYE.) Boil, for a few minutes, chloride of sodium, 1 dr., and sulphate of iron, 2 drs., in red wine, 1 lb.; then add of verdigris, 1 dr.; in 2 or 3 minutes remove it from the fire, and further add of powdered galls, 2 drs.; the next day filter. For use, moisten the hair with the liquid; in a few minutes dry it with a cloth, and afterwards wash the skin with water.

5. To prevent the hair falling off.—*a.* (AMERICAN SHAMPOO LIQUID.) Take of carbonate of ammonia, ½ oz.; carbonate of potash, 1 oz.; water, 1 pint; dissolve, and add the solution to a mixture of tincture of cantharides, 5 fl. oz.; rectified spirit, 1 pint; good rum, 3 quarts. *Used* to strengthen the hair and to remove dandruff, by moistening it with the mixture, rubbing, so as to form a lather, and then washing with cold water.

b. (BALM OF COLUMBIA.) As the last, omitting the potash, quadrupling the carbonate of ammonia, and adding some perfume.

c. (Eras. Wilson.) Eau de Cologne (strongest), 8 fl. oz.; tincture of cantharides, 1 fl. oz.; oils of rosemary and lavender, of each, ½ fl. dr.

d. (DR. LOCOCK'S LOTION.) From expressed oil of mace (nutmeg), 1 oz., liquefied, at a gentle heat, with olive oil, ½ oz.; and, when cold, formed into an emulsion by agitation with rose water, ¼ pint; spirit of rosemary, 2½ fl. oz.; stronger liquor of ammonia, 1½ fl. drs. For other formulæ, see BALDNESS, HAIR DYES, LOTION, &c.

Washes, Medicinal. See LOTION, &c.

Washes, Mouth. *Syn.* TOOTH WASHES; COLLUTORIA, L. *Prep.* 1. Take of camphor (cut small), ¼ oz.; rectified spirit, 2 fl. oz.; dissolve. A few drops to be added to a wineglassful of water, to sweeten the breath and preserve the teeth.

2. Chloride of lime, ½ oz.; water, 2 fl. oz.; agitate well together in a phial for ½ an hour, filter, and add, of rectified spirit, 2 fl. oz.; rose or orange-flower water, 1 fl. oz. *Used*, highly diluted with water, as the last, by smokers and persons having a foul breath.

3. Mastic (in powder), 2 drs.; balsam of Peru, ½ dr.; gum, 2 drs., or q. s.; orange-flower water, 6 fl. oz.; tincture of myrrh, 2 fl. drs.; for an emulsion. In loose teeth, &c.

4. Tannin, ½ dr.; tincture of tolu, 2 fl. drs.; tincture of myrrh, 6 fl. drs.; spirit of horse-radish, 2 fl. oz.; mix. In spongy gums, scurvy, &c.; diluted with tepid water.

5. (Swediaur.) Borax, ¼ oz.; water and tincture of myrrh, of each, 1 fl. oz.; honey of roses, 2 oz. In tender or ulcerated gums.

6. Balsam of Peru, 2 drs.; camphor, ½ dr.; essence of musk and liquor of ammonia, of each, ½ fl. dr.; tincture of myrrh, 3 fl. drs.; spirit of horseradish, 1½ fl. oz. To sweeten and perfume the breath; a teaspoonful in ½ wineglassful of tepid water to rinse the mouth with.

Washes, Tooth. See *above*.

WASHING FLUIDS. Solutions of carbonate of soda, rendered caustic with quicklime.

WASHING POWDERS. See POWDERS.

WATCHFULNESS. *Syn.* SLEEPLESSNESS; AGRYPNIA, L. The common causes of watchfulness are thoughtfulness or grief, disordered stomach or bowels, heavy and late suppers, and a deficiency of out-door exercise. The best treatment, in ordinary cases, simply consists in an attention to these points. The method of producing sleep recommended by a late celebrated hypnotist consists in merely adopting an easy recumbent position, inclining the head toward the chest, shutting the eyes, and taking several deep inspirations with the mouth closed. Another method, recommended by an eminent surgeon, and which appears infallible if persevered in with proper confidence, and which is suitable either to the sitting or recumbent posture, consists in tying a decanter cork with a bright metallic top, a pencil-case, or any other bright object on the forehead, in such a position that the eyes must be distorted or strained to be capable of seeing it. By resolutely gazing in this way for a short time, without winking, with the mind fully absorbed in the effort, the muscles of the eyes gradually relax, and the experimenter falls asleep. Gazing in a similar manner on any imaginary bright spot in the dark, as at night, exerts a like effect. A tumblerful of cold spring water, either with or without a few grains of bicarbonate of potash in it, taken just before lying down, will frequently succeed with the dyspeptic and nervous, when all other means fail. See SUPPER, &c.

WATER. H_2O. *Syn.* OXIDE OF HYDROGEN, PROTOXIDE OF H.; AQUA, L.; EAU, Fr.; WASSER, Ger. The ancients regarded water as a simple substance, and as convertible into various mineral and organic products. Earth, air, fire, and water, were at one time conceived to be the elementary principles or essences of matter, from which all form and substance derived their existence. The true constitution of water was not discovered until about the year 1781, when Cavendish and James Watt, independently and nearly simultaneously, showed it to be a compound of hydrogen and oxygen. Five years, however, before this time (1776), the celebrated Macquer, assisted by Sigaud de la Fond, obtained pure water by the combustion of hydrogen in the air. It has since been satisfactorily demonstrated that hydrogen and oxygen exist in water in the proportion of 1 to 8 by weight, or 2 to 1 by volume; the sp. gr. of hydrogen being to that of oxygen as 1 to 16. One cubic inch of perfectly pure water at 62° Fahr., and 30 inches of the barometer, weighs 252·458 grs.; by which it will be seen that it is 815 times heavier than atmospheric air. Its sp. gr. is 1·0, it being made the standard by which the densities of all solid and liquid bodies are estimated. The sp. gr. of frozen water (ice) is ·9175 water being 1·0 (Dufour); that of aqueous vapour (steam), ·6252, air being 1·0. Water changes its volume with the temperature; its greatest density is at about 39½° Fahr., and its sp. gr. decreases from that point, either way. By the enormous pressure of 30,000 lbs. on the square inch, 14 volumes of water are condensed into 13 volumes. Water evaporates, at all temperatures, but at 212°, under ordinary circumstances, this takes place so rapidly that it boils, and is converted into vapour (steam), whose bulk is nearly 1700 times greater than that of water. The general properties and uses of water are too well known to require notice.

Var. Of these the following are the principal:—

DISTILLED WATER; AQUA DESTILLATA (B. P., Ph. L. E. & D.), L. Obtained by the distillation of common water through a block-tin worm, rejecting the first and last portions that come over. The still employed for this operation should be used for no other purpose; and when great nicety is required the distillation should be performed in glass or earthenware. It remains limpid on the addition of lime water, chloride of barium, nitrate of silver, oxalate of ammonium, or hydrosulphuric acid. It is the only kind of water that should be employed in chemical and pharmaceutical operations. When distilled water is not at hand, clean filtered or clarified rain water is the only kind that can be successfully substituted.

RAIN WATER; AQUA PLUVIA, L. A nearly pure kind of natural water; but it contains minute quantities of air, carbonic and nitric acid, carbonate of ammonium, &c.

SNOW WATER; AQUA NIVALIS, L. The purest of all natural waters.

SPRING WATER; AQUA (Ph. E.), AQUA FONTANA (Ph. D.), L. Rain water which has percolated through the earth almost always contains mineral impurities. For pharmaceutical use, spring water must be so far free of saline matter as not to possess the quality of hardness, or contain above 1·6000th part of solid matter. (Ph. E.)

RIVER WATER; AQUA FLUVIALIS, L. Less pure than good spring water. Thames water contains about 1·3500th part of fixed impurities, chiefly carbonate of calcium; or from 16 to 24 grs. of solid matter per gallon, indepedently of gaseous matter and mechanical impurities.

WELL WATER, PUMP WATER; AQUA PUTEANA, L. Less pure than either of the preceding. Usually contains a large quantity of carbonate and sulphate of calcium. Hence its 'hardness' and property of curdling soap. When this arises from the first-named substance, it is called, temporary hardness,' since it is, for the most part, removed by boiling and exposure; but when it arises from sulphate of calcium, it is called 'permanent hardness,' since it cannot be so easily remedied.

SEA WATER; AQUA MARINA, L. The characteristic of this variety is its saltness. Its density is about 1·0274, and the average quantity of saline matter which it contains is about 3½ per cent., of which about $\frac{2}{3}\frac{7}{5}$ are chloride of sodium, and the remainder chiefly chloride of magnesium and sulphate of magnesium.

Analysis of Sea Water (British Channel), by Dr. Schweitzer, of Brighton:

1000 *grains contained*—	*grains.*
Water	964·745
Chloride of sodium	27·059
„ of potassium	0·766
„ of magnesium	3·666
Bromide of magnesium	0·029
Sulphate of magnesium	2 296
„ of calcium	1·406
Carbonate of calcium	0 033
	1000·

Pur. Pure water is perfectly transparent, odourless, and colourless, and evaporates without residue, or even leaving a stain behind. The purest natural water is that obtained by melting snow or frozen rain, that has fallen at some distance from any town. Absolutely pure water can only be obtained by the union of its gaseous constituents; but very pure water, sufficiently so for all purposes, may be procured by the careful distillation of common water.

Tests. 1. If a precipitate is formed, or a 'fur' or 'crust' deposited on the vessel during ebullition, it indicates the presence of carbonate of calcium.—2. The residuum, if any, of evaporation, is impurity; if it be organic matter, smoke and a peculiar odour will be evolved, as the residue becomes dry and charred.—3. If a solution of ferrous sulphate, when added to the water contained in a stoppered phial, occasions a reddish-brown precipitate after a few days, the presence of oxygen is indicated.—4. Neither litmus, syrup of violets, nor turmeric, are discoloured or affected when moistened with pure water; if the first two are reddened, it indicates an acid; if the last is turned brown, an alkali.—5. If a milkiness follows the addition of a solution of hydrate of calcium before and not after the water has been boiled, it contains carbonic acid.—6. Chloride of barium occasions a white precipitate, insoluble in nitric acid if sulphuric acid or sulphates be present.—7. Oxalate of ammonium produces a white precipitate in water containing calcium salts.—8. Nitrate of silver occasions a cloudy white precipitate, insoluble in nitric acid, but soluble in ammonia, in water containing chlorine or chlorides.—9. Phosphate of sodium and ammonium (microcosmic salt), added to water that has been boiled, and precipitated by oxalic acid (if required), produces, in a few hours, a white precipitate, if the water contains magnesium salts.—10. Tincture or infusion of galls turns water containing iron black; when this takes place, both before and after the water has been boiled, the metal is present under the form of sulphate; but if it only occurs before boiling, then ferrous carbonate may be suspected, and will be precipitated as a reddish powder, by exposure to air and heat.—11. Ferrocyanide of potassium gives a blue precipitate in water containing a ferric salt, and a white one, turning blue by exposure to the air, in water containing a ferrous salt.—12. Sulphuretted hydrogen and the hydro-sulphates give a brown or black precipitate in water containing copper, iron, or lead; and a yellow precipitate in water containing arsenic, or its compounds.

Purif. Pure water is incapable of putrefaction, but ordinary water contains a small quantity of organic matter in solution, which speedily undergoes decomposition, even in closed vessels. This is especially the case with water kept in wooden casks, or in open cisterns into which leaves and insects are driven by the wind. Putrescent water is highly unwholesome as a beverage; and it is a fact, clearly demonstrated by the returns of the Registrar-General, that the last visitations of cholera corresponded in severity to the impurity of the water supplied to the respective districts.

Among the methods adopted for purifying foul water are the following:—1. Filtration through, or agitation with, coarsely powdered freshly burnt charcoal, either animal or vegetable, but preferably the former. This removes both mechanically suspended matter and part of the calcareous and gaseous impurities held in solution.—2. Free exposure to the action of the air, by which the organic matters become oxidised and insoluble, and speedily subside. This may be easily effected by agitating the water in contact with fresh air, or by forcing air through it by means of bellows.—3. The addition of a little sulphuric acid has a like effect; 15 or 20 drops are usually sufficient for a gallon. This addition may be advantageously made to water intended for

filtration through charcoal, by which plan at least ⅔ of the latter may be saved. (Lowitz.)—4. An ounce of powdered alum (dissolved), well agitated with a hogshead or more of foul water, will purify it in the course of a few hours, when the clear portion may be decanted. When the water is very putrid, about ½ dr. (or even 1 dr. per gal.) may be employed; any alum that may be left in solution may be precipitated by the cautious addition of an equivalent proportion of carbonate of sodium.—5. A solution of ferric sulphate acts in the same way as alum; a few drops are sufficient for a gallon.—6. Agitation with about the ½ to 1% of finely powdered black oxide of manganese has a similar effect to the last.—7. The addition of a little aqueous chlorine, or chlorine gas, to foul water, cleanses it immediately. This method has the advantage of the water being perfectly freed from any excess of the precipitant by heat.—8. Sea water may be rendered fit for washing by the addition of a solution of carbonate of sodium or salt of tartar, as long as it turns milky. After repose, the clear portion must be decanted.—9. Sea water may be rendered fit for use as a beverage by distillation. The waste heat of the cook's galley is amply sufficient for this purpose. (There are several patent contrivances for the distillation of water on shipboard.)—10. Hard water may be softened in the same way as sea water.—11. Hard water may be both aerated and softened by the addition of a few grains of bicarbonate of potassium per gallon, followed by half as much lemon juice or tartaric acid as is sufficient to saturate the alkali in the carbonate thus added.—12. The hardness of water depending on the presence of carbonate of calcium ('temporary hardness'), including that of most rivers and many springs, may be nearly removed by ebullition; or, as recommended by Prof. Clark, by mixing the hard water with lime water in the proper proportions, when the calcium combines with the excess of carbonic acid, which previously rendered the carbonate soluble, and is precipitated as carbonate (chalk), together with the carbonate originally present. This method has been successfully carried out on the large scale.—13. Another method is to precipitate the lime by the addition of oxalate of ammonium in atomic proportion, carefully avoiding excess, and then to agitate the water with a little binoxide of manganese, in fine powder.—14. 'Permanently hard' water, that chiefly due to sulphate of calcium, may be softened by the addition of carbonate of sodium or wood-ashes.

Water, Quantitative Analysis of. The general quantitative analysis of potable waters is confined to the following: total residue; chlorine; hardness, temporary and permanent; nitrates, and nitrites, and nitrogenous organic matter.

Excess of chlorine is generally an indication of the presence of sewage, unless in the case of tidal waters; while nitrates and nitrites are usually the result of the oxidation of decomposing organic matter, and therefore likewise, indicate more or less contamination by sewage or decomposing animal matter. The nitrogenous organic matter is usually estimated as ammonia, urea, and albuminoid matter.

Unfortunately no decisive test for, or rather method of estimation of, the actually injurious organic matter has been discovered, not even a satisfactory proof of previous sewage contamination, but the fact of obtaining albuminoid ammonia, and the presence of an appreciable amount of nitrates or nitrites is generally sufficient ground for rejecting as suspicious a water, as if not absolutely injurious, at least liable to become so at any moment.

The hardness should be determined in the natural water, and after boiling it for one hour, replacing that lost by evaporation by distilled water. The second determination gives the permanent hardness of that due to sulphate of calcium, while the first determination is the total hardness, and minus the second gives the temporary hardness, or that due to bicarbonate of calcium. Temporary hardness can be remedied by Dr. Clark's softening process, which consists in treating the water with milk of lime, which decomposes the soluble bicarbonates into carbonates, insoluble in water. Permanent hardness can be best removed for washing processes by the addition of carbonate of sodium, or by filtering the water through wood-ashes.

Solid residue. One thousand grains of the water are evaporated down to dryness in a platinium dish over a water bath, and the residue heated to about 250 Fahr. for one hour. The increase in weight of the platinium vessel gives the total solid residue.

Hardness. One thousand measured grains of the water are run into a narrow-mouthed six or eight ounce stoppered bottle, well shaken and the air sucked out by means of a piece of glass tube. The standard soap solution is now run in a little at a time, shaking well between each addition, until a permanent lather is formed over the whole surface when the bottle is placed upon its side, and lasting for five minutes. The measure of soap solution used will indicate the hardness of the water by reference to Table A. Should, however, this not take place before 320 grain measures of soap solution have been added, a second trial must be made. One thousand grain measures of soap solution are placed in the bottle with a like amount of distilled water, and treated in the same manner as before. The amount of soap solution divided by two, will indicate half the hardness of the water. In the case of extremely hard water, where even 600 measures of soap solution gives no permanent lather, to every one thousand grains of the water twice that volume of distilled water must be added and the degree of hardness found by multiply

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TABLE A.

Soap test measures corresponding to one thousand measures of water of each degree of

Degree of hardness.	Soap test measures.	Difference.
0	14	18
1	32	22
2	54	22
3	76	20
4	96	20
5	116	20
6	136	20
7	156	19
8	175	19
9	194	19
10	213	18
11	231	18
12	249	18
13	267	18
14	285	18
15	303	17
16	320	—

The soap test is made as follows:—Sixteen grains of pure carbonate of calcium (Iceland spar) are dissolved in pure dilute hydrochloric acid, and the whole cautiously evaporated to dryness over a water bath, redissolved in water and again evaporated to dryness. The resulting chloride of calcium, if perfectly neutral, is dissolved in one gallon of pure distilled water, and constitutes the standard water of "sixteen degrees of hardness." Good curd soap is dissolved in proof spirit, in the proportion of one ounce to the gallon. One thousand grains of the water of sixteen degrees of hardness are placed into a bottle, and this soap solution run in from a burette until a permanent lather is formed. The number of measures is noted, and the soap solution made up to such a strength that 320 grain measures produce a lather permanent for five minutes in 1000 grain measures of water of sixteen degrees of hardness.

Chlorine. Two thousand grains of the water are evaporated down to a little less than half an ounce in a platinium capsule over a water bath, and the bulk made up to 250 grains exactly with pure distilled water, a drop of neutral chromate of sodium solution is added, and a standard solution of nitrate of silver run in from a burette until a red colouration is produced. The number of grains of standard solution used multiplied by ·0035 will give the grains of chlorine in one gallon of the water.

The standard solution is prepared by dissolving 33·53 grains of pure nitrate of silver in one gallon of distilled water.

Nitrates and Nitrites. The most convenient method is Messrs. Wanklyn and Chapman's modification of Schulze's. Two thousand grains of the water are placed in a retort, and half as much of a solution of hydrate of sodium (of a strength of one in ten) added. Half the contents of the retort are distilled over, and the residue cooled. A piece of sheet aluminium is introduced into the solution and the whole allowed to stand several hours, the neck of the retort being closed by a cork (traversed by a tube moistened with hydrochloric acid and connected with a drying tube, if thought necessary). The neck of the retort (and tube) is then washed down with a little pure water, and the contents distilled over, down to about an ounce, into two or three ounces of water placed in the receiver. The contents of the receiver are made up to 2000 grains, and one half Nesslerised, as described further on. The amount of ammonia found multiplied by 259·2 gives the amount of nitrates, as nitric acid, in one gallon of the water.

Drs. Frankland and Armstrong have also described a method of estimating nitrates by the use of a special piece of apparatus, for which method we must refer the reader to the 'Journal of the Chemical Society' for March, 1868.

Nitrogen as Ammonia and Organic Matter. For the estimation of these Messrs. Wanklyn's and Chapman's is, for general use, the best and most convenient method. It depends on the conversion of the nitrogen of the nitrogenous organic matter into ammonia, and the employment of Nessler's test to estimate this ammonia.

Nessler's Reagent. 500 grains of iodide of potassium are dissolved in a small quantity of hot distilled water. Place this over a water bath, and add to it a strong aqueous solution of mercuric chloride, until the precipitate ceases to be dissolved as quickly as formed, when the addition of mercuric chloride is stopped. Filter, add to the filtrate 2000 grains of potassium dissolved in water, and dilute the volume to 10,000 grains. A little of the aqueous mercuric chloride solution is added, and the whole allowed to settle and the clear liquid decanted off.

Standard Ammonia Solution. Dissolve 27·164 grains of pure sulphate of ammonium in one gallon of distilled water. For use dilute 100 grains to 1000 grains. It will then contain 1 grain of ammonia in 100,000 of water.

In order to estimate ammonia, several tall glass cylinders, graduated at 1000 grains, and holding about six ounces, are employed. One of these is filled up to the graduation with the ammonia solution to be estimated, and about 30 grains of Nessler's reagent added from a pipette. The colouration produced is noted. A second cylinder is filled nearly to the mark with distilled water, and what is thought sufficient ammonia to produce a similar colour to the first run in, the whole made up to 1000 grains, and 30 grains of Nessler added; if after standing ten minutes, the colouration in the second is the same as in the first, the amount

of ammonia solution added is the same as in the water examined; but if this is not the case, a second trial must be added, using more or less standard ammonia as the intensity of colour is less or greater than the first. After a little experience more than two trials is rarely necessary.

Examination. Five thousand grains of the water to be analysed are placed in a tubulated retort, and half an ounce of a saturated solution of carbonate of sodium added. The contents are distilled over and every 500 grains collected separately, until 1000 or 1500 has passed over, when the next portion of 500 grains is Nesslerised; if it gives no reaction, the distillation is stopped; if it does, the distillation is continued until a portion of 500 grains ceases to. The ammonia in all these portions is estimated, making each portion of 500 grains up to 1000 with distilled water, and the total put down to ammonia, from ammonium salts and urea. The ammonic from ammonium salts can be estimated by boiling 2000 grains of the water with carbonate of sodium for half an hour, making up the loss from evaporation, and by using some of this instead of distilled water in estimating the ammonia in 1000 grains of the original water, the amount of ammonia will be obtained. This substracted from the total ammonia will give the ammonia from the urea, and multiplying by 1·76 will give the amount of urea.

To the retort after all the ammonia from the urea and has been driven off, one ounce of a solution of hydrate and permanganate of potassium, of a strength of 2000 grains of hydrate of potassium and 80 grains of permanganate to 10,000 grains of water, is added, and the distillation continued until no more ammonia comes over, collecting the distillate in portions of 500 grains as before. After estimation the total ammonia obtained must be put down to ammonia set free by the decomposition of nitrogenous organic, or albuminoid bodies. By multiplying the ammonia by ten, a fairly approximate weight of these substances will be obtained.

The following are some determinations of Professor Wanklyn. (Water Analysis.)

	Grains per gallon of Ammonia from	
	Urea and Salts.	Albuminoid bodies.
Thames, London Bridge	0·123	0·024
,, Hampton Court	0·003	0·002
Well near East of London	2·800	0·210
London Institution	0·0014	0·006
Bishopsgate Street pump	0·525	0·018
Bala Lake	0·0007	0·017
Loch Katrine (Glasgow)	0·0003	0·006

Pres. Water is usually preserved on shipboard in iron tanks, or in casks well charred on the inside. It cannot be safely kept in copper or leaden vessels, and receives a calcareous impregnation by contact with lime, mortar, stucco, or stone containing lime. The addition to water of about ½ to 1% of finely powdered black oxide of manganese materially promotes its preservation, especially at sea, where the motion of the vessel, and the consequent agitation of the water, increases the points of contact. Water never putrefies in iron vessels, or when some fragments of metallic iron are immersed in it. Distilled water should be preserved in stoppered glass bottles or carboys. See LOTION, SOLUTION, SPIRITS, WATERS (Distilled, Eye, Mineral, Perfumed, &c.), and the articles below.

Water, Barèges. *Prep.* Take of alum, carbonate of calcium, and hard Spanish soap, of each, 2 grs.; common salt, 4 grs.; dried carbonate of sodium, 20 grs.; sulphide of potassium, 16 grs.; water, 1 quart; boil them together until the fumes of sulphuretted hydrogen begin to be evolved, then add enough water to make up 1 gallon. *Used* as a medicated lotion or bath in cutaneous diseases, from the slightest eruption to the most obstinate cases of leprosy. 60 times the above quantity formed the medicated warm bath employed by the Emperor Napoleon. See WATERS (Mineral).

Water, Carrara. *Syn.* CARBONATED LIME WATER; AQUA CALCIS SUPERCARBONATIS, L. *Prep.* From lime water (professedly prepared from lime made by calcining Carrara marble), supersaturated by strong pressure with carbonic anhydride, so that the carbonate of calcium at first thrown down is redissolved. Each ½-pint bottle contains 8 to 10 grs. of carbonate of calcium.

Water, Chalyb'eated. *Syn.* AQUA CHALYBEATA, L. *Prep.* (Ure.) Ferrous sulphate, 3 grs.; bicarbonate of potassium, 61 grs.; cold rain or distilled water, 1 quart; mix, and agitate in a corked bottle. Possesses equal tonic powers to that of the springs, but it may be rendered pleasanter by forcing in a little carbonic acid gas. See WATERS (Mineral.)

Water, Fly. *Prep.* From white arsenic ½ dr.; boiling water, 1 pint; dissolve, and sweeten the mixture with treacle. *Used* to kill flies. A dangerous method, and one that should never be adopted where there are children.

Water, Lime. See SOLUTION OF LIME.

Water, Lith'ia. From the freshly precipitated carbonate, as solution of magnesia. Antacid and antilithic.

Water, Potash. See SOLUTION.

Water, Rose. See WATERS (Distilled).

Water, Seidlitz. See POWDERS and WATERS (Mineral).

Water, Soda. Each bottle of this liquid should contain at least 15 grs. of carbonate of sodium, but that of the shops is usually nothing else but water highly charged with carbonic anhydride. Not a particle of soda enters into its composition, on which account

ly, the carbolic [illegible]
ater, and the corks so prepared that they ill not impart their peculiar flavour to the verage. See POWDERS, SOLUTION, and 'INES.

Water, Tar. See INFUSION OF TAR.

WATERS (Distilled). *Syn.* AROMATIC ATERS, ODORIFEROUS W., PERFUMED W.; QUÆ (Ph. L.), AQUÆ DESTILLATÆ (Ph. E. & .), L. Pure water, charged, by distillation, ith the volatile, odorous, and aromatic inciples of plants.

Prep. 1. (Ph. L.)—*a.* 2 galls. of water are rt into the still along with the vegetable atter (bruised, if necessary), but only 1 gal. drawn over. In the Ph. L. 1836, 7 fl. oz. proof spirit were added before distillation.

b. Take of the essential oil of the plant, fl. dr.; powdered silex, 2 drs.; triturate em diligently together, and then with distilled water, 1 gal., gradually added; lastly after briskly agitating the whole for some me), strain the solution.

2. (Ph. E.) As 1, *a*, but adding of rectified pirit, 3 fl. oz., before distillation.

3. (Ph. D.) From the respective essences Ph. D.), 1 fl. oz.; distilled water, 2 quarts: gitated well together, and then filtered rough paper.

The following are the AQUÆ DESTILLATÆ of ne British Colleges, with some others, the uantities referring to a product of 1 gal., to e prepared as above when not otherwise irected.

ANGELICA WATER; AQUA ANGELICÆ (P. od.), L. Bruised seed, 3 lbs.

ANISEED WATER; AQUA ANISI (Ph. D.), L.

BALM WATER; AQUA MELISSÆ (P. Cod.), L. resh tops, 12 lbs.

BITTER-ALMOND WATER; AQUA AMYGDALÆ AMARÆ, AQUA AMYGDALARUM AMARUM (P. Cod.), L. Bitter-almond cake from which the oil has been expressed), 5 lbs.; nacerate for 24 hours, and filter the distilled roduct through paper previously wetted with ure distilled water. Poisonous.—*Dose.* 10 to 60 drops, as a substitute for hydrocyanic acid.

BORAGE WATER; AQUA BORAGINIS (P. od.), L. Fresh leaves, 12 lbs.

CARAWAY WATER; AQUA CARUI (B. P., Ph. . & D.). Caraway, bruised, 1; water, 20; listil 10.

CASCARILLA WATER; AQUA CORTICIS CASCARILLÆ (P. Cod.), L. Cascarilla, bruised, 3 lbs.

CASSIA WATER; AQUA CASSIÆ (Ph. E.), L. Cassia, bruised, 1½ lb.

CHERRY-LAUREL WATER; AQUA LAUROCERASI (B. P., Ph. E. & D.), L. *Prep.* 1. (B. P.) Fresh leaves of common laurel, 16, lavender, 8 fl. oz.; agitate [illegible] filter it (through wet paper—Ph. D. & P. Cod. —*Dose.* 10 to 60 drops, as a substitute f hydrocyanic acid. It is commonly imitated trade, by dissolving 75 drops (minims) of t oil of bitter almonds in 2½ fl. oz. of rectifi spirit, agitating the mixture with warm d tilled water, 1 gal., and filtering.

CINNAMON WATER; AQUA CINNAMOMI (P., Ph. L. E. & D), L. 1. Cinnamon, bruis 18 oz.; or oil, 2 fl. drs.—2. (B. P.) Cinnam bruised, 1; water, 16; distil 8.

CLOVE WATER; AQUA CARYOPHILLI (Cod.), L. Cloves, bruised, 3 lbs.

DILL WATER; AQUA ANETHI (B. P., Ph. & E.), L. 1. Bruised seed, 1½ lb.; or essent oil, 2 fl. drs.—2. (B. P.) Bruised fruit, 1; wat 20; distil 10.

ELDER-FLOWER WATER; AQUA SAMBI (B. P., Ph. L. & E.), L. 1. Fresh elder flowe 10 lbs.—2. (B. P.) Fresh elder flowers, se rated from the stalks, 1; water 2; distil 1

FENNEL WATER; AQUA FŒNICULI (B. Ph. L. E. & D.), L. As DILL WATER.

HYSSOP WATER; AQUA HYSSOPI (P. Co L. Fresh tops, 12 lbs.

JUNIPER WATER; AQUA BACCÆ JUNIP (P. Cod.), L. Berries, bruised, 3 lbs.

LAVENDER WATER; AQUA LAVENDULÆ Cod.), L. Flowering tops, 3 lbs.

LETTUCE WATER; AQUA LACTUCÆ (P. Cc L. Fresh lettuces, bruised, 12 lbs.

MELILOT WATER; AQUA MELLIOTI (P. Cc L. Dried flowers, 3 lbs.

MINT WATER, SPEARMINT W.; AQUA M THÆ VIRIDIS (B. P., Ph. L. E. & D.) 1. Dried herb, 2 lbs.; or fresh herb, 4 lbs. essential oil, 2 fl. drs.—2. (B. P.) English of spearmint, 1½ drm.; water, 1½ gal.; d 1 gal.

ORANGE-FLOWER WATER; AQUA AURA FLORIS (B. P., Ph. L.), A. FLORUM AURAI L. "Water distilled from the flowers of *Ci Bigaradia*, Risso, and *Citrus Aurant* D. C." (Ph. L.) Orange flowers, 10 l proof spirit, 7 fl. oz. (Ph. L. 1836.)

ORIGANUM WATER; AQUA ORIGANI Cod.), L. Dried flowers, 3 lbs.

PEACH WATER; AQUA PERSICÆ (P. C L. Fresh leaves, chopped small, 12 lbs. CHERRY-LAUREL WATER.

PENNYROYAL WATER; AQUA PULEGII L. & E.), AQUA MENTHÆ PULEGII (Ph. D. As MINT WATER (*above*).

PEPPERMINT WATER; AQUA MENTHÆ PIPERITÆ (B. P., Ph. L. E. & D.), L. As MINT WATER (*above*).

PIMENTO WATER; AQUA PIMENTÆ (B. Ph. L. E. & D.), L. 1. Pimento, bruise